

The GHM Jackson 1972 Children's Settlement Trust

Proposed Residential Development Hulbert Road, Havant

Air Quality Assessment October 2020

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Executive Summary

WYG has undertaken an Air Quality Assessment to support an application for a proposed residential development at land off Hulbert Road, Havant.

Construction Phase

The potential effects during the construction phase include fugitive dust emissions from site activities, such as earthworks, construction and trackout. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

During the construction phase, site specific mitigation measures detailed within this assessment will be implemented. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Operational Phase

An operational year assessment for 2021 traffic emissions has been undertaken to assess the effects of Proposed Development.

The maximum predicted annual average exposure to NO₂, PM₁₀ and PM_{2.5} at any proposed residential receptor is below the annual average AQO and therefore no additional mitigation is required.

The assessment of the impact description of the effects associated with the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposure, the impact description of the proposed development is determined 'negligible' for all identified existing sensitive receptors. The effect on ecological receptors has been assessed and is determined to be 'negligible'.

1. Introduction

The GHM Jackson 1972 Children's Settlement Trust commissioned WYG Environment to prepare an Air Quality Assessment to support an outline application for a proposed residential development at land off Hulbert Road, Havant.

1.1 Site Location and Context

The approximate United Kingdom National Grid Reference (NGR) is approximately 469434, 108131. The Site is bounded to the north and east by forested land, to the west by the A3(M) and residential properties beyond, and to the south by forested land and B&Q store.

Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

The following assessment stages have been undertaken as part of this assessment:

- Baseline evaluation;
- Assessment of potential air quality impacts during the construction phase;
- Assessment of potential air quality impacts during the operational phase; and,
- Identification of mitigation measures (as required).

The results of the assessment are detailed in the following sections of this report.

The construction phase assessment considers the potential effects of dust and particulate emissions from site activities and materials movement based on a qualitative risk assessment method based on the Institute of Air Quality Management's (IAQM) 'Guidance on the Assessment of Dust from Demolition and Construction' document, published in 2014.

The assessment of the potential air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO₂) and particulate matter with an aerodynamic diameter of less than 10 µm (PM₁₀) and less than 2.5 µm (PM_{2.5}) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and significance of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

This Air Quality Assessment has been updated following comments made by Jonathan Driver, the Environmental Control Officer at Havant Borough Council, received via email dated 8th September 2020. The assessment has been updated to include further diffusion tube monitoring undertaken by WYG, emissions offsetting through Defra Damage Cost Calculations and mitigation measures proposed to reduce the potential impact from road traffic emissions. Dispersion modelling has been updated using the latest DEFRA calculating

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tools and ADMS Roads 5.0. Modelling has been undertaken where the building plan shows the building line would be 37 m from the A3(M) kerbside.

2. Policy and Legislative Context

2.1 Documents Consulted

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised February 2019;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016;
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007;
- The Environment Act, 1995;
- Local Air Quality Management Technical Guidance LAQM.TG16, Defra, 2018;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, November 2019;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014.
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on Monitoring in the Vicinity of Demolition and Construction Sites, IAQM, October 2018; and,
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.0), IAQM, June 2019.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.gov.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (<http://magic.defra.gov.uk/>);
- Planning Practice Guidance (<http://planningguidance.planningportal.gov.uk/>); and
- Havant Borough Council (<https://www.havant.gov.uk/>).

Site Specific Reference Documents

- Havant Borough Council, 2018 Air Quality Annual Status Report (Published March 2019);
- Havant Borough Council: Local Plan: Core Strategy, Adopted March 2011.

2.2 Air Quality Legislative Framework

European Legislation

European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- **Directive 1999/30/EC** – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO₂ and oxides of nitrogen, sulphur dioxide, lead and PM₁₀;
- **Directive 2000/69/EC** – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- **Directive 2002/3/EC** – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

The fourth daughter Directive was not included within the consolidation and is described as:

- **Directive 2004/107/EC** – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant³, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments.

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in Table 2.1 and Table 2.2 along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines.

Table 2.1 Human Health Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as ¹⁰	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM ₁₀	UK	50µg/m ³ by end of 2004 (max 35 exceedances a year)	24-hour Mean	1 st January 2005	50µg/m ³ by end of 2004 (max 35 exceedances a year)	1 st January 2005	Retain Existing
	UK	40µg/m ³ by end of 2004	Annual Mean	1 st January 2005	40µg/m ³	1 st January 2005	
PM _{2.5}	UK	25µg/m ³	Annual Mean	31 st December 2010	25µg/m ³	1 st January 2010	Retain Existing
NO ₂	UK	200µg/m ³ not to be exceeded more than 18 times a year	1-Hour Mean	31 st December 2005	200µg/m ³ not to be exceeded more than 18 times a year	1 st January 2010	Retain Existing
	UK	40µg/m ³	Annual Mean	31 st December 2005	40µg/m ³	1 st January 2010	

Table 2.2 Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as ¹⁰
NO _x	UK	30µg/m ³	Annual Mean

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (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 quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) 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 (AQAP), the objective of which is to reduce pollutant concentrations in pursuit of the AQOs.

2.3 Planning and Policy Guidance

National Policy

The National Planning Policy Framework (NPPF), revised February 2019, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

'Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas or 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 or 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 Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM₁₀ and PM_{2.5}) and nitrogen dioxide (NO₂).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter (PM_{2.5})*

- ammonia (NH₃)
- nitrogen oxides (NO_x)
- sulphur dioxide (SO₂)
- non-methane volatile organic compounds (NMVOCs)

As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

Local Policy

The Havant Borough Council (HBC) Local Plan (adopted in March 2011) sets out and provides guidance for managing development and land use within the borough. Following a review of the HBC Local Plan, the following policies have been identified:

"Policy DM10 Pollution

Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

- 1. The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.*
- 2. National air quality standards or objectives would not be breached.*
- 3. The water environment would not be detrimentally affected.*
- 4. It would not lead to an unacceptable deterioration in the quality or potential yield of coastal, surface and ground water resources.*
- 5. External lighting is of the minimum level of illumination and duration required for security and operational purposes. 6. External lighting would not interfere with safe navigation in either Chichester or Langstone Harbours and other coastal locations."*

3. Assessment Methodology

The potential environmental effects of the operational phase of the proposed development are identified as far as current knowledge of the site and development allows. The impact description of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and June 2019 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

The methodology used to determine the potential air quality effects of the construction phase of the proposed development has been derived from the IAQM '*Guidance on the Assessment of the Impacts of Dust from Demolition and Construction*' document and is summarised in Section 5.

3.1 Determining the Impact Magnitude of the Air Quality Effects

The impact magnitude of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall impact description of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The impacts are provided as a percentage of the Air Quality Objective (AQO), which may be an EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)';
2. The absolute concentrations are also considered in terms of the AQO and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQO;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small increase at a receptor which is already close to or above the AQO will have higher severity compared to a relatively large change at a receptor which is significantly below the AQO;
4. The impacts can be adverse when pollutant concentrations increase or beneficial when concentrations decrease as a result of development;
5. The judgement of overall impact description of the effects is then based on severity of effects on all the individual receptors considered; and,

6. Where a development is not resulting in any change in emissions itself, the impact description of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQO.

Table 3.1 Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2-5	6-10	>10
≤75% of AQO	Negligible	Negligible	Slight	Moderate
76-94% of AQO	Negligible	Slight	Moderate	Moderate
95-102% of AQO	Slight	Moderate	Moderate	Substantial
103-109 of AQO	Moderate	Moderate	Substantial	Substantial
≥110 of AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

4. Baseline Conditions

4.1 Air Quality Review

This section provides a review of the existing air quality in the vicinity of the proposed development site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the proposed development site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, HBC has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. Havant Borough Council currently does not have any AQMAs.

Air Quality Monitoring

Monitoring of air quality within HBC is undertaken through non-continuous monitoring methods. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the proposed development site.

Non-Continuous Monitoring

HBC operated a network of 37 diffusion tubes during 2018. Reference should be made to Figure 1 for the locations of the diffusion tubes within the extents of the air quality study area. The closest diffusion tube to the Proposed Development site is S9, which is located 520 m west of the site boundary.

The most recently available diffusion tube monitoring data is from 2018, which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO₂ Concentrations

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	2018 Annual Mean NO ₂ Concentration (µg/m ³)
14	Elm Park Road	Suburban	1.75	2.65	20.30
28	Park Road South (West Street)	Roadside	4.75	2.75	34.90
29	Orchard Road	Suburban	31	2.5	24.95
W10	Compton Court	Roadside	12.5	2.35	29.14
T1	Dunsbury Way	Urban Centre	10	2.5	22.47
T2	The Limes	Other	17.3	2.7	25.26
T3	Bedhampton Hill	Suburban	25.75	2.4	22.93
S1	Trosnant (Field)	Other	N/A	2.25	22.05
S2	Trosnant (Entrance)	Other	50	2.4	23.95
S7	Barncroft (Car Park)	Other	5.25	2.4	31.62

Site ID	Location	Site Type	Distance from Kerb (m)	Inlet Height (m)	2018 Annual Mean NO ₂ Concentration (µg/m ³)
S8	Barncroft (Woodland)	Other	N/A	2.1	19.58
*Located within the AQMA					

As indicated in Table 4.1, no diffusion tubes monitored an exceedance of the NO₂ AQO (40µg/m³ annual mean) in 2018.

4.2 WYG Air Quality Monitoring Survey

Diffusion Tube Locations

An air quality survey of nitrogen dioxide has been undertaken by WYG to determine the spatial variation of NO₂ across the study area.

WYG undertook a transect of monitoring along the northern parameter of the site boundary, as well as additional monitoring locations along site boundary adjacent to the A3(M), and Hulbert Road. This is as shown at monitoring locations WYG1 to WYG10. Triplicate diffusion tubes were co-located with Portsmouth AURN. This was supplemented by the monitoring on surrounding streets to better understand the local air quality dispersion within the study area.

The monitoring was undertaken over the following dates:

- **Period 1:** 9th January 2020 – 5th February 2020;
- **Period 2:** 5th February 2020 – 5th March 2020;
- **Period 3:** 5th March 2020 – 3rd April 2020; and,
- **Period 4:** 3rd April 2020 – 3rd May 2020.

Diffusion tubes are supplied and analysed by Gradko Laboratories using the 20% TEA in Water methodology. Periods 3 and 4 have been adjusted, using a factor of 1.33, to account for the reduced road traffic emissions as a result of the national lockdown caused by the COVID-19 pandemic¹.

The monitoring locations are summarised in Table 4.2 below and illustrated in Figure 3.

¹ Estimation of changes in air pollution emissions, concentrations and exposure during the COVID-19 outbreak in the UK DEFRA

Table 4.2 WYG Nitrogen Dioxide Diffusion Tube Locations

Location Reference	Location Description	Monitoring Method	Inlet Height (m)
WYG1	North West Site – Adjacent to A3(M)	NO ₂ Diffusion Tube	1.8
WYG2	North West Site – Adjacent to A3(M)	NO ₂ Diffusion Tube	1.8
WYG3	North Site	NO ₂ Diffusion Tube	1.8
WYG4	North Site	NO ₂ Diffusion Tube	1.8
WYG5	North Site	NO ₂ Diffusion Tube	1.8
WYG6	North East Site – Adjacent to Hulbert Road	NO ₂ Diffusion Tube	1.8
WYG7	Central Site	NO ₂ Diffusion Tube	1.8
WYG8	Central Site	NO ₂ Diffusion Tube	1.8
WYG9	South West Site – Adjacent to A3(M)	NO ₂ Diffusion Tube	1.8
WYG10	South East Site – Adjacent to Hulbert Road	NO ₂ Diffusion Tube	1.8
WYG11	AURN 1 – Portsmouth AURN	NO ₂ Diffusion Tube	1.8
WYG11	AURN 1 – Portsmouth AURN	NO ₂ Diffusion Tube	1.8
WYG11	AURN 1 – Portsmouth AURN	NO ₂ Diffusion Tube	1.8

The survey results for nitrogen dioxide have been bias corrected and seasonally adjusted in general accordance with the guidance in Local Air Quality Management Guidance TG (16) as detailed below.

The site survey monitoring locations are shown in Figure 1. WYG also monitored at the closest AURN (Automatic Urban and Rural Network) to the site. This was at Portsmouth AURN. No data is currently available for 2020 at this monitoring location.

Seasonal Adjustment

Nitrogen dioxide levels are known to vary throughout the year due to changes in emissions and the effects of seasonal weather changes. The application of a 'seasonal adjustment factor' is necessary to account for the relative influence of weather conditions during the survey period compared to annualised weather conditions. Box 7.10 of Local Air Quality Management Technical Guidance LAQM.TG(16) provides a method to adjust short term monitoring data to extrapolate annualised averages.

The seasonal correction factor for all roadside monitoring locations has been obtained from the nearest Automatic Urban and Rural Network (AURN) Monitoring Stations to the proposed site. In accordance with TG(16), the best practice guidance is to "*Identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. The data capture for each of these sites should be at least 85%. These sites should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should, wherever possible lie within a radius of about 50 miles*".

The closest 'urban background' AURN, which have greater than 85% data capture, within 50 miles of Hulbert Road is Portsmouth AURN.

The seasonal correction factor calculation is summarised in Table 4.3.

Table 4.3 AURN Annual Mean

AURN Location	2019 Annual Mean ($\mu\text{g}/\text{m}^3$)	Period 1 Period Mean and Seasonal Adjustment Factor ($\mu\text{g}/\text{m}^3$)		Period 2 Period Mean and Seasonal Adjustment Factor ($\mu\text{g}/\text{m}^3$)		Period 3 Period Mean and Seasonal Adjustment Factor ($\mu\text{g}/\text{m}^3$)		Period 4 Period Mean and Seasonal Adjustment Factor ($\mu\text{g}/\text{m}^3$)		Averaged Seasonal Adjustment Factor (P1,2,3)	Averaged Seasonal Adjustment Factor (P1,2,4)
Portsmouth	17.47	26.19	0.67	24.63	0.71	17.84	0.98	17.86	0.98	0.79	0.78

WYG Monitoring Location Results

The results of WYG monitoring are summarised in Table 4.4 below, with the averaged periods for each tube shown in Table 4.5.

Table 4.4 Period 1 -4 Survey Results

Location Reference	Raw Monitored Results	Seasonally Adjusted Result ($\mu\text{g}/\text{m}^3$)	Nationally Bias Adjusted Result ($\mu\text{g}/\text{m}^3$)
Period 1			
WYG1	30.71	24.12	22.24
WYG2	32.76	25.73	23.72
WYG3	34.05	26.74	24.65
WYG4	22.44	17.63	16.25
WYG5	23.05	18.11	16.69
WYG6	28.57	22.44	20.69
WYG7	26.67	20.95	19.31
WYG8	22.44	17.62	16.25
WYG9	37.19	29.21	26.93
WYG10	25.52	20.04	18.48
WYG11	31.15	24.47	22.56
WYG11	31.21	24.52	22.60
WYG11	27.23	21.38	19.71
Period 2			
WYG1	30.11	23.65	21.80
WYG2	23.71	18.62	17.17
WYG3	25.13	19.73	18.19
WYG4	19.02	14.94	13.78
WYG5	19.68	15.46	14.25
WYG6	19.76	15.52	14.31
WYG7	22.34	17.54	16.17

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WYG8	17.95	14.10	13.00
WYG9	29.38	23.08	21.28
WYG10	18.37	14.43	13.31
WYG11	28.04	22.02	20.30
WYG11	26.94	21.16	19.51
WYG11	27.69	21.75	20.05
Period 3			
WYG1	33.36	26.20	24.15
WYG2	31.10	24.42	22.52
WYG3	27.79	21.82	20.12
WYG4	20.22	15.88	14.64
WYG5	21.19	16.64	15.34
WYG6	25.08	19.70	18.16
WYG7	23.48	18.44	17.00
WYG8	-	-	-
WYG9	-	-	-
WYG10	-	-	-
WYG11	-	-	-
WYG11	-	-	-
WYG11	-	-	-
Period 4			
WYG1	-	-	-
WYG2	-	-	-
WYG3	-	-	-
WYG4	-	-	-
WYG5	-	-	-
WYG6	-	-	-
WYG7	-	-	-
WYG8	19.28	15.14	13.96
WYG9	31.18	24.49	22.58
WYG10	20.85	16.37	15.10
WYG11	24.59	19.31	17.80
WYG11	27.89	21.90	20.19
WYG11	25.55	20.06	18.50

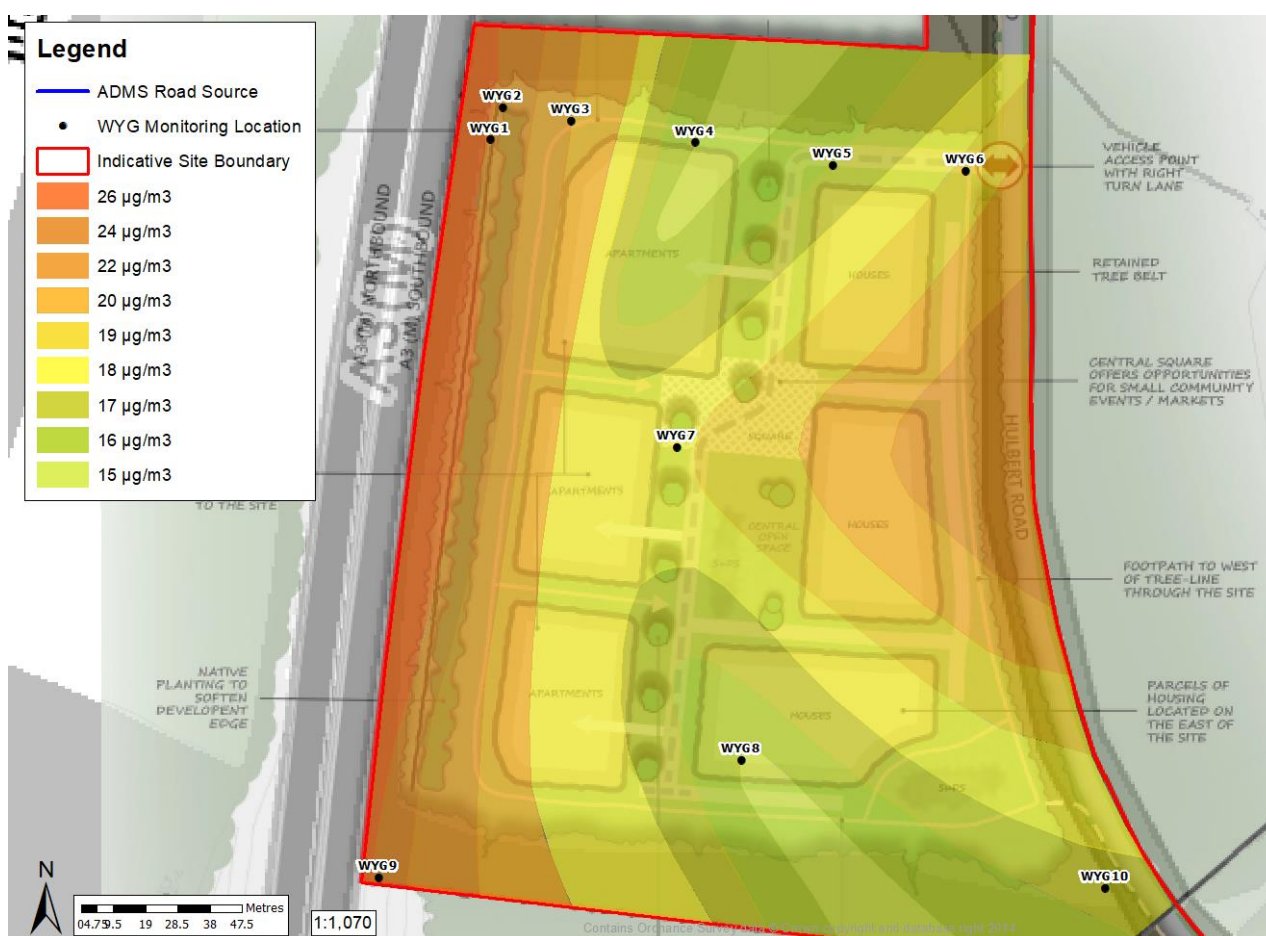
Table 4.5 Average Period 1 - 4 Survey Results

Location Reference	Raw Monitored Results	Seasonally Adjusted Result ($\mu\text{g}/\text{m}^3$)	Nationally Bias Adjusted Result ($\mu\text{g}/\text{m}^3$)
Period 1 – 4 Average			
WYG1 (1,2,3)	31.39	24.65	22.68
WYG2 (1,2,3)	29.19	22.92	21.09
WYG3 (1,2,3)	28.99	22.77	20.94
WYG4 (1,2,3)	20.56	16.15	14.86
WYG5 (1,2,3)	21.31	16.74	15.40
WYG6 (1,2,3)	24.47	19.22	17.68
WYG7 (1,2,3)	24.16	18.98	17.46
WYG8 (1,2,4)	19.89	15.62	14.37

WYG9 (1,2,4)	32.58	25.59	23.54
WYG10 (1,2,4)	21.58	16.95	15.59
WYG11 (1,2,4)	27.93	21.93	20.18
WYG11 (1,2,4)	28.68	22.53	20.72
WYG11 (1,2,4)	26.82	21.07	19.38

Monitoring results illustrated in Table 4.5 above, show that no exceedances of the AQO were observed on the proposed development site.

Figure 4.1 Monitored Average NO₂ Concentration Contour Plot – Periods 1 to 4



4.3 Meteorology

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The 2018 meteorological data used in the assessment is derived from Southampton Meteorological Station. This is the nearest meteorological station, which is considered representative of the development site, with all the complete parameters necessary for

the ADMS model. Reference should be made to Figure 4 for an illustration of the prevalent wind conditions at the Southampton Meteorological Station site.

4.4 Emission Sources

A desktop assessment has identified that traffic movements are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO₂, PM₁₀ and PM_{2.5}.

The assessment has therefore modelled all roads within the immediate vicinity of the proposed development site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to Figure 1 for a graphical representation of the traffic data utilised within the ADMS Roads 5.0 model.

It should be noted that the pollutant contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

4.5 Sensitive Receptors

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations are summarised in Table 4.6 (overleaf) and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 4.6 Modelled Existing Sensitive Receptor Locations

	Discrete Sensitive Receptor	Receptor Height (m)
R1	57 Holly Drive	1.5
R2	12 Khandala Gardens	1.5
R3	11 Ampfield Close	1.5
R4	Sparshatts, Hulbert Road	1.5
R5	423 Purbrook Way	1.5
R6	1e Park Lane	1.5
R7	5 Belmont Grove	1.5
R8	108 Bedhampton Road	1.5
R9	61 Bedhampton Road	1.5
R10	4 Bedhampton Hill	1.5
R11	2a Marylands Road	1.5
R12	76 Lower Road	1.5
R13	54 Bedhampton Hill	1.5
R14	34 Brunel Way	1.5
R15	Compton Court, Chidham Close	1.5
R16	43 Mavis Crescent	1.5
R17	Bosmere Junior School, South Street (South of Building)	1.5
R18	Bosmere Junior School, South Street (North of Building)	1.5
R19	Havant College, New Road	1.5
R20	103 Stockheath Way	1.5
R21	2 Langrish Close	1.5
R22	138 Purbrook Way	1.5
S7	Barncroft (Car Park)	2.4
PR1	Proposed Receptor	1.5
PR2	Proposed Receptor	1.5
PR3	Proposed Receptor	1.5
PR4	Proposed Receptor	1.5
*Located within the AQMA		

The locations of the existing sensitive receptors are identified on Figure 2.

4.6 Ecological Receptors

Air quality impacts associated with the proposed re-development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on 'Air Quality Impacts on Designated Nature Conservation Sites' (2019) document outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment. These are inclusive of;

- Sites of Special Scientific Interest (SSSIs);
- Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Ramsar Sites;

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- Areas of Special Scientific Interest (ASSIs);
- National Nature Reserves (NNRs);
- Local Nature Reserves (LNRs);
- Local Wildlife Sites (LWSs); and,
- Areas of Ancient Woodland (AW).

The Conservation of Habitats and Species Regulations (2017) additionally requires competent authorities to review planning applications and consents that have the potential to impact on European designated sites (e.g. Special Protection Areas).

A study was undertaken to identify any statutory designated sites of ecological or nature conservation importance within the extents of the dispersion modelling assessment. This was completed using the Multi-Agency Geographic Information for the Countryside (MAGIC) web-based interactive mapping service, which draws together information on key environmental schemes and designations.

In accordance with the IAQM Guidance, multiple receptor locations have been identified within the sensitive conservation area to determine any change in exposure as a result of the proposed scheme.

Table 4.7 Ecological Receptors

Site ID	Site	Designation	UK NGR (m)		Distance from Site (m)	Distance from Nearest Road (m)
			X	Y		
E1	Johnston's Coppice	AW	469541	108165	11	16
E2	Neville's Park	AW	469549	108660	10	20
E3	Neville's Park	AW	469695	108728	135	131
E4	Beech Wood	LWS	469668	109100	407	48
E5	Beech Wood	LWS	469683	109244	550	26
E6	Beech Wood	LWS	469619	109270	570	68
E7	Outhurst Wood	LWS	469435	109067	362	36
E8	Johnston's Coppice	AW	469039	107687	445	26
E9	Johnston's Coppice	AW	469202	108127	141	125
E10	Gundymoor Wood	AW	468954	107634	542	25
E11	Gundymoor Wood	AW	469215	107585	453	24
E12	Gundymoor Wood	AW	469274	107257	708	45
E13	Littlepark Wood	AW	469355	107255	663	33

5. Assessment of Air Quality Impacts - Construction Phase

5.1 Pollutant Sources

The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from construction materials. The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Construction activities can give rise to short-term elevated dust/PM₁₀ concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 Particulate Matter (PM₁₀)

The UK Air Quality Standards seek to control the health implications of respirable PM₁₀. However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM₁₀ concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

5.3 Dust

Particles greater than 10µm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there is no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m²/day. Therefore, a deposition rate of 200mg/m²/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. However, the proposed development site is well contained, and the closest existing residential dwelling is located 140m west of the site boundary. Measures will be taken to minimise the emissions of dust as part of good site practice.

Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

5.4 Methodology

The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in February 2014.

Four construction processes are considered; these are demolition, earthworks, construction and trackout. For each of these phases, the significance of the potential dust impacts is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix A.

5.5 Assessment Results

Based on the methodology detailed in Appendix A, the scale of the anticipated works has determined the potential dust emission magnitude for each process, as presented in the Table 5.1 below.

Table 5.1 Dust Emission Magnitude

Construction Process	Site Criteria	Dust Emission Magnitude
Demolition	No demolition required	N/A
Earthworks	Total site area >10,000 m ²	Large
Construction	Total building volume 25,000 - 100,000 m ³	Medium
Trackout	Assumed >50 HDV outward movements, unpaved road length >100 m	Large

The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the Table 5.2.

Table 5.2 Sensitivity of the Area

Source	Area Sensitivity					
	Dust Soiling	Site Sensitivity Criteria	Health Effects of PM ₁₀	Site Sensitivity Criteria	Ecological	Site Sensitivity Criteria
Demolition	N/A – No demolition required					
Earthworks	Low	1-10 Highly Sensitive Receptors within 150 m	Low	Annual Mean of <24 ug/m ³ for PM ₁₀ 10-100 Highly Sensitive Receptors within 50 m	Low	Locations with a local designation where the features may be affected by dust deposition
Construction	Low		Low		Low	
Trackout	Low	10-100 Highly Sensitive Receptors within 50 m	Low		Low	

Source	Area Sensitivity					
	Dust Soiling	Site Sensitivity Criteria	Health Effects of PM ₁₀	Site Sensitivity Criteria	Ecological	Site Sensitivity Criteria
		of roads within 500 m of site exit				

The dust emission magnitude determined in Table 5.1 has been combined with the sensitivity of the area determined in Table 5.2, to determine the risk of impacts prior to the implementation of appropriate mitigation measures. The potential impact significance of dust emissions associated with the construction phase, without mitigation, is presented overleaf.

Table 5.3 Impact Significance of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM ₁₀	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low	Low	Low
Construction	Low	Low	Low
Trackout	Low	Low	Low

Appropriate mitigation measures are detailed and presented in Section 8. Following the adoption of these measures, the subsequent impact significance of the construction phase is not predicted to be significant.

6. Assessment of Air Quality Impacts - Operational Phase

In the context of the proposed development, road traffic is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors.

The operational phase assessment therefore consists of the quantified predictions of the change in NO₂, PM₁₀ and PM_{2.5} for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2021. The assessment scenarios are therefore:

- 2018 Baseline = Existing baseline conditions;
- 2021 'Do Minimum' = 2021 Baseline Scenario + Committed Developments;
- 2021 'Do Something' = 2021 Baseline Scenario + Committed Developments + Proposed Development Flows.

6.1 Existing and Predicted Traffic Flows

Baseline 2018 data, projected 2021 'do minimum' and 'do something' traffic data and average vehicle speeds have been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

Baseline 2018 traffic data was sourced from the Department for Transport (DfT) road statistic database. To calculate the predicted 2021 opening operational year traffic flows, a TEMPro factor of 1.0329 has been applied.

Emission factors for the 2018 baseline and 2021 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit Version 10 (August 2020).

A 50m 20km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in Figure 1 and Figure 2. Detailed traffic figures are provided in the Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2018		2021			
		AADT	HGV%	Do Minimum		Do Something	
				AADT	HGV%	AADT	HGV%
Hulbert Road (North of Site)	64	16236	0.9	16771	0.9	17183	0.9
Hulbert Road (South of Site)	64	16236	0.9	16771	0.9	17235	0.9

Link	Speed (km/h)	2018		2021			
		AADT	HGV%	Do Minimum		Do Something	
				AADT	HGV%	AADT	HGV%
Purbrook Way (West of Hulbert Road)	48	18899	0.9	19521	0.9	19676	0.9
Hulbert Road (South of Purbrook Way)	48	16236	0.9	16771	0.9	16926	0.9
Purbrook Way (East of Hulbert Road)	48	20829	2.0	21514	2.0	21669	2.0
Purbrook Way (East of Park Lane)	48	20829	2.0	21514	2.0	21566	2.0
Stockheath Road	48	20829	2.0	21514	2.0	21527	2.0
New Road	48	17259	1.9	17827	1.9	17904	1.9
Bedhampton Hill (West of Hulbert Road)	48	17259	1.9	17827	1.9	17904	1.9
Bedhampton Hill (South of Portsdown Hill)	48	8630	1.9	8913	1.9	8952	1.9
Portsdown Hill Road	48	17259	1.9	17827	1.9	17866	1.9
Park Lane	32	5889	1.8	6083	1.8	6135	1.8
Park Road	48	24424	1.4	25228	1.4	25266	1.4
Petersfield Road	64	17259	1.9	17827	1.9	17866	1.9
A3(M)	112	91845	3.6	94867	3.6	95073	3.6
A27	112	78868	4.0	81463	4.0	81501	4.0

6.2 Background Concentrations

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and TG (16).

The IAQM Guidance states:

"A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO."

Additionally, TG (16) states:

"Typically, only the process contributions from local sources are represented within and output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations."

Defra Published Background Concentrations for 2018

The background concentrations shown in Table 6.2 below were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In May 2019, Defra issued revised 2018 based background maps for nitrogen oxide (NO_x), NO₂, PM₁₀ and PM_{2.5}. The mapped background concentrations are summarised in Table 6.2.

Table 6.2 Published Background Air Quality Levels (µg/m³)

Receptor Location	2018			
	NO ₂	NO _x	PM ₁₀	PM _{2.5}
Local Authority Monitoring				
S7	17.49	25.36	16.23	11.92
W10	19.54	29.03	15.01	10.73
28	19.54	29.03	15.01	10.73
22	19.54	29.03	15.01	10.73
Existing Sensitive Receptors				
R1	17.19	24.75	15.08	10.64
R2	15.67	22.35	14.62	10.47
R3	18.65	27.23	15.37	10.77
R4	18.65	27.23	15.37	10.77
R5	18.65	27.23	15.37	10.77
R6	19.23	28.38	15.75	10.90
R7	19.23	28.38	15.75	10.90
R8	19.23	28.38	15.75	10.90
R9	19.23	28.38	15.75	10.90
R10	20.58	30.60	15.76	10.88
R11	19.23	28.38	15.75	10.90
R12	20.58	30.60	15.76	10.88
R13	20.58	30.60	15.76	10.88
R14	20.58	30.60	15.76	10.88
R15	19.54	29.03	15.01	10.73
R16	19.54	29.03	15.01	10.73
R17	20.78	31.33	15.10	10.45
R18	19.54	29.03	15.01	10.73
R19	19.54	29.03	15.01	10.73
R20	18.93	28.17	16.59	11.87
R21	16.16	23.17	15.51	11.26
R22	17.49	25.36	16.23	11.92
S7	17.49	25.36	16.23	11.92
Proposed Sensitive Receptors				
PR1 – PR4	17.19	24.75	15.08	10.64
*Located within the AQMA				

All the Defra background concentrations detailed in Table 6.2 for 2018, show that the background levels are predicted to be below the relevant AQO within the study area.

A breakdown of the background source apportionment of NO_x concentrations at each monitoring location and receptor is shown in Table 6.3.

Table 6.3 Pollutant Source Apportionment of NO_x (µg/m³)

Receptor Location	2018						
	Total NO _x	% of NO _x from Road Sources	% of NO _x from Industrial Sources	% of NO _x from Domestic Sources	% of NO _x from Aircraft Sources	% of NO _x from Rail Sources	% of NO _x from Other Sources
Local Authority Monitoring Locations							
S7	25.36	38.56	3.16	9.48	0.00	0.18	48.62
W10	29.03	42.95	3.63	11.20	0.00	0.31	56.39
28	29.03	42.95	3.63	11.20	0.00	0.31	56.39
22	29.03	42.95	3.63	11.20	0.00	0.31	56.39
Existing Receptor Locations							
R1	24.75	43.15	3.21	6.46	0.00	0.14	47.04
R2	22.35	33.46	4.05	8.46	0.00	0.21	53.82
R3	27.23	45.57	3.06	6.40	0.00	0.16	44.81
R4	27.23	45.57	3.06	6.40	0.00	0.16	44.81
R5	27.23	45.57	3.06	6.40	0.00	0.16	44.81
R6	28.38	40.67	3.59	6.17	0.00	0.29	49.27
R7	28.38	40.67	3.59	6.17	0.00	0.29	49.27
R8	28.38	40.67	3.59	6.17	0.00	0.29	49.27
R9	28.38	40.67	3.59	6.17	0.00	0.29	49.27
R10	30.60	48.90	2.90	5.16	0.00	0.19	42.85
R11	28.38	40.67	3.59	6.17	0.00	0.29	49.27
R12	30.60	48.90	2.90	5.16	0.00	0.19	42.85
R13	30.60	48.90	2.90	5.16	0.00	0.19	42.85
R14	30.60	48.90	2.90	5.16	0.00	0.19	42.85
R15	29.03	37.52	3.17	9.78	0.00	0.27	49.26
R16	29.03	37.52	3.17	9.78	0.00	0.27	49.26
R17	31.33	37.51	5.64	5.60	0.00	0.11	51.14
R18	29.03	37.52	3.17	9.78	0.00	0.27	49.26
R19	29.03	37.52	3.17	9.78	0.00	0.27	49.26
R20	28.17	28.61	6.57	8.46	0.00	0.27	56.09
R21	23.17	34.65	3.66	8.70	0.00	0.16	52.83
R22	25.36	38.56	3.16	9.48	0.00	0.18	48.62
S7	25.36	38.56	3.16	9.48	0.00	0.18	48.62
Proposed Receptor Locations							
PR1 – PR4	24.75	43.15	3.21	6.46	0.00	0.14	47.04
*Located within the AQMA							

Table 6.3 above shows that the major background source of NO_x at the monitoring and sensitive receptor locations, where sources have been identified is comprised of 'other sources' but road sources make up the bulk of identified sources.

A review of the Defra background concentrations shows that the NO₂ concentrations at the monitoring and sensitive receptor locations are lower in comparison to the LA monitoring. For the ecological sensitive receptor locations, a review of the NO_x background concentrations using the Air Pollution Information System (APIS) website² has been undertaken. A detailed search for these conservation sites on the website has determined the background concentration. The background concentrations at the conservation sites are considered to be the most representative.

Table 6.4 shows the background concentrations utilised within the verification.

Table 6.4 Utilised Background Concentrations (µg/m³)

Receptor Location	2018		Source
	NO ₂	NO _x	
Local Authority Monitoring			
S7	17.49	25.36	Defra Published Backgrounds
W10	19.54	29.03	
28	19.54	29.03	
22	19.54	29.03	
Existing Sensitive Receptors			
R1	17.19	24.75	Defra Published Backgrounds
R2	15.67	22.35	
R3	18.65	27.23	
R4	18.65	27.23	
R5	18.65	27.23	
R6	19.23	28.38	
R7	19.23	28.38	
R8	19.23	28.38	
R9	19.23	28.38	
R10	20.58	30.60	
R11	19.23	28.38	
R12	20.58	30.60	
R13	20.58	30.60	
R14	20.58	30.60	
R15	19.54	29.03	
R16	19.54	29.03	
R17	20.78	31.33	
R18	19.54	29.03	
R19	19.54	29.03	
R20	18.93	28.17	
R21	16.16	23.17	
R22	17.49	25.36	
S7	17.49	25.36	

² <http://www.apis.ac.uk/>

Receptor Location	2018		Source
	NO ₂	NO _x	
Proposed Sensitive Receptors			
PR1 – PR4	17.19	24.75	Defra Published Backgrounds
*Located within the AQMA			

6.3 Model Verification

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_x at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_x emissions. These are converted into predicted roadside contribution NO₂ exposure at the relevant receptor locations based on the updated approach to deriving NO₂ from NO_x for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_x to NO₂ worksheet in the online LAQM tools website hosted by Defra. Table 6.6 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.6 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
S7	31.62	29.25	-7.50
W10	29.14	28.63	-1.77
28	34.90	35.50	1.72
22	32.95	34.49	4.67
*Located within the AQMA			

The final model produced data at the monitoring locations to within 10% of the monitoring results at all of the receptors, as recommended by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.00³. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

³ This was achieved by applying a model correction factor of 1.65 to roadside predicted NO_x concentrations before converting to NO₂

6.4 Summary of Model Inputs

Table 6.7 Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Chemistry	A facility within ADMS-Roads to calculate the chemical reactions in the atmosphere between Nitric Oxide (NO), NO ₂ , Ozone (O ₃) and Volatile organic compounds (VOCs).	No atmospheric chemistry parameters included
Meteorology	Representative meteorological data from a local source	Southampton Meteorological Station , hourly sequential data
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	0.5m representing a typical surface roughness for Parkland, Open Suburbia were used for both Site Data and Met Measurement Site Data
Latitude	Allows the location of the model area to be set	United Kingdom = 50.9
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Small Towns = 10m was used for both Site Data and Met Measurement Site Data
Elevation of Road	Allows the height of the road link above ground level to be specified.	All road links were set at ground level = 0m .
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	Urban (Not London) and Motorway (Not London) settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on Google Map observations
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a "street canyon".	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EFT database of traffic emission factors.	The EFT Version 10.1 (2020) dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	2018 data for verification and baseline operational phase assessment 2021 data for the operational phase assessment.

6.5 ADMS Modelling Results

6.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO₂, PM₁₀ and PM_{2.5} at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. All receptor locations identified for assessment are close to roads where there is predicted to be a change in emissions.

6.5.2 Assessment Scenarios

For the operational year of 2021, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2021 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

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- 2018 Baseline = Existing baseline conditions;
- 2021 'Do Minimum' = 2021 Baseline Scenario + Committed Developments; and,
- 2021 'Do Something' = 2021 Baseline Scenario + Committed Developments + Proposed Development Flows.

Nitrogen Dioxide

Table 6.8 presents a summary of the predicted change in NO₂ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.8 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	27.46	24.25	24.30	0.05
R2	12 Khandala Gardens	25.22	22.83	22.89	0.06
R3	11 Ampfield Close	24.61	22.09	22.18	0.09
R4	Sparshatts, Hulbert Road	21.14	19.36	19.41	0.05
R5	423 Purbrook Way	24.89	22.35	22.42	0.07
R6	1e Park Lane	25.38	23.16	23.21	0.05
R7	5 Belmont Grove	22.67	20.94	20.98	0.04
R8	108 Bedhampton Road	24.48	22.38	22.42	0.04
R9	61 Bedhampton Road	24.58	22.43	22.47	0.04
R10	4 Bedhampton Hill	31.93	28.14	28.18	0.04
R11	2a Marylands Road	27.96	25.15	25.18	0.03
R12	76 Lower Road	28.70	25.68	25.70	0.02
R13	54 Bedhampton Hill	36.01	31.42	31.45	0.03
R14	34 Brunel Way	37.39	32.46	32.50	0.04
R15	Compton Court, Chidham Close	29.16	26.45	26.48	0.03
R16	43 Mavis Crescent	27.62	25.25	25.27	0.02
R17	Bosmere Junior School, South Street (South of Building)	32.06	28.78	28.79	0.01
R18	Bosmere Junior School, South Street (North of Building)	25.61	23.62	23.63	0.01
R19	Havant College, New Road	23.66	22.01	22.03	0.02
R20	103 Stockheath Way	24.21	22.55	22.57	0.02
R21	2 Langrish Close	19.40	18.05	18.06	0.01
R22	138 Purbrook Way	28.48	25.36	25.43	0.07
S7	Barncroft (Car Park)	28.91	25.83	25.90	0.07
PR1	Proposed Receptor	-	-	28.46	-
PR2	Proposed Receptor	-	-	29.73	-
PR3	Proposed Receptor	-	-	29.81	-
PR4	Proposed Receptor	-	-	30.10	-
PR5	Proposed Receptor	-	-	29.80	-
PR6	Proposed Receptor	-	-	30.24	-
PR7	Proposed Receptor	-	-	27.38	-
PR8	Proposed Receptor	-	-	21.05	-
PR9	Proposed Receptor	-	-	20.67	-

Receptor		NO ₂ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
PR10	Proposed Receptor	-	-	20.54	-
PR11	Proposed Receptor	-	-	20.07	-
PR12	Proposed Receptor	-	-	19.87	-
PR13	Proposed Receptor	-	-	24.30	-
Annual Mean AQO		40 µg/m ³			
*Located within the AQMA					

All modelled existing receptors, other than 34 Brunel Way (R14), are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.8, the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development, is 0.09 µg/m³ at 11 Ampfield Close (R3).

The impact description of changes in traffic flow associated with the development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.9.

Table 6.9 Significance of Effects at Key Receptors (NO₂)

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.05	0.13	0%	≤75% of AQO	Negligible
R2	0.06	0.15	0%	≤75% of AQO	Negligible
R3	0.09	0.23	0%	≤75% of AQO	Negligible
R4	0.05	0.13	0%	≤75% of AQO	Negligible
R5	0.07	0.18	0%	≤75% of AQO	Negligible
R6	0.05	0.13	0%	≤75% of AQO	Negligible
R7	0.04	0.10	0%	≤75% of AQO	Negligible
R8	0.04	0.10	0%	≤75% of AQO	Negligible
R9	0.04	0.10	0%	≤75% of AQO	Negligible
R10	0.04	0.10	0%	≤75% of AQO	Negligible
R11	0.03	0.08	0%	≤75% of AQO	Negligible
R12	0.02	0.05	0%	≤75% of AQO	Negligible
R13	0.03	0.08	0%	76-94% of AQO	Negligible
R14	0.04	0.10	0%	76-94% of AQO	Negligible
R15	0.03	0.08	0%	≤75% of AQO	Negligible
R16	0.02	0.05	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	≤75% of AQO	Negligible
R18	0.01	0.03	0%	≤75% of AQO	Negligible
R19	0.02	0.05	0%	≤75% of AQO	Negligible
R20	0.02	0.05	0%	≤75% of AQO	Negligible
R21	0.01	0.03	0%	≤75% of AQO	Negligible
R22	0.07	0.18	0%	≤75% of AQO	Negligible
S7	0.07	0.18	0%	≤75% of AQO	Negligible

NO ₂ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within the AQMA					

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Annual average nitrogen dioxide levels at the proposed development site and contributions from the scheme across the study area are illustrated in Figures 6.1 and 6.2 below.

Figure 6.1 Annual Average Nitrogen Dioxide ($\mu\text{g}\text{m}^{-3}$) at the Proposed Development Site



Figure 6.2 Annual Average Nitrogen Dioxide ($\mu\text{g}\text{m}^{-3}$) Contribution from the Scheme Across the Study Area

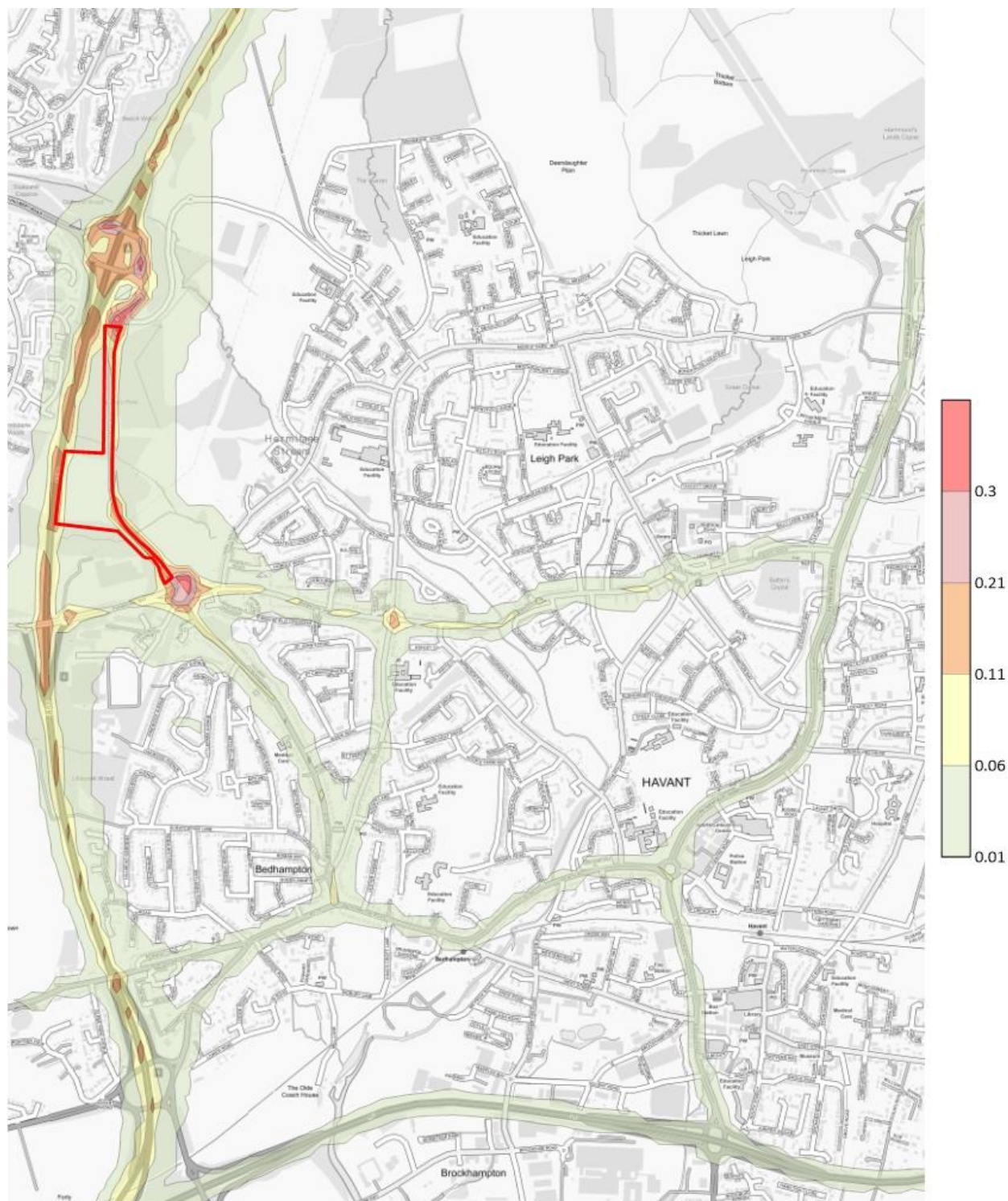
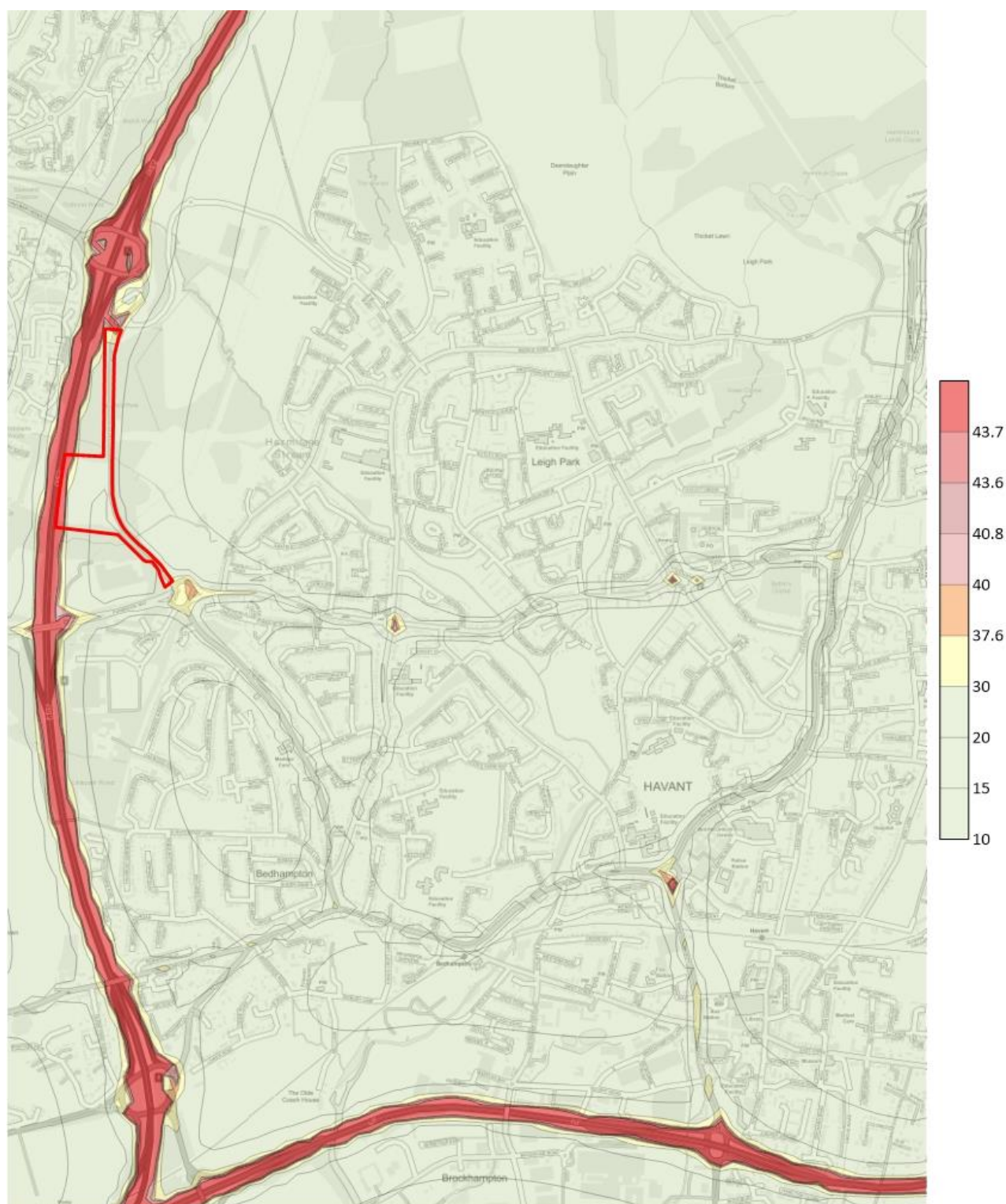


Figure 6.3 Annual Average Nitrogen Dioxide ($\mu\text{g}\text{m}^{-3}$) Across the Study Area



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Particulate Matter (PM₁₀)

Table 6.10 presents a summary of the predicted change in annual mean PM₁₀ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.10 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	16.79	16.71	16.72	0.01
R2	12 Khandala Gardens	16.92	16.90	16.91	0.01
R3	11 Ampfield Close	17.12	17.07	17.09	0.02
R4	Sparshatts, Hulbert Road	16.68	16.64	16.66	0.01
R5	423 Purbrook Way	17.41	17.37	17.39	0.02
R6	1e Park Lane	17.53	17.49	17.50	0.01
R7	5 Belmont Grove	17.08	17.06	17.07	0.01
R8	108 Bedhampton Road	17.28	17.25	17.25	0.01
R9	61 Bedhampton Road	17.27	17.23	17.24	0.01
R10	4 Bedhampton Hill	18.54	18.47	18.47	0.01
R11	2a Marylands Road	17.72	17.67	17.68	0.01
R12	76 Lower Road	17.85	17.80	17.81	<0.01
R13	54 Bedhampton Hill	18.29	18.16	18.16	<0.01
R14	34 Brunel Way	18.57	18.41	18.42	0.01
R15	Compton Court, Chidham Close	17.01	16.96	16.97	0.01
R16	43 Mavis Crescent	16.85	16.81	16.82	<0.01
R17	Bosmere Junior School, South Street (South of Building)	17.80	17.76	17.76	<0.01
R18	Bosmere Junior School, South Street (North of Building)	16.56	16.53	16.53	<0.01
R19	Havant College, New Road	16.21	16.18	16.18	<0.01
R20	103 Stockheath Way	18.13	18.11	18.11	<0.01
R21	2 Langrish Close	16.49	16.47	16.47	<0.01
R22	138 Purbrook Way	18.48	18.43	18.44	0.01
S7	Barncroft (Car Park)	18.54	18.49	18.51	0.01
PR1	Proposed Receptor	-	-	16.87	-
PR2	Proposed Receptor	-	-	17.00	-
PR3	Proposed Receptor	-	-	17.01	-
PR4	Proposed Receptor	-	-	17.05	-
PR5	Proposed Receptor	-	-	17.02	-
PR6	Proposed Receptor	-	-	17.07	-
PR7	Proposed Receptor	-	-	16.77	-
PR8	Proposed Receptor	-	-	16.42	-
PR9	Proposed Receptor	-	-	16.36	-
PR10	Proposed Receptor	-	-	16.33	-
PR11	Proposed Receptor	-	-	16.27	-
PR12	Proposed Receptor	-	-	16.23	-
PR13	Proposed Receptor	-	-	16.17	-
Annual Mean AQO		40 µg/m ³			
*Located within the AQMA					

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.10, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the development, is 0.02 µg/m³ at 11 Ampfield Close (R3) and 423 Purbrook Way (R5).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.11.

Table 6.11 Significance of Effects at Key Receptors (PM₁₀)

PM ₁₀ Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.01	0.02	0%	≤75% of AQO	Negligible
R2	0.01	0.04	0%	≤75% of AQO	Negligible
R3	0.02	0.04	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.02	0.04	0%	≤75% of AQO	Negligible
R6	0.01	0.03	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.02	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	0.01	0.02	0%	≤75% of AQO	Negligible
R11	0.01	0.02	0%	≤75% of AQO	Negligible
R12	<0.01	0.01	0%	≤75% of AQO	Negligible
R13	<0.01	0.01	0%	≤75% of AQO	Negligible
R14	0.01	0.01	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.00	0%	≤75% of AQO	Negligible
R18	<0.01	0.00	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.04	0%	≤75% of AQO	Negligible
S7	0.01	0.03	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within the AQMA					

The significance of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM₁₀ exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

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Particulate Matter (PM_{2.5})

Table 6.12 presents a summary of the predicted change in annual mean PM_{2.5} concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6.12 Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	11.76	11.65	11.66	0.01
R2	12 Khandala Gardens	11.83	11.77	11.78	0.01
R3	11 Ampfield Close	11.84	11.77	11.78	0.01
R4	Sparshatts, Hulbert Road	11.57	11.52	11.52	0.01
R5	423 Purbrook Way	12.00	11.93	11.94	0.01
R6	1e Park Lane	11.97	11.91	11.91	0.01
R7	5 Belmont Grove	11.70	11.66	11.66	<0.01
R8	108 Bedhampton Road	11.83	11.77	11.77	<0.01
R9	61 Bedhampton Road	11.82	11.76	11.77	<0.01
R10	4 Bedhampton Hill	12.57	12.46	12.47	<0.01
R11	2a Marylands Road	12.11	12.03	12.03	<0.01
R12	76 Lower Road	12.18	12.10	12.10	<0.01
R13	54 Bedhampton Hill	12.55	12.38	12.38	<0.01
R14	34 Brunel Way	12.72	12.52	12.53	<0.01
R15	Compton Court, Chidham Close	11.95	11.87	11.87	<0.01
R16	43 Mavis Crescent	11.84	11.78	11.78	<0.01
R17	Bosmere Junior School, South Street (South of Building)	12.07	11.98	11.98	<0.01
R18	Bosmere Junior School, South Street (North of Building)	11.66	11.61	11.61	<0.01
R19	Havant College, New Road	11.46	11.41	11.41	<0.01
R20	103 Stockheath Way	12.77	12.74	12.74	<0.01
R21	2 Langrish Close	11.85	11.81	11.82	<0.01
R22	138 Purbrook Way	13.29	13.20	13.21	0.01
S7	Barncroft (Car Park)	13.33	13.24	13.25	0.01
PR1	Proposed Receptor	-	-	11.80	-
PR2	Proposed Receptor	-	-	11.89	-
PR3	Proposed Receptor	-	-	11.90	-
PR4	Proposed Receptor	-	-	11.92	-
PR5	Proposed Receptor	-	-	11.90	-
PR6	Proposed Receptor	-	-	11.93	-
PR7	Proposed Receptor	-	-	11.73	-
PR8	Proposed Receptor	-	-	11.46	-
PR9	Proposed Receptor	-	-	11.42	-
PR10	Proposed Receptor	-	-	11.40	-
PR11	Proposed Receptor	-	-	11.36	-
PR12	Proposed Receptor	-	-	11.34	-
PR13	Proposed Receptor	-	-	11.31	-
Annual Mean AQO		40 µg/m³			
*Located within the AQMA					

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.12, the maximum predicted increase in the annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the development, is 0.01 µg/m³ at 57 Holly Drive (R1), 12 Khandala Gardens (R2), 11 Ampfield Close (R3), Sparshatts, Hulbert Road (R4), 423 Purbrook Way (R5), 1e Park Lane (R6), 138 Purbrook Way (R22), and Barncroft (Car Park) (S7).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table 6.13.

Table 6.13 Significance of Effects at Key Receptors (PM_{2.5})

PM _{2.5} Significance Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change Due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Significance
R1	0.01	0.02	0%	≤75% of AQO	Negligible
R2	0.01	0.03	0%	≤75% of AQO	Negligible
R3	0.01	0.04	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.01	0.04	0%	≤75% of AQO	Negligible
R6	0.01	0.03	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	<0.01	0.02	0%	≤75% of AQO	Negligible
R9	<0.01	0.01	0%	≤75% of AQO	Negligible
R10	<0.01	0.02	0%	≤75% of AQO	Negligible
R11	<0.01	0.02	0%	≤75% of AQO	Negligible
R12	<0.01	0.01	0%	≤75% of AQO	Negligible
R13	<0.01	0.01	0%	≤75% of AQO	Negligible
R14	<0.01	0.01	0%	≤75% of AQO	Negligible
R15	<0.01	0.01	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.00	0%	≤75% of AQO	Negligible
R18	<0.01	0.00	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.03	0%	≤75% of AQO	Negligible
S7	0.01	0.03	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					

The significance of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{2.5} exposure, for existing receptors, is determined to be 'negligible' based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Ecological Receptors Assessment (Nitrogen Oxide)

Ecologically sensitive receptors outlined in Section 4 have been considered as part of the operational phase dispersion modelling. Background concentrations at each of the ecologically sensitive sites are determined through a review of the NO_x pollutants published on the APIS website.

The below assessment has been undertaken in accordance with 'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites (IAQM, 2019)'.

Table 6.14 Identified Ecological Receptors and Nearest Affected Roads

Recep. ID	Site Name	Site Designation	Distance to Road (m)	NO _x (µg/m ³)		
				Do Minimum (2021)	Do Something (2021)	Difference (DS-DM)
E1	Johnston's Coppice	AW	16	34.56	34.79	0.24
E2	Neville's Park	AW	20	44.02	44.31	0.29
E3	Neville's Park	AW	131	27.91	27.98	0.08
E4	Beech Wood	LWS	48	48.73	48.85	0.11
E5	Beech Wood	LWS	26	79.37	79.53	0.15
E6	Beech Wood	LWS	68	52.50	52.60	0.10
E7	Outhurst Wood	LWS	36	36.26	36.37	0.11
E8	Johnston's Coppice	AW	26	29.27	29.33	0.06
E9	Johnston's Coppice	AW	125	27.29	27.33	0.04
E10	Gundymoor Wood	AW	25	28.02	28.08	0.06
E11	Gundymoor Wood	AW	24	36.33	36.39	0.06
E12	Gundymoor Wood	AW	45	44.62	44.69	0.07
E13	Littlepark Wood	AW	33	63.78	63.89	0.11

As indicated in Table 6.14, the maximum predicted increase in the annual average exposure to NO_x at any ecological receptor, due to changes in traffic movements associated with the development, is 0.29 µg/m³ at E2 (Neville's Park, AW).

Section 5.5.4.1 of 'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites', IAQM 2019 states:

"Where the assessment indicates that changes in annual mean NO_x concentrations within a designated site cannot be dismissed as imperceptible (i.e. an increase of over 0.4 µg/m³) and the NO_x critical level is exceeded, then changes in nutrient nitrogen deposition should be calculated as supporting information to further assist in the evaluation of significance."

The maximum predicted increase in the annual average exposure to NO_x is 0.29 µg/m³ at E2 (Neville's Park, AW), is less than the 0.40 µg/m³ development contribution stated within the guidance of 'A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites', IAQM 2019. It is considered that the effect can therefore be deemed imperceptible.

7. Damage Cost Calculations

Jonathan Driver, the Environmental Control Officer at Havant Borough Council requested further information regarding emission offsetting. Therefore, a damage costs assessment has been undertaken in accordance with the Defra IGCB damage costs guidelines.

The pollutant emissions costs calculation identifies the environmental damage costs associated with the proposal and determine the amount (value) of mitigation that is expected to be spent on measures to mitigate the impacts. The calculation utilises the most recent Defra Emissions Factor Toolkit (version 9.1) to estimate the additional pollutant emissions from a proposed development and the latest Defra Air Quality Damage Costs (published January 2019) for the specific pollutant of interest, to calculate the resultant damage cost.

The Emissions Assessment Calculator has been used, as detailed below.

EFT Input:

- 877 cars
- 0 HGVs (0% HGV)
- 50 kph
- 10 km (NTS UK avg.)

A Baseline Year of 2018 for 'Road Transport' has been used within this assessment.

Table 7.1 – 7.2 below shows how the total damage cost calculations have been calculated.

Table 7.1 Annual Emissions Factor Outputs (g/tonnes/year)

Pollutant	Year				
	2021	2022	2023	2024	2025
NO _x	0.81	0.73	0.66	0.60	0.54
PM ₁₀	0.06	0.06	0.06	0.06	0.06

Table 7.2 Central Damage Costs (£)

Pollutant	Year				
	2021	2022	2023	2024	2025
NO _x	£9,469	£8,432	£7,551	£6,738	£5,991
PM ₁₀	£13,012	£12,632	£12,304	£12,019	£11,766

Total NO _x	=	£38,181
Total PM ₁₀	=	£61,733
Total Damage Costs	=	£99,914

This calculated figure is to be put towards the mitigation measures outlined in Section 8 of the report and does not represent a sum owed by the developer.

8. Mitigation

8.1 Construction Phase

The dust risk categories have been determined in Section 5 for each of the four construction activities. The assessment has determined that the potential impact significance of dust emissions associated with the construction phase of the proposed development is 'low' at the worst affected receptors.

Using the methodology described in Appendix A, appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction. The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout. They are categorised into 'highly recommended' and 'desirable' measures.

The mitigation measures for the proposed development are detailed in Table 8.1 and 8.2 below:

Table 8.1 Highly Recommended Construction Phase Mitigation Measures

Communications
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
Dust Management
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
Make the complaints log available to the local authority when asked.
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
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 boundary that are at least as high as any stockpiles on site.
Avoid site runoff of water or mud.
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.
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
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
Use enclosed chutes and conveyors and covered skips
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Avoid bonfires and burning of waste materials.

Table 8.2 Desirable Construction Phase Mitigation Measures

Construction
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Dust Management
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
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.
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 additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods
Construction
Avoid scabbling (roughening of concrete surfaces) if possible.
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.
Trackout
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
Avoid dry sweeping of large areas.
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
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).

Following the implementation of the mitigation measures detailed in the tables above, the impact significance of the construction phase is not considered to be significant.

8.2 Operational Phase

Operational phase mitigation is not deemed necessary as the predicted level of significance associated with the additional vehicle movements at all modelled receptors is negligible. In addition, the proposed receptor locations are not considered to be exposed to poor air quality and will be below the Air Quality Objective.

Mitigation measures are proposed within the associated travel plan to reduce the impacts of road traffic emissions. Mitigation measures proposed within the travel plan predicted to have an impact on reducing the effect of road traffic emissions include cycle parking and the promotion of sustainable transport. The promotion of sustainable transport is proposed through information provided to residents outlining the key

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facilities for walking, cycling and public transport, safe cycling practice, and information promoting the health and cost benefits of walking and cycling.

9. Conclusions

WYG has undertaken an Air Quality Assessment to support an application for a proposed residential development at land off Hulbert Road, Havant.

Construction Phase

Prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development has potential as 'low' at some worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been recommended based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to emissions from the construction phase will not be significant.

Operational Assessment

An operational assessment of 2021 emissions has been undertaken.

The 2021 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor is likely to be 0.09 µg/m³ at 11 Ampfield Close (R3).

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.02 µg/m³ at 11 Ampfield Close (R3) and 423 Purbrook Way (R5). For PM_{2.5}, the maximum predicted increase in the annual average exposure is likely to be 0.01 µg/m³ at 57 Holly Drive (R1), 12 Khandala Gardens (R2), 11 Ampfield Close (R3), Sparshatts, Hulbert Road (R4), 423 Purbrook Way (R5), 1e Park Lane (R6), 138 Purbrook Way (R22), and Barncroft (Car Park) (S7).

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂, PM₁₀ and PM_{2.5} exposures, significance is determined to be 'negligible' at all identified receptor locations.

It is not predicted that there will be any exceedance of the NO₂, PM₁₀ or PM_{2.5} pollutant concentrations at all proposed sensitive receptor locations assessed, and therefore, mitigation is not required at the proposed development.

Figures

Figure 1 Air Quality Assessment Area – Local Authority Monitoring Locations

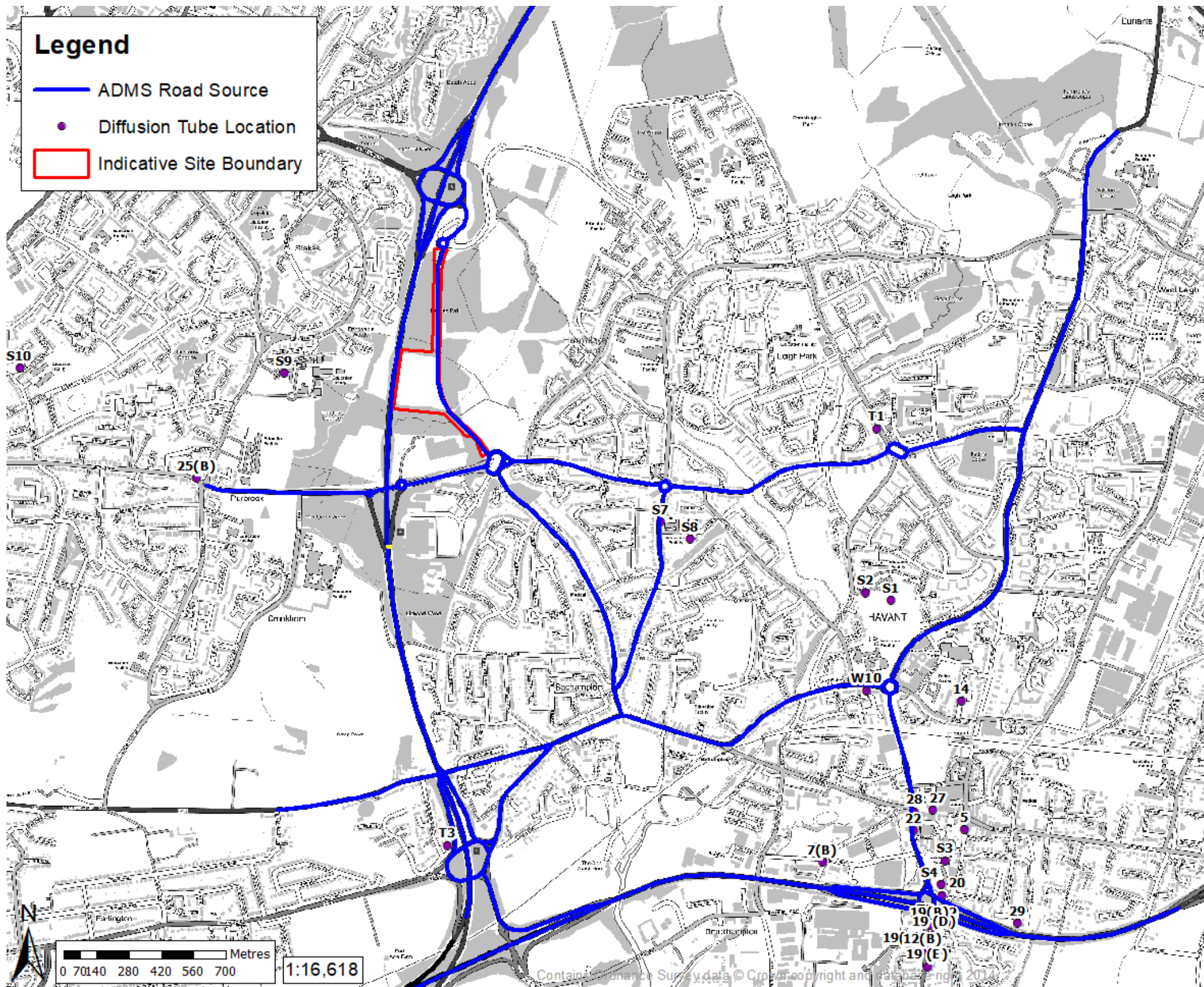
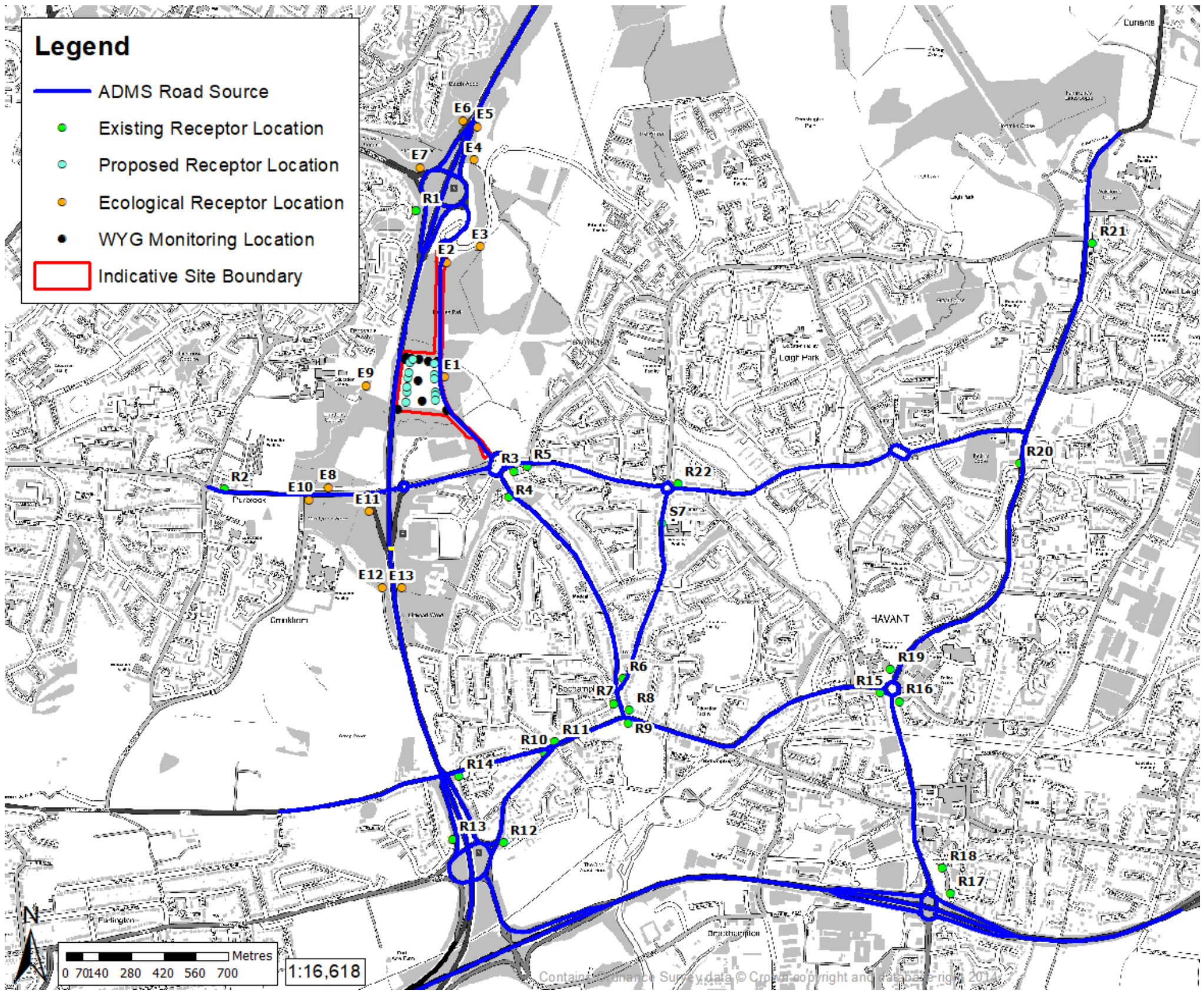


Figure 2 Air Quality Assessment Area – Modelled Receptor Locations



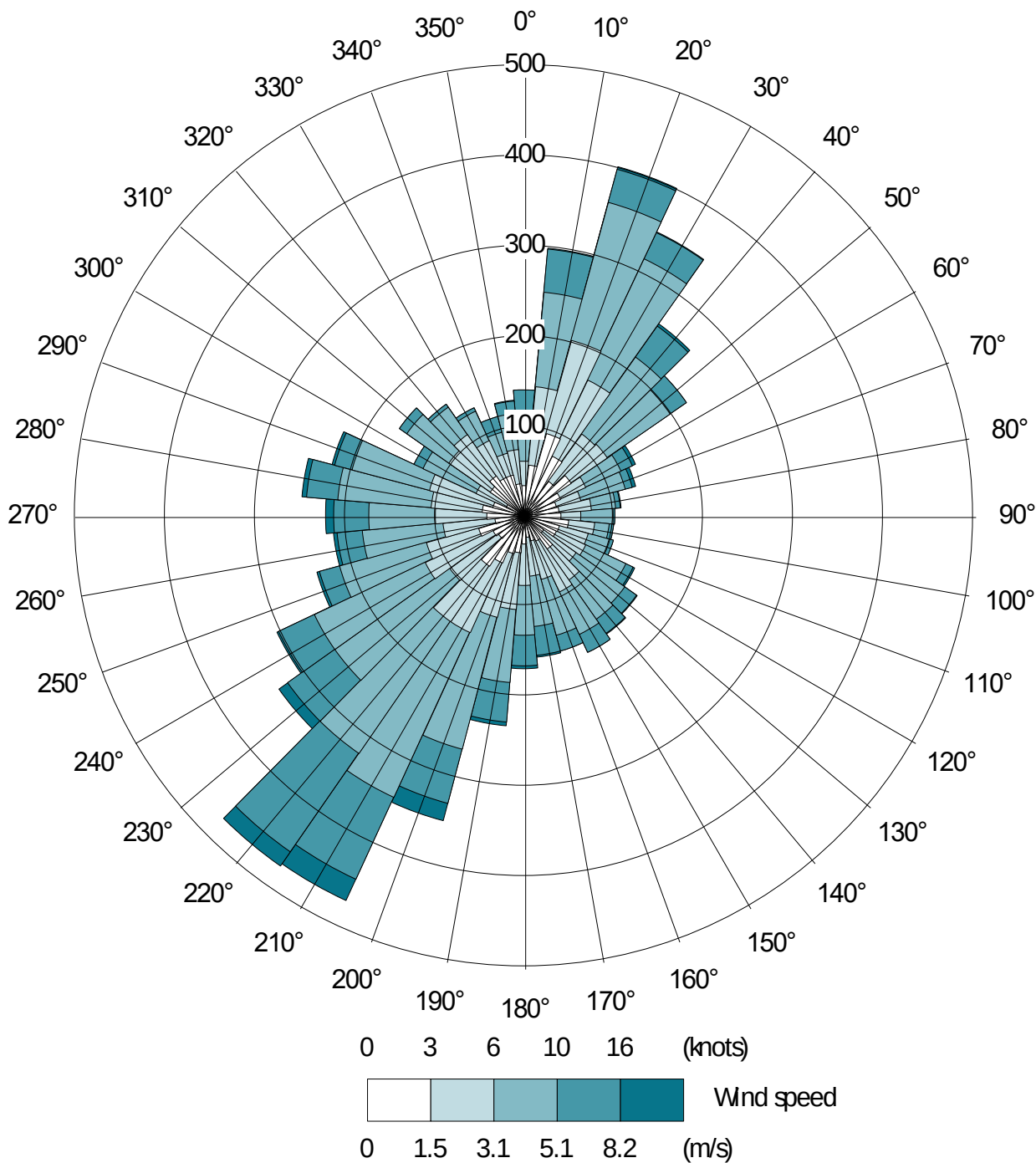
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Figure 3 Air Quality Site Area - WYG Monitoring Locations and Proposed Receptor Locations



Figure 4 Southampton 2018 Meteorological Station Wind Rose



Appendix A Construction Phase Assessment Methodology

The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance⁴.

Step 1 – Screen the Requirement for a more Detailed Assessment

An assessment is required if there are sensitive receptors within 350m of the site boundary, within 50m of the route(s) used by construction vehicles on the surrounding road network, or within 500m from the site entrance. A detailed assessment is also required if there is an ecological receptor within 50m of the site boundary.

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude for the demolition phase has been determined based on the below criteria:

- *Large:* Total building volume >50 000m³, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- *Medium:* Total building volume 20 000m³ – 50 000m³, potentially dusty construction material, demolition activities 10-20m above ground level; and,
- *Small:* Total building volume <20 000m³, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude for the planned earthworks has been determined based on the below criteria:

- *Large:* Total site area >10 000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes;
- *Medium:* Total site area 2 500m² – 10 000m², 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; and
- *Small:* Total site area <2 500 m², soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude for the construction phase has been determined based on the below criteria:

- *Large:* Total building volume >100 000m³, on site concrete batching; sandblasting
- *Medium:* Total building volume 25 000m³ – 100 000m³, potentially dusty construction material (e.g. concrete), on site concrete batching; and,
- *Small:* Total building volume <25 000m³, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

The dust emission magnitude for trackout has been determined based on the below criteria:

- *Large:* >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- *Medium:* 10-50 HGV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,
- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

⁴ Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction*.

Step 2B - Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
 - * Users can reasonably expect an enjoyment of a high level of amenity;
 - * The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
 - * Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks and car showrooms.
- *Medium:*
 - * Users can reasonably expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
 - * The appearance, aesthetics or value of their property could be diminished by soiling;
 - * The 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; and,
 - * Indicative examples include parks and places of work.
- *Low:*
 - * The enjoyment of amenity would not reasonably be expected;
 - * Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling;
 - * There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land; and,
 - * Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A1– Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of People to the Health Effects of PM₁₀

- *High:*
 - * Locations where members of the public are exposed over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
 - * Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- *Medium:*
 - * Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM₁₀ (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and,
 - * Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM₁₀, as protection is covered by Health and Safety at Work legislation.
- *Low:*
 - * Locations where human exposure is transient; and,
 - * Indicative examples include public footpaths, playing fields, parks and shopping streets.

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The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A2 - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM ₁₀ Concentration	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m ³	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28 - 32 µg/m ³	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24 - 28 µg/m ³	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m ³	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of Receptors to Ecological Effects

- **High:**
 - * Locations with an international or national designation and the designated features may be affected by dust soiling;
 - * Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain; and,
 - * Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
- **Medium:**
 - * Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
 - * Locations with a national designation where the features may be affected by dust deposition; and,
 - * Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
- **Low:**
 - * Locations with a local designation where the features may be affected by dust deposition; and,
 - * Indicative example is a local Nature Reserve with dust sensitive features.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A3 - Sensitivity of the Area to Ecological Impacts

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Step 2C - Defining the Risk of Impacts

The risk of impacts with no mitigation is determined by combining the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B.

The following tables provide a method of assigning the level of risk for each activity.

Demolition

Table A4 - Risk of Dust Impacts, Demolition

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

Earthworks

Table A5 - Risk of Dust Impacts, Earthworks

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

Construction

Table A6 - Risk of Dust Impacts, Construction

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

Trackout

Table A7 - Risk of Dust Impacts, Trackout

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

Step 3 – Site Specific Mitigation

The dust risk categories for each of the four activities determined in Step 2C should be used to define the appropriate, site-specific mitigation measures to be adopted.

These mitigation measures are contained within section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction.

Appendix B Theoretical Scenario (No Reduction in UK Fleet Emissions over Time) Results

Scenario Context

This additional theoretical scenario uses emission factors for 2017 for the 'do minimum' and 'do something' based on a recent appeal decision (planning reference no.APP/D3830/A/14/22269877) that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reductions in emissions over the forthcoming years will not occur. This should not be considered as a 'more correct' scenario in accordance with the 2010 note [<http://laqm.defra.gov.uk/laqm-faqs/faq5.html>] which confirms that: '*There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year projections of both NO_x and NO₂, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections*'.

The two assessment scenarios are defined below:

- 2021 'Do Minimum' Theoretical Scenario = Baseline conditions + Cumulative Development flows (TEMPro'd) (**using 2018 traffic emission factors**); and,
- 2021 'Do Something' Theoretical Scenario = Baseline conditions + Cumulative Development + The Proposed Development flows (**using 2018 traffic emission factors**).

Table B2 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	27.46	28.27	28.33	0.06
R2	12 Khandala Gardens	25.22	25.62	25.70	0.08
R3	11 Ampfield Close	24.61	25.00	25.11	0.11
R4	Sparshatts, Hulbert Road	21.14	21.44	21.50	0.06
R5	423 Purbrook Way	24.89	25.29	25.38	0.09
R6	1e Park Lane	25.38	25.75	25.82	0.07
R7	5 Belmont Grove	22.67	22.95	23.00	0.05
R8	108 Bedhampton Road	24.48	24.82	24.87	0.05
R9	61 Bedhampton Road	24.58	24.93	24.97	0.04
R10	4 Bedhampton Hill	31.93	32.54	32.59	0.05
R11	2a Marylands Road	27.96	28.41	28.46	0.05
R12	76 Lower Road	28.70	29.62	29.64	0.02
R13	54 Bedhampton Hill	36.01	37.03	37.08	0.05
R14	34 Brunel Way	37.39	38.15	38.19	0.04
R15	Compton Court, Chidham Close	29.16	29.58	29.62	0.04
R16	43 Mavis Crescent	27.62	28.00	28.02	0.02
R17	Bosmere Junior School, South Street (South of Building)	32.06	32.94	32.95	0.01

Receptor		NO ₂ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R18	Bosmere Junior School, South Street (North of Building)	25.61	26.07	26.08	0.01
R19	Havant College, New Road	23.66	23.92	23.94	0.02
R20	103 Stockheath Way	24.21	24.48	24.49	0.01
R21	2 Langrish Close	19.40	19.61	19.63	0.02
R22	138 Purbrook Way	28.48	28.96	29.04	0.08
S7	Barncroft (Car Park)	28.91	29.39	29.47	0.08
PR1	Proposed Receptor	-	-	33.49	-
PR2	Proposed Receptor	-	-	35.08	-
PR3	Proposed Receptor	-	-	35.19	-
PR4	Proposed Receptor	-	-	35.55	-
PR5	Proposed Receptor	-	-	35.17	-
PR6	Proposed Receptor	-	-	35.72	-
PR7	Proposed Receptor	-	-	32.10	-
PR8	Proposed Receptor	-	-	23.90	-
PR9	Proposed Receptor	-	-	23.42	-
PR10	Proposed Receptor	-	-	23.25	-
PR11	Proposed Receptor	-	-	22.64	-
PR12	Proposed Receptor	-	-	22.39	-
PR13	Proposed Receptor	-	-	22.06	-
Annual Mean AQO		40 µg/m ³			
*Located in the AQMA					

All modelled existing receptors, except for 54 Bedhampton Hill (R13) and 34 Brunel Way (R14), are predicted to be below the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table B2, the maximum predicted increase in the annual average exposure to NO₂ at any existing receptor, due to changes in traffic movements associated with the development, is 0.11 µg/m³ at 11 Ampfield Close (R3).

The impact description of changes in traffic flow associated with the development with respect to annual mean NO₂ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table B3.

Table B3 Impact Description of Effects at Key Receptors (NO₂)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.06	0.15	0%	≤75% of AQO	Negligible
R2	0.08	0.20	0%	≤75% of AQO	Negligible
R3	0.11	0.28	0%	≤75% of AQO	Negligible
R4	0.06	0.15	0%	≤75% of AQO	Negligible
R5	0.09	0.23	0%	≤75% of AQO	Negligible
R6	0.07	0.18	0%	≤75% of AQO	Negligible
R7	0.05	0.13	0%	≤75% of AQO	Negligible

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R8	0.05	0.13	0%	≤75% of AQO	Negligible
R9	0.04	0.10	0%	≤75% of AQO	Negligible
R10	0.05	0.13	0%	76-94% of AQO	Negligible
R11	0.05	0.13	0%	≤75% of AQO	Negligible
R12	0.02	0.05	0%	≤75% of AQO	Negligible
R13	0.05	0.13	0%	76-94% of AQO	Negligible
R14	0.04	0.10	0%	95-102% of AQO	Negligible
R15	0.04	0.10	0%	≤75% of AQO	Negligible
R16	0.02	0.05	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	76-94% of AQO	Negligible
R18	0.01	0.03	0%	≤75% of AQO	Negligible
R19	0.02	0.05	0%	≤75% of AQO	Negligible
R20	0.01	0.03	0%	≤75% of AQO	Negligible
R21	0.02	0.05	0%	≤75% of AQO	Negligible
R22	0.08	0.20	0%	≤75% of AQO	Negligible
S7	0.08	0.20	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located in the AQMA					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO₂ exposure for existing receptors, is determined to be 'negligible' at all identified receptors. This is based on the methodology outlined in Section 3.

Table B4 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	16.79	16.88	16.89	0.01
R2	12 Khandala Gardens	16.92	16.99	17.01	0.02
R3	11 Ampfield Close	17.12	17.18	17.20	0.02
R4	Sparshatts, Hulbert Road	16.68	16.72	16.73	0.01
R5	423 Purbrook Way	17.41	17.48	17.50	0.02
R6	1e Park Lane	17.53	17.59	17.60	0.01
R7	5 Belmont Grove	17.08	17.13	17.14	0.01
R8	108 Bedhampton Road	17.28	17.33	17.34	0.01
R9	61 Bedhampton Road	17.27	17.33	17.33	0.01
R10	4 Bedhampton Hill	18.54	18.63	18.64	0.01
R11	2a Marylands Road	17.72	17.79	17.80	0.01
R12	76 Lower Road	17.85	17.96	17.97	<0.01
R13	54 Bedhampton Hill	18.29	18.42	18.42	<0.01
R14	34 Brunel Way	18.57	18.67	18.68	0.01
R15	Compton Court, Chidham Close	17.01	17.08	17.09	0.01
R16	43 Mavis Crescent	16.85	16.91	16.92	<0.01
R17	Bosmere Junior School, South Street (South of Building)	17.80	17.93	17.94	<0.01
R18	Bosmere Junior School, South Street (North of Building)	16.56	16.63	16.63	<0.01
R19	Havant College, New Road	16.21	16.25	16.26	<0.01

Receptor		PM ₁₀ (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R20	103 Stockheath Way	18.13	18.18	18.18	<0.01
R21	2 Langrish Close	16.49	16.52	16.53	<0.01
R22	138 Purbrook Way	18.48	18.56	18.57	0.01
S7	Barncroft (Car Park)	18.54	18.62	18.63	0.01
PR1	Proposed Receptor	-	-	17.10	-
PR2	Proposed Receptor	-	-	17.26	-
PR3	Proposed Receptor	-	-	17.27	-
PR4	Proposed Receptor	-	-	17.31	-
PR5	Proposed Receptor	-	-	17.27	-
PR6	Proposed Receptor	-	-	17.33	-
PR7	Proposed Receptor	-	-	16.99	-
PR8	Proposed Receptor	-	-	16.54	-
PR9	Proposed Receptor	-	-	16.47	-
PR10	Proposed Receptor	-	-	16.44	-
PR11	Proposed Receptor	-	-	16.37	-
PR12	Proposed Receptor	-	-	16.33	-
PR13	Proposed Receptor	-	-	16.27	-
Annual Mean AQO		40 µg/m³			
*Located in the AQMA					

All modelled existing receptors are predicted to be below the AQO for PM₁₀ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table B4, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the development, is 0.02 µg/m³ at 12 Khandala Gardens (R2), 11 Ampfield Close (R3), and 423 Purbrook Way (R5).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM₁₀ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table B5.

Table B5 Impact Description of Effects at Key Receptors (PM₁₀)

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.01	0.02	0%	≤75% of AQO	Negligible
R2	0.02	0.04	0%	≤75% of AQO	Negligible
R3	0.02	0.05	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.02	0.04	0%	≤75% of AQO	Negligible
R6	0.01	0.03	0%	≤75% of AQO	Negligible
R7	0.01	0.02	0%	≤75% of AQO	Negligible
R8	0.01	0.02	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	0.01	0.02	0%	≤75% of AQO	Negligible

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R11	0.01	0.02	0%	≤75% of AQO	Negligible
R12	<0.01	0.01	0%	≤75% of AQO	Negligible
R13	<0.01	0.01	0%	≤75% of AQO	Negligible
R14	0.01	0.01	0%	≤75% of AQO	Negligible
R15	0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.01	0%	≤75% of AQO	Negligible
R18	<0.01	0.00	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.04	0%	≤75% of AQO	Negligible
S7	0.01	0.03	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located in the AQMA					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to PM₁₀ exposure for existing receptors, is determined to be 'negligible' at all identified receptors. This is based on the methodology outlined in Section 3.

Table B6 Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
R1	57 Holly Drive	11.76	11.82	11.83	0.01
R2	12 Khandala Gardens	11.83	11.87	11.88	0.01
R3	11 Ampfield Close	11.84	11.88	11.89	0.01
R4	Sparshatts, Hulbert Road	11.57	11.59	11.60	0.01
R5	423 Purbrook Way	12.00	12.04	12.05	0.01
R6	1e Park Lane	11.97	12.00	12.01	0.01
R7	5 Belmont Grove	11.70	11.73	11.73	<0.01
R8	108 Bedhampton Road	11.83	11.86	11.86	<0.01
R9	61 Bedhampton Road	11.82	11.86	11.86	<0.01
R10	4 Bedhampton Hill	12.57	12.63	12.64	0.01
R11	2a Marylands Road	12.11	12.15	12.15	<0.01
R12	76 Lower Road	12.18	12.25	12.26	<0.01
R13	54 Bedhampton Hill	12.55	12.63	12.63	<0.01
R14	34 Brunel Way	12.72	12.78	12.79	<0.01
R15	Compton Court, Chidham Close	11.95	11.99	11.99	<0.01
R16	43 Mavis Crescent	11.84	11.88	11.88	<0.01
R17	Bosmere Junior School, South Street (South of Building)	12.07	12.15	12.15	<0.01
R18	Bosmere Junior School, South Street (North of Building)	11.66	11.70	11.71	<0.01
R19	Havant College, New Road	11.46	11.48	11.48	<0.01
R20	103 Stockheath Way	12.77	12.80	12.81	<0.01
R21	2 Langrish Close	11.85	11.87	11.87	<0.01
R22	138 Purbrook Way	13.29	13.33	13.34	0.01

Receptor		PM _{2.5} (µg/m³)			
		Baseline 2018	Do Minimum 2021	Do Something 2021	Development Contribution
S7	Barncroft (Car Park)	13.33	13.37	13.38	0.01
PR1	Proposed Receptor	-	-	12.03	-
PR2	Proposed Receptor	-	-	12.14	-
PR3	Proposed Receptor	-	-	12.15	-
PR4	Proposed Receptor	-	-	12.18	-
PR5	Proposed Receptor	-	-	12.15	-
PR6	Proposed Receptor	-	-	12.19	-
PR7	Proposed Receptor	-	-	11.95	-
PR8	Proposed Receptor	-	-	11.58	-
PR9	Proposed Receptor	-	-	11.53	-
PR10	Proposed Receptor	-	-	11.51	-
PR11	Proposed Receptor	-	-	11.47	-
PR12	Proposed Receptor	-	-	11.44	-
PR13	Proposed Receptor	-	-	11.41	-
Annual Mean AQO		25 µg/m³			
*Located in the AQMA					

All modelled existing receptors are predicted to be below the AQO for PM_{2.5} in both the 'do minimum' and 'do something' scenarios.

As indicated in Table B6, the maximum predicted increase in the annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the development, is 0.01 µg/m³ at any modelled existing receptor.

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{2.5} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in Table B7.

Table B7 Impact Description of Effects at Key Receptors (PM_{2.5})

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1	0.01	0.02	0%	≤75% of AQO	Negligible
R2	0.01	0.04	0%	≤75% of AQO	Negligible
R3	0.01	0.04	0%	≤75% of AQO	Negligible
R4	0.01	0.03	0%	≤75% of AQO	Negligible
R5	0.01	0.04	0%	≤75% of AQO	Negligible
R6	0.01	0.03	0%	≤75% of AQO	Negligible
R7	<0.01	0.02	0%	≤75% of AQO	Negligible
R8	<0.01	0.02	0%	≤75% of AQO	Negligible
R9	<0.01	0.02	0%	≤75% of AQO	Negligible
R10	0.01	0.02	0%	≤75% of AQO	Negligible
R11	<0.01	0.02	0%	≤75% of AQO	Negligible
R12	<0.01	0.01	0%	≤75% of AQO	Negligible
R13	<0.01	0.01	0%	≤75% of AQO	Negligible

Impact Description of NO ₂ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m ³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R14	<0.01	0.02	0%	≤75% of AQO	Negligible
R15	<0.01	0.02	0%	≤75% of AQO	Negligible
R16	<0.01	0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.00	0%	≤75% of AQO	Negligible
R18	<0.01	0.00	0%	≤75% of AQO	Negligible
R19	<0.01	0.01	0%	≤75% of AQO	Negligible
R20	<0.01	0.01	0%	≤75% of AQO	Negligible
R21	<0.01	0.01	0%	≤75% of AQO	Negligible
R22	0.01	0.04	0%	≤75% of AQO	Negligible
S7	0.01	0.03	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located in the AQMA					

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to PM_{2.5} exposure for existing receptors, is determined to be 'negligible' at all identified receptors. This is based on the methodology outlined in Section 3.

Appendix C Report Terms & Conditions

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