12. AIR QUALITY

The following Technical Appendices referred to in this chapter can be found at Appendix 6 to this document.

Appendices

Appendix 6.1 - Modelling Methodology

Appendix 6.2 – Dust Risk Assessment Methodology

12.1 Introduction

12.1.1 This chapter of the Environmental Statement (ES) has been prepared by Air Quality Assessments Ltd and considers the impact of the proposed development on air quality and dust.

12.1.2 This chapter describes the existing air quality conditions in proximity to the site and assesses the likely impact that dust and vehicle emissions from the operation of the proposed development will have on local air quality and the amenity of receptors close to the application site. The main pollutants of concern related to road traffic are nitrogen dioxide (NO_2) and fine particulate matter (PM_{10} and $PM_{2.5}$).

12.1.3 Where relevant, mitigation measures are proposed to minimise the impacts of the proposed development during both the preparation and operational phases of the scheme. Any anticipated residual effects of the proposals are then stated.

12.2 Methodology

Previous Assessment Stages

12.2.1 No previous air quality assessment works have been identified.

Legislation and Planning Policy

EU Limit Values

12.2.2 The European Union's Directive on ambient air quality and cleaner air for Europe (European Parliament, Council of the European Union, 2008) set legally binding limit values for NO_2, PM_{10} and $PM_{2.5}$. The Air Quality Standards Regulations 2010 (The Stationary Office, 2010) implement the EU Directive limit values in English legislation. Achievement of the limit values is a national obligation rather than a local one.

12.2.3 The limit values are the same as the objective values (see Table 1); however, the compliance dates differ, and the limit values apply at all locations (apart from where the public does not have access, where health and safety at work provisions apply and on the road carriageway). The PM_{10} and NO_2 limit value applied from 2005 and 2010 respectively, whereas the $PM_{2.5}$ limit value applied from 2015.

12.2.4 The United Kingdom left the European Union on 31st January 2020; however, the EU legislation currently remains enshrined in UK law through the Air Quality Standards Regulations.

Clean Air Strategy

12.2.5 Part IV of The Environment Act 1995 required the UK Government to prepare an Air Quality Strategy which includes standards and objectives for air quality and sets out measures which are to be taken by local authorities and the government in order to achieve those objectives. The Clean Air Strategy

provides an overview of the actions that the government will take to improve air quality and promises new legislation that will tackle air pollution (Defra, 2019).

12.2.6 Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date.

12.2.7 Part IV of the Environment Act 1995 also describes the system of Local Air Quality Management (LAQM), which requires every local authority to carry out regular review and assessments of air quality in its area. Where an objective has not been, or is unlikely to be achieved, the local authority must declare an AQMA, and prepare an action plan which sets out appropriate measures to be introduced in pursuit of the objectives.

12.2.8 The objectives for NO_2 and PM_{10}, as prescribed by the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 (The Stationary Office, 2000; The Stationary Office, 2002), are shown in Table 12.1. The objectives for PM_{10} and NO_2 were to have been achieved by 2004 and 2005 respectively and continue to apply in all future years thereafter. The $PM_{2.5}$ objective, also shown in Table 12.1, was to be achieved by 2020; however, although local authorities are expected to work towards reducing $PM_{2.5}$ concentrations, there is no obligation for local authorities to try to meet the $PM_{2.5}$ objective, and it is not included in the Regulations.

Table 12.1 The Objectives for NO_2, PM_{10} and $PM_{2.5}$

Pollutant	Concentration Measured As	Objective
NO_2	1-hour Mean	200 µg/m^3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m^3
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3
$PM_{2.5}$	Annual Mean	25 µg/m^3

12.2.9 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. Examples of where the objectives should apply are provided in the Local Air Quality Management Technical Guidance (Defra, 2021a) issued by the Department for Environment, Food and Rural Affairs (Defra). The annual mean NO_2 and PM_{10} objectives should apply at the building façades of residential properties, schools, hospitals, care homes etc.; they should not apply at the building façades of places of work, hotels, gardens or kerbside sites. The 24-hour mean PM_{10} objective should apply at all locations where the annual mean objective applies, as well as the gardens of residential properties and hotels. The 1-hour mean NO_2 objective should apply at all locations where the annual and 24-hour mean objectives apply, as well as at kerbside sites where the public have regular access, e.g., the pavements of busy shopping streets.

National Planning Policy and Practice Guidance

12.2.10 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these should be applied (Ministry of Housing, Communities & Local Government, 2021). It provides a framework within which locally prepared plans for development can be produced. At Paragraph 8c, the NPPF states that the purpose of the planning system is to contribute to the achievement of sustainable development and includes an overarching environmental objective:

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

12.2.11 With regard to environmental impacts from traffic, at Paragraph 104 the NPPF states that:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: …

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; …"

12.2.12 The NPPF also states at Paragraph 174 that:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development

should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; …"

12.2.13 The NPPF goes on to state at Paragraph 18:

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

12.2.14 With specific reference to air quality, the NPPF states at Paragraph 186 that:

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

12.2.15 The NPPF also includes the following statement at Paragraph 188:

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will

operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

12.2.16 The NPPF is supported by Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019). The PPG states that:

"The Department for Environment, Food and Rural Affairs carries out an annual national assessment of air quality using modelling and monitoring to determine compliance with relevant Limit Values. It is important that the potential impact of new development on air quality is taken into account where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."

12.2.17 The PPG goes on to state that:

"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity."

12.2.18 The PPG also sets out the information that may be required in an air quality assessment, stating that:

"Assessments need to be proportionate to the nature and scale of development proposed and the potential impacts (taking into account existing air quality conditions), and because of this are likely to be locationally specific."

12.2.19 It also provides guidance on options for mitigating air quality impacts, and makes clear that:

"Mitigation options will need to be locationally specific, will depend on the proposed development and need to be proportionate to the likely impact."

12.2.20 The PPG makes clear that:

"… dust can also be a planning concern, for example, because of the effect on local amenity."

Local Planning Policy

12.2.21 The Hampshire Minerals and Waste Plan includes Policy 10: Protecting public health, safety and amenity (Hampshire County Council, 2013), which states:

"Minerals and waste development should not cause adverse public health and safety impacts, and unacceptable adverse amenity impacts.

Minerals and waste development should not:

a. release emissions to the atmosphere, land or water (above appropriate standards);

b. have an unacceptable impact on human health;

c. cause unacceptable noise, dust, lighting, vibration or odour;

d. have an unacceptable visual impact;

e. potentially endanger aircraft from bird strike and structures;

f. cause an unacceptable impact on public safety safeguarding zones;

g. cause an unacceptable impact on:

i. tip and quarry slope stability; or

ii. differential settlement of quarry backfill and landfill; or

iii. subsidence and migration of contaminants;

h. cause an unacceptable impact on coastal, surface or groundwaters;

i. cause an unacceptable impact on public strategic infrastructure;

j. cause an unacceptable cumulative impact arising from the interactions between minerals and waste developments, and between mineral, waste and other forms of development.

The potential cumulative impacts of minerals and waste development and the way they relate to existing developments must be addressed to an acceptable standard."

12.2.22 A number of policies from the Eastleigh Local Plan Review (2001-2011) have been saved until they can be replaced by the new Local Plan currently passing through the examination process (Eastleigh Borough Council, 2006). Saved Policy 32.ES states that:

"Proposals for uses which may generate air, land or water pollution will only be permitted if the Borough Council is satisfied that they have been designed to control their impact to an acceptable level."

12.2.23 Saved Policy 33.ES states that:

"Where new development appears likely to have a significant impact on air quality in the locality, or future occupiers of the development may be subject to unacceptable air quality, the Council will require a suitable air quality assessment to be carried out prior to consideration of the application."

Air Quality Action Plan

12.2.24 Eastleigh Borough Council has developed an Air Quality Action Plan (AQAP) for each of its AQMAs which sets out measures that the council intend to implement in order to help meet the objectives (Eastleigh Borough Council, 2020).

Guidance

12.2.25 The Institute of Air Quality Management (IAQM) has published Guidance on the Assessment of Mineral Dust Impacts for Planning (IAQM, 2016). The guidance has been prepared to assist practitioners in undertaking dust assessments for the operational phases of minerals developments and it is considered appropriate to follow the source-pathway-receptor approach underlying the IAQM dust assessment method for assessing the impacts.

Assessment Methodology

Existing Conditions

12.2.26 Information on existing air quality within the study area has been collated from the following sources:

- The results of monitoring and the Air Quality Annual Status Reports undertaken by Eastleigh Borough Council (Eastleigh Borough Council, 2020); and
- Background pollutant concentration maps published by Defra (Defra, 2021b).

Road Traffic Impacts

12.2.27 Receptors have been identified at locations where members of the public are likely to be regularly present over the averaging period of the objectives. The receptors have been located on the façades of properties closest to the road

sources, paying particular attention to those located close to junctions, where traffic may become congested, and there is a combined effect from several road links. The receptors are described in Table 12.2 and are shown in Figure 12.1.

Table 12.2: Description of Receptors

Receptor	Location	x	y	Z (m)
R1	108 Hamble Lane	447429.3	107835.4	1.5
R2	Rosegarth	447360.8	108468.0	1.5
R3	Threeways	447370.7	108700.4	1.5
R4	Melisande	447370.7	108726.7	1.5
R5	Pasadera	447379.4	108761.2	1.5
R6	Broxmoor	447689.8	110206.8	1.5
R7	1 Claremont Cottages	447671.1	110220.3	1.5
R8	6 St George Close	447752.7	110445.7	1.5
R9	43 Bowers Drive	447762.5	110675.3	1.5
R10	9 Jacobs Close	447773.4	110716.4	1.5

12.2.28 Concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been predicted at the receptors for the following scenarios:

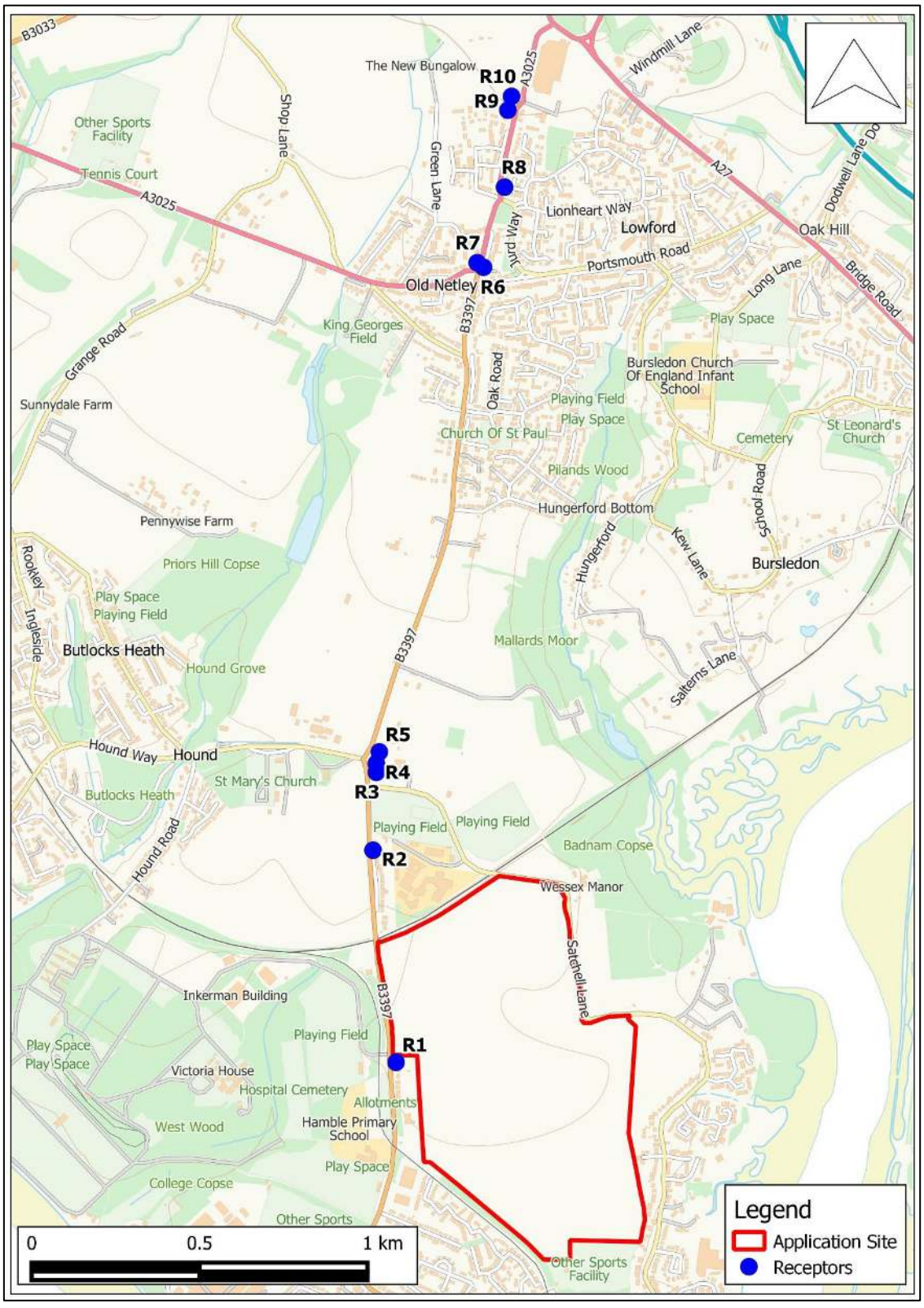
- 2019 baseline assessment; and
- 2023 both without and with the proposed development.

12.2.29 Concentrations have been predicted using the ADMS Roads (v5.0.0.1) dispersion model (CERC, 2021). The model requires the input of a range of data, details of which are provided in Air Quality Appendix 6.1, along with details of the model verification calculations.

12.2.30 There are many factors that contribute to uncertainty when predicting pollutant concentrations. The emission factors utilised in the air quality model are dependent on traffic data, which have inherent uncertainties associated with them. There are also uncertainties associated with the model itself, which simplifies real world conditions into a series of algorithms. The model

verification process, as described in Air Quality Appendix 6.1, minimises the uncertainties; however, future year predictions use projected traffic data, emissions data, and background concentrations. The most recent emission factors and background data published by Defra have been used in this assessment.

Figure 12.1: Location of Receptors



12.2.31 There is no official guidance in the UK on how to describe air quality impacts, nor how to assess their significance. The approach suggested by Environmental Protection UK (EPUK) and the IAQM in guidance on Land-Use Planning & Development Control: Planning for Air Quality has been used for this assessment (EPUK and IAQM, 2017). The air quality impacts have been described at each receptor by determining the percentage change in concentrations relative to an air quality assessment level (AQAL) and comparing this with the total long-term average concentration, as set out in Table 12.3.

12.2.32 For impacts on existing receptors, the AQALs for NO_2 and $PM_{2.5}$ are based on the annual mean objectives (as shown in Table 12.1). The AQAL for PM_{10} is an annual mean concentration of 32 µg/m^3 as measured data show that the 24-hour PM_{10} objective could be exceeded where annual mean concentrations are above 32 µg/m^3 (Defra, 2021a).

12.2.33 The air quality impact, i.e., the change in concentrations as a result of the proposed development, may have an effect on human health, dependent on the severity of the impact and other factors.

12.2.34 The IAQM guidance advises that the overall effect of the air quality impacts should be judged as either significant or not significant taking account of:

- The descriptions of the predicted impacts;
- The existing and future air quality in the absence of the development;
- The extent of current and future population exposure to the impacts;
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts;
- The potential for cumulative impacts, i.e., several slight impacts taken together could have a significant effect, or a moderate or substantial

effect confined to a small area and not obviously a cause of harm to human health could be described as not significant; and

- The consequences of the impacts, i.e., will the impacts have an effect on human health that can be considered significant? The impacts from an individual development would usually not be large enough to result in a measurable change in health outcomes regarded as significant by healthcare professionals, and therefore the impact on local air quality is used as a proxy for assessing effects on health.

12.2.35 The judgement of significance should be made by a competent, suitably qualified professional, and the professional experience of the consultant preparing the report is set out Chapter 5 of this ES.

Table 12.3: Impact Descriptors for Individual Receptors

Long-term Average Concentration at Receptor in Assessment Year b	% Change in Concentration Relative to AQAL [a]			
	1	2-5	6-10	>10
≤ 75% of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
≥ 110% of AQAL	Moderate	Substantial	Substantial	Substantial

a The % change rounded to a whole number. Changes of 0%, i.e. less than 0.5%, are described as negligible. The AQAL for NO_2 is 40 µg/m^3, the AQAL for PM_{10} is 32 µg/m^3 and the AQAL for $PM_{2.5}$ is 25 µg/m^3.
b The without scheme concentration where there is a decrease in predicted concentrations, and the with scheme concentration where there is an increase in predicted concentrations.

Operational Dust Impacts

12.2.36 Locations sensitive to dust emitted during site operations will be places where members of the public are regularly present. Residential properties and commercial operations close to the application site will be most sensitive to operational dust. Any areas of sensitive vegetation or ecology that are very close to dust sources may also be susceptible to some negative effects.

12.2.37 The IAQM minerals dust guidance describes a qualitative source-pathway-receptor approach to determine the risk of dust effects. The assessment method uses a number of steps to determine the site characteristics and baseline conditions, an estimate of the dust impact risk and an estimate of the likely magnitude of effects. Potential dust sources and activities have been identified and the risk of impacts at sensitive receptors determined based on the prevailing meteorological conditions and topography, the likely magnitude of emissions (with mitigation in place) and the distances over which effects may occur.

12.2.38 The IAQM minerals dust guidance divides activities on minerals sites into seven types to reflect their different potential impacts, with the relevant types for this assessment described below:

- Site preparation and restoration;
- Mineral extraction;
- Material handling;
- Mineral processing;
- Stockpiling and exposed surfaces;
- On-site transportation; and
- Off-site transportation.

12.2.39 A series of steps then consider the potential impact due to:

- the risk of health effects from an increase in exposure to $PM_{10;}$
- annoyance due to the deposition of dust;
- harm to the natural environment.

12.2.40 Full details of the dust impact assessment methodology are set out in Appendix 6.2.

12.3 Baseline Environment

LAQM Review and Assessment

12.3.1 Eastleigh Borough Council has declared four AQMAs for exceedances of the annual mean NO_2 objective. The Hamble Lane Area AQMA may be affected by emissions from traffic generated by the proposed development. The AQMA follows the B3397 Hamble Lane from its junction with the A3025 Portsmouth Road to the Windhover roundabout, encompasses the roundabout and follows the A27 southeast to the Borough boundary with a 30m corridor either side. The AQMA is shown in Figure 12.2.

12.3.2 No AQMAs have been declared for PM_{10}; therefore, it is unlikely that there are exceedances of the PM_{10} objectives anywhere in Eastleigh.

Local Air Quality Monitoring

12.3.3 Eastleigh Borough Council operates three automatic monitoring sites; however, the sites are located in the town of Eastleigh, approximately 10km to the north-northeast of the application site, and data from them would not be representative of air quality within the study area.

12.3.4 Eastleigh Borough Council also undertook NO_2 diffusion tube monitoring at 53 sites in 2019, and data from sites located on Hamble Lane are shown in Table 12.4, with the monitoring site locations shown in Figure 12.2.

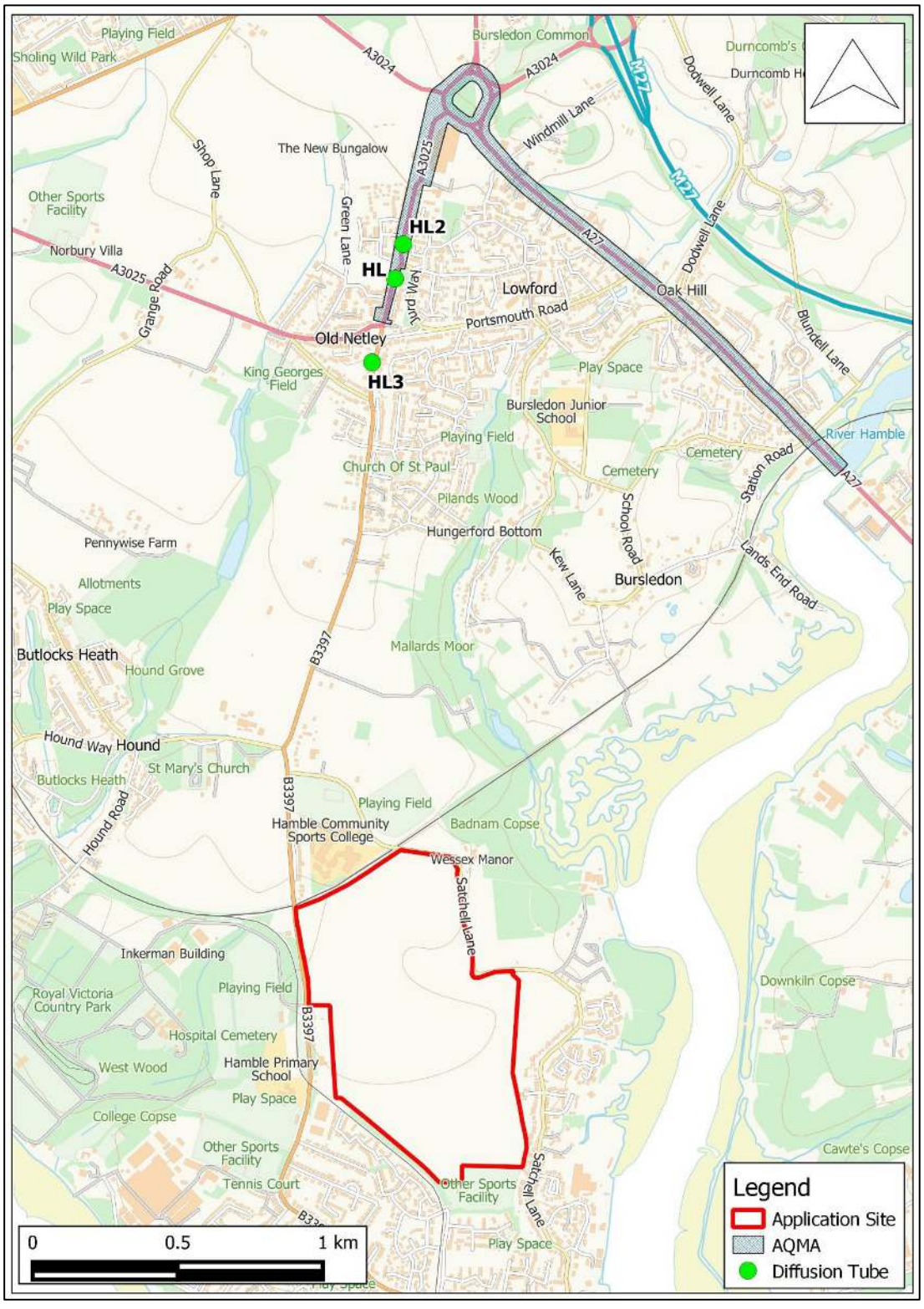
12.3.5 Measured annual mean NO_2 concentrations on Hamble Lane ranged from 21.7 to 42.3 µg/m^3 between 2015 and 2019. Annual mean NO_2 concentrations were at, or above, the objective at monitoring site HL2 in 2016 and 2017. No exceedances of the annual mean NO_2 objective have been measured at any of the monitoring sites on Hamble Lane in 2018 or 2019. Monitoring sites HL and HL2 are located within the Hamble Lane Area AQMA.

Table 12.4: Measured Annual Mean NO_2 Concentrations

Site ID	Location	Site Type [a]	Annual Mean (µg/m3) [b]				
			2015	2016	2017	2018	2019
HL	Hamble Lane	R	32.0	36.9	33.3	33.6	29.9
HL2	Hamble Lane	R	30.5	40.0	**42.3**	39.2	38.2
HL3	Hamble Lane	R	-	-	-	22.1	21.7
Objective			40				

a R = Roadside
b Exceedances of the objective are shown in bold.

Figure 12.2: Air Quality Monitoring Sites and AQMA



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Background Concentrations

12.3.6 The estimated background concentrations across the study area are shown in Table 12.5. The background concentrations are well below the objectives.

Table 12.5: Estimated Annual Mean Background Concentrations in 2019 and 2023 (µg/m^3)

Grid	Annual Mean (µg/m^3)					
	NO_2		PM_{10}		$PM_{2.5}$	
	2019	2023	2019	2023	2019	2023
447500,110500	15.6	13.8	15.0	14.3	10.2	9.6
447500,107500	16.8	15.5	13.6	12.9	9.5	8.9
447500,108500	15.5	14.1	13.9	13.2	9.4	8.9
Objective	40		40		25	

Predicted Baseline Concentrations

12.3.7 Baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been modelled at the existing receptor locations and the results are shown in Table 12.6. Predicted annual mean baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ are below the AQALs in 2019 and 2023.

Table 12.6: Predicted Baseline Concentrations in 2019 and 2023

Receptor	Annual Mean (µg/m^3)					
	NO_2		PM_{10}		$PM_{2.5}$	
	2019	2023	2019	2023	2019	2023
R1	21.8	18.8	14.6	13.9	10.1	9.5
R2	22.7	18.9	15.4	14.6	10.3	9.7
R3	19.6	16.8	14.7	13.9	9.9	9.3
R4	19.8	17.0	14.7	13.9	9.9	9.3
R5	19.9	17.0	14.7	14.0	9.9	9.3
R6	28.2	22.5	17.6	16.8	11.7	11.0
R7	29.3	23.3	17.8	17.0	11.8	11.1
R8	29.7	23.5	17.4	16.6	11.6	10.9
R9	22.4	18.4	16.3	15.6	11.0	10.3
R10	22.0	18.1	16.2	15.4	10.9	10.2
AQAL	40		32		25	

12.4 Embedded Mitigation

12.4.1 The following is a summary of the mitigation measures that will be utilised during the operation of the proposed development:

- A Dust Management Plan (DMP) will be prepared and agreed with the local planning authority for implementation at the proposed development;
- Screening bunds will be constructed along the site boundary between the onsite operations and nearby sensitive receptors. The bunds will be seeded immediately on completion;
- Existing vegetation will largely be retained, where practicable;
- Won minerals will be transported to the processing area using a field conveyor;
- The processing area and stockpiles will be located more than 100m from any dust sensitive receptors;
- The screening and washing of minerals is a wet process, that would minimise dust emissions;
- Drop heights will be minimised;
- Water suppression will be used as necessary;
- Duration and timing of dust generating activities will be restricted when undertaken within 100m of dust sensitive receptors during dry/windy conditions, when operationally possible;
- On-site vehicle speeds will be kept below 10mph; and
- All HGVs would be covered prior to leaving the site and would use a wheelwash and travel over more than 50m of clean, hard surface before joining the public highway.

12.5 Likely Significant Environmental Effects

Operational Phase (Extraction and Restoration)

Road Traffic Impacts

12.5.1 Predicted annual mean NO_2 concentrations in 2023, both without and with the proposed development, are shown in Table 12.7. The predicted NO_2 concentrations are all well below the AQAL and the impacts are described as negligible at all receptors.

12.5.2 Predicted annual mean PM_{10} concentrations in 2023, both without and with the proposed development, are shown in Table 12.8. The predicted PM_{10} concentrations are all well below the AQAL and the impacts are described as negligible at all receptors.

12.5.3 Predicted annual mean $PM_{2.5}$ concentrations in 2023, both without and with the proposed development, are shown in Table 12.9. The predicted annual mean $PM_{2.5}$ concentrations are all well below the AQAL and the impacts are described as negligible at all receptors.

Table 12.7: Predicted NO_2 Impacts in 2023 [a]

Receptor	Annual Mean (µg/m³)		% Change in Concentration Relative to AQAL	Total Concentration as % of AQAL	Impact Descriptor
	WO	W			
R1	18.8	18.9	0	47	Negligible
R2	18.9	19.0	0	48	Negligible
R3	16.8	16.9	0	42	Negligible
R4	17.0	17.0	0	43	Negligible
R5	17.0	17.1	0	43	Negligible
R6	22.5	22.6	0	57	Negligible
R7	23.3	23.4	0	59	Negligible
R8	23.5	23.6	0	59	Negligible
R9	18.4	18.5	0	46	Negligible
R10	18.1	18.2	0	45	Negligible
AQAL	40		-		

a WO = without scheme, W = with scheme.

Table 12.8: Predicted PM_{10} Impacts in 2023 [a]

Receptor	Annual Mean (µg/m³)		% Change in Concentration Relative to AQAL	Total Concentration as % of AQAL	Impact Descriptor
	WO	W			
R1	13.9	13.9	0	43	Negligible
R2	14.6	14.7	0	46	Negligible
R3	13.9	13.9	0	44	Negligible
R4	13.9	13.9	0	44	Negligible
R5	14.0	14.0	0	44	Negligible
R6	16.8	16.8	0	53	Negligible
R7	17.0	17.1	0	53	Negligible
R8	16.6	16.6	0	52	Negligible
R9	15.6	15.6	0	49	Negligible
R10	15.4	15.4	0	48	Negligible
AQAL	32		-		

a WO = without scheme, W = with scheme.

Table 12.9: Predicted $PM_{2.5}$ Impacts in 2023 [a]

Receptor	Annual Mean ($\mu g/m^3$)		% Change in Concentration Relative to AQAL	Total Concentration as % of AQAL	Impact Descriptor
	WO	W			
R1	9.5	9.5	0	38	Negligible
R2	9.7	9.7	0	39	Negligible
R3	9.3	9.3	0	37	Negligible
R4	9.3	9.3	0	37	Negligible
R5	9.3	9.3	0	37	Negligible
R6	11.0	11.0	0	44	Negligible
R7	11.1	11.2	0	45	Negligible
R8	10.9	10.9	0	44	Negligible
R9	10.3	10.3	0	41	Negligible
R10	10.2	10.2	0	41	Negligible
AQAL	25		-		

a WO = without scheme, W = with scheme.

Dust Impacts

Screening

12.5.4 The operation of the proposed development will potentially lead to dust emissions. There are human receptors within 250m of the application site boundary; therefore, a detailed dust assessment is required. An area of ancient woodland at Mallards Moor is also located within 250m of the application site boundary and the dust impact on this habitat has been assessed. No other sensitive ecological receptors are located within 250m of the application site boundary.

Residual Source Emissions

12.5.5 The residual source emissions, i.e., the emissions with designed in mitigation in place, have been estimated for each of the main operational activities.

Site Preparation

12.5.6 The application site area is approximately 60ha, with a working area of approximately 42ha; however, the area would be worked in phases, working anticlockwise following the Phase 1 construction of a freshwater pond, a silt pond and the plant area at the north of the site, as detailed within the submitted Method of Working plans. Each working phase would range in size from 3.6 to 7.6ha. Screening bunds with a height of 3-5m on the western boundary, and 4m on the northern and eastern boundary, would be constructed using soils and overburden removed from the Phase 1 areas. The bunds would be seeded immediately on completion. There are unlikely to be any more than five heavy plant in operation during the site preparation works. The top soils and overburden removal could be a source of dust. The residual source emission magnitude during site preparation is considered to be medium.

Mineral Extraction, Materials Handling and On-site Transportation

12.5.7 Sand and gravel would be extracted using a 360° excavator and moved by a wheeled loading shovel onto a field conveyor, which will move the aggregates to the plant area for processing. Each working area would be relatively small (3.6 to 7.6ha), with just one extractor in use at any one time to win the minerals. The minerals would retain a high level of moisture, reducing the likelihood of dust emissions as the minerals are worked.

12.5.8 The mineral extraction works will take place for up to 7 years. Approximately 1.7 million tonnes of sand and gravel would be extracted at an average rate of around 250,000 tonnes/yr. Most of the extraction works would take place more than 100m from dust sensitive receptors and would be screened from the surrounding area by the bunds.

12.5.9 The use of a field conveyor to transport the minerals from the extraction phase to the plant area would minimise any dust emissions from on-site transportation.

12.5.10 The residual source emission magnitude during mineral extraction, handling and on-site transportation is considered to be small.

Stockpiles and Exposed Surfaces

12.5.11 Due to the progressive working of the site, the exposed surface of the void would never be more than 10 ha and the sand and gravel would have a low dust potential due to inherent moisture in the minerals. The working areas are shielded from local receptors by the screening bunds.

12.5.12 Processed mineral will be moved to stockpiles in the centre of the plant area by loading shovel. The stockpiles would be located more than 100m from any dust sensitive receptors, and water suppression would be used if visible dust emissions were observed from the stockpiles.

12.5.13 The residual source emission magnitude from exposed surfaces and stockpiles is considered to be small.

Mineral Processing

12.5.14 The processing plant would be located in the plant area, well over 100m from any dust sensitive receptors. The extracted minerals will be screened and washed and sorted into sizes, likely to be 10mm, 20mm and sand fractions. The screening and washing process is wet, which would control any dust emissions.

12.5.15 The residual source emission magnitude during mineral processing is considered to be small.

Off-site Transportation

12.5.16 There would be a maximum of around 72 additional HGV movements out of the application site. All HGVs would be covered prior to leaving the site and would use a wheelwash and travel over more than 50m of clean, hard surface before joining the public highway. The dust controls would ensure that there is minimal trackout from the site; therefore, the residual source emission magnitude for off-site transportation is considered to be small.

Summary of Residual Source Emissions

12.5.17 A summary of the residual source emissions is shown in Table 12.10.

Table 12.10: Summary of Residual Source Emissions

Activity	Residual Source Emissions
Site Preparation	Medium
Mineral Extraction, Materials Handling and On-site Transportation	Small
Stockpiles and Exposed Surfaces	Small
Mineral Processing	Small
Off-site Transportation	Small

Pathway Effectiveness

12.5.18 The transport of fugitive dust in the air is dependent on the prevailing meteorological conditions. Receptors downwind of the dust emissions source, with regard to the prevailing wind, will be exposed to dust more frequently than those located upwind. An eight year average wind rose from Southampton

Airport meteorological station (see Figure 12.3) shows that the prevailing wind direction is from the southwest. Southampton Airport meteorological station is located approximately 9 km to the north-northwest of the application site and wind conditions are likely to be similar to those at the application site.

12.5.19 There is a risk that dust will be entrained from the ground even when no dust generating activities are taking place. Wind speeds greater than 5 m/s are considered strong enough to initiate the suspension of dust from the ground, and the risk is increased on dry days, i.e., when less than 0.2 mm of rainfall are recorded over a 24 hour period. The prevailing wind data show that, for approximately 59% of the time, wind speeds are likely to be below 5 m/s, when dust is unlikely to become suspended in the air.

12.5.20 Analysis of average rainfall data for the area shows that, over the 30 year period from 1981 to 2010, an average of 150-160 days will be wet days, i.e. rainfall will be greater than 0.2 mm (Met Office, 2021). Therefore, for approximately 42% of the time, daily rainfall will be greater than 0.2 mm, when there will be natural dust suppression.

12.5.21 Following the construction of screening bunds, most dust sensitive receptors would be more than 100m from dust generating activities at the application site, as shown in Figure 12.4; however, part of the Hamble School and Wessex Manor, to the north and northeast of the application site respectively, and some dwellings off Satchell Lane to the east, are within 100m of dust generating activities. The area of ancient woodland at Ballards Moor is between 100-200m from dust generating activities.

12.5.22 Receptors have been identified to represent where the worst-case impacts are likely to occur due to dust generating activities, as shown in Figure 12.4 and described in Table 12.11.

12.5.23 The wind frequency category towards each receptor, estimated from the meteorological data, is shown in Table 12.11. In order to provide a conservative assessment, it has been assumed that dust could be emitted from any location within the working area.

Figure 12.3: 8 Year Average Wind Rose Southampton Airport (2012-2019)

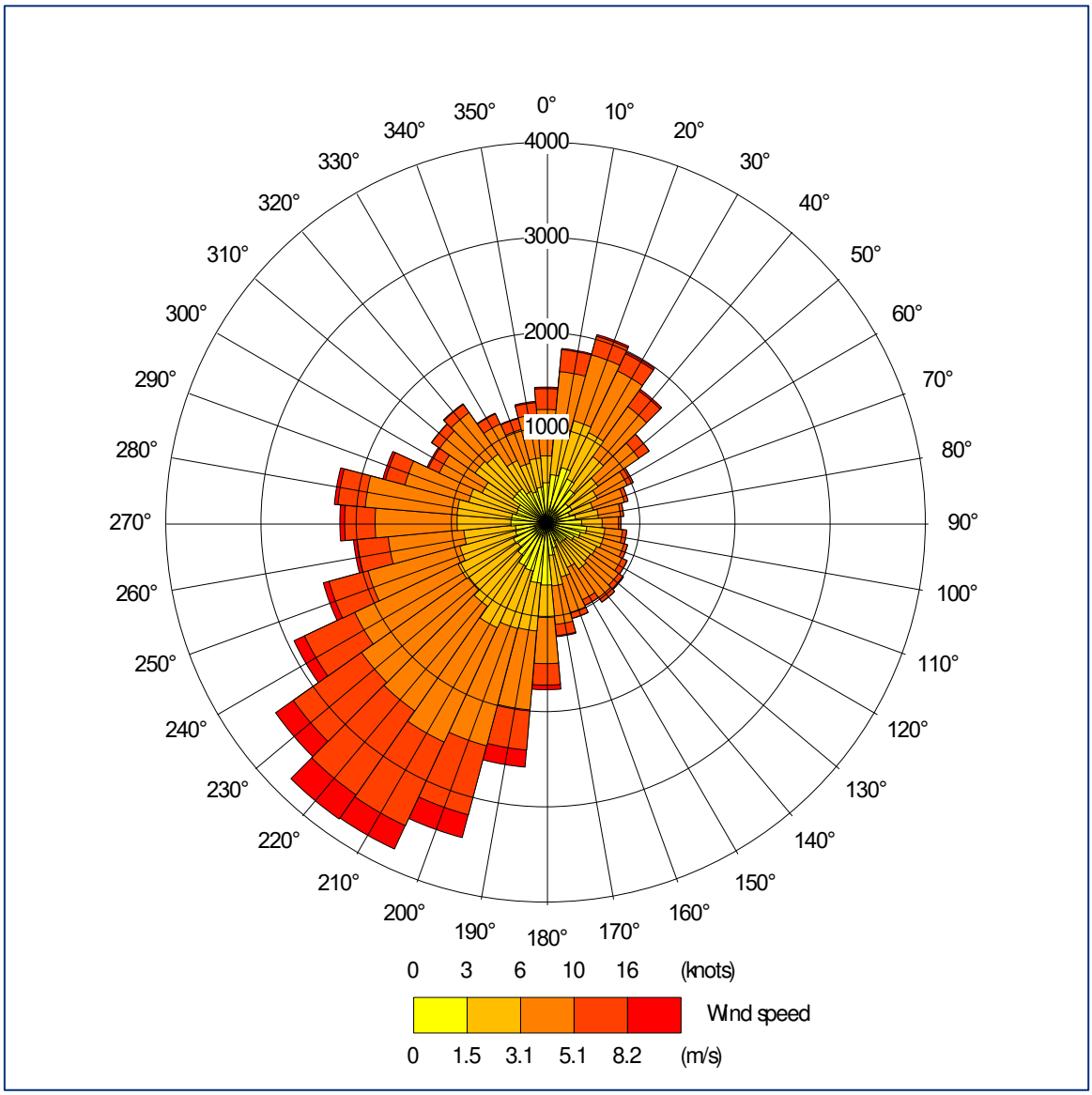

Figure 12.4: Dust Receptors and 100m and 200m Distance from the Working Area

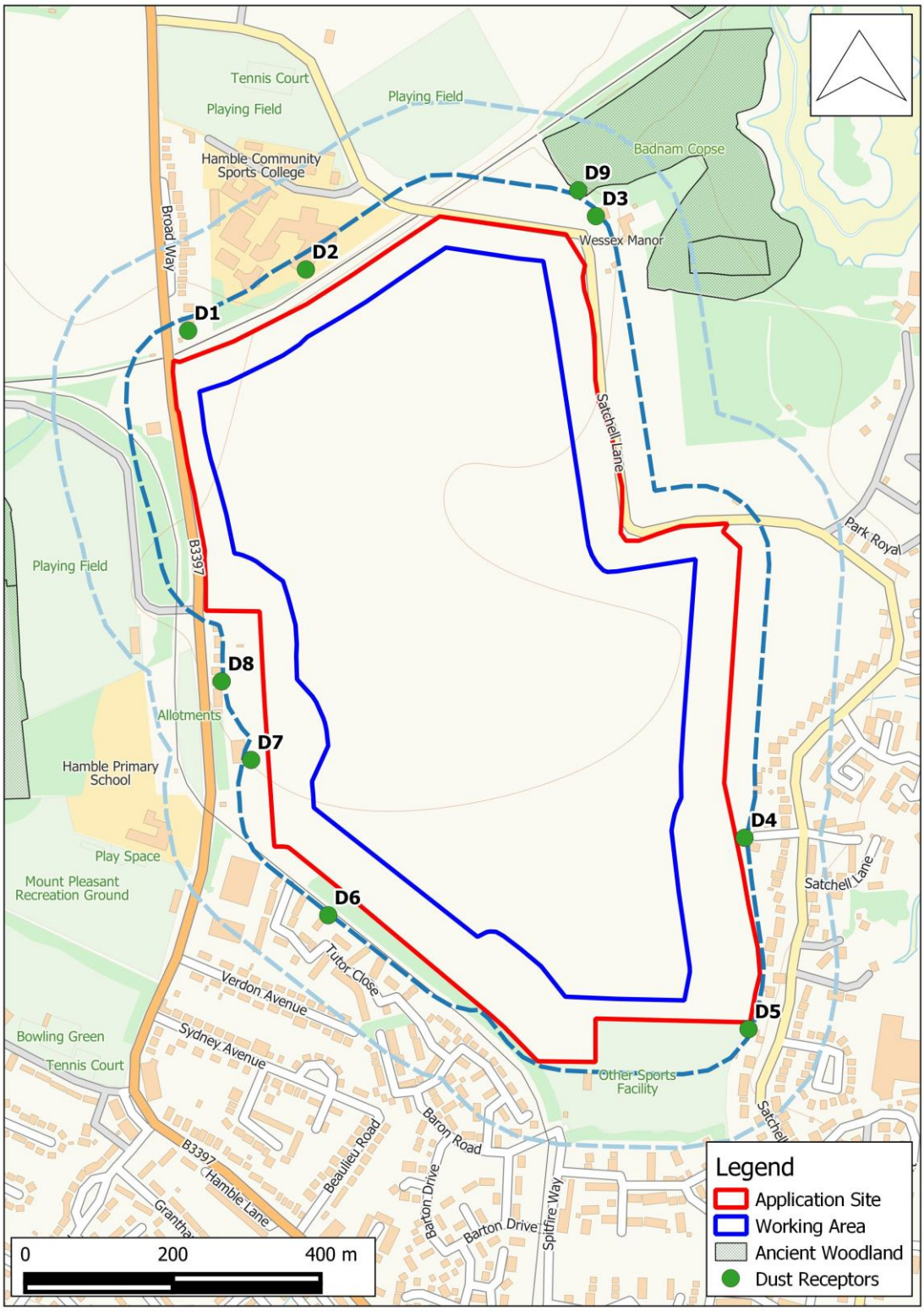

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Table 12.11: Wind Frequency Category for Each Receptor Area

Receptor	Description	Wind Sectors Affecting Receptor Area (°)	Frequency of Wind >5m/s Towards Receptor Area (%)	Frequency of Wind >5m/s Towards Receptor Area on Dry Days (%)	Wind Frequency Category
D1	Dwelling	70-170	1	1	Infrequent
D2	Hamble School	80-220	9	5	Moderately Frequent
D3	Dwelling	180-260	12	6	Moderately Frequent
D4	Dwelling	200-350	14	7	Moderately Frequent
D5	Dwelling	280-350	3	1	Infrequent
D6	Dwelling	340-110	4	2	Infrequent
D7	Commercial	350-130	4	2	Infrequent
D8	Dwelling	0-140	3	2	Infrequent
D9	Ancient Woodland	180-280	14	7	Moderately Frequent

12.5.24 The potential impact of dust emissions at receptors is dependent on the distance from the source to the receptor and the presence of any physical features that may affect dispersion. Particles responsible for most dust annoyance will usually deposit within 100m of the source and the receptors within this distance would be categorised as close.

12.5.25 Combining the wind frequency category with the receptor distance category determines the pathway effectiveness for each receptor area, as shown in Table 12.12.

Table 12.12: Pathway Effectiveness for Each Receptor Area

Receptor	Frequency of Potentially Dusty Wind	Receptor Distance Category	Pathway Effectiveness
D1	Infrequent	Close	Ineffective
D2	Moderately Frequent	Close	Moderately Effective
D3	Moderately Frequent	Close	Moderately Effective
D4	Moderately Frequent	Close	Moderately Effective
D5	Infrequent	Close	Ineffective
D6	Infrequent	Intermediate	Ineffective
D7	Infrequent	Close	Ineffective
D8	Infrequent	Intermediate	Ineffective
D9	Moderately Frequent	Intermediate	Moderately Effective

Potential Dust Deposition Effects

12.5.26 The pathway effectiveness for each receptor has been combined with the overall residual source emissions to estimate the dust impact risk at each receptor. The dust impact risk and receptor sensitivity have then been used to determine the magnitude of the dust effect at each receptor. The dust deposition effects are described as negligible at all of the receptors, as summarised in Table 12.13.

12.5.27 There is a risk of medium residual source emission during the site preparation phase when the screening bunds are being constructed. This could result in a dust impact risk, and a slight adverse magnitude of dust effects at receptors D2, D3 and D4. The risk of slight adverse dust effects would be of short

duration, and once the screening bund construction is complete, the dust deposition effects would be negligible.

Table 12.13: Summary of Dust Deposition Effects

Receptor	Overall Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effect
D1	Small	Ineffective	Negligible	High	Negligible
D2	Small	Moderately Effective	Negligible	High	Negligible
D3	Small	Moderately Effective	Negligible	High	Negligible
D4	Small	Moderately Effective	Negligible	High	Negligible
D5	Small	Ineffective	Negligible	High	Negligible
D6	Small	Ineffective	Negligible	High	Negligible
D7	Small	Ineffective	Negligible	Medium	Negligible
D8	Small	Ineffective	Negligible	High	Negligible
D9	Small	Moderately Effective	Negligible	Medium	Negligible

Dust Deposition Health Effects

12.5.28 The annual mean PM_{10} concentration at receptor R1 is predicted to be 14.6 µg/m^3 in 2019 (see Table 12.6). Given the proximity of the receptor to the road, this is likely to be the maximum annual mean PM_{10} concentration within the area that may be affected by PM_{10} emissions from the proposed development. IAQM minerals guidance takes the approach that there is little risk that a process contribution from a dust source would lead to an exceedance of the objectives where background ambient PM_{10} concentrations

are below 17µg/m^3; therefore, the proposed development will have an insignificant effect on health due to fugitive emissions of PM_{10}.

Post Restoration

12.5.29 Following restoration at the landfill there would no longer be any effects on air quality or dust deposition.

12.6 Additional Mitigation, Compensation, Enhancement Measures

Road Traffic

12.6.1 The assessment has demonstrated that the scheme will not cause any exceedances of the air quality objectives. Mitigation measures to reduce pollutant emissions from road traffic are principally being delivered in the longer term by the introduction of more stringent emissions standards, largely via European legislation. It is not considered appropriate to propose further road traffic mitigation measures for this scheme.

Dust

12.6.2 The magnitude of dust effects at local receptors has been shown to be negligible. It is considered that the designed in mitigation measures provide an appropriate level of mitigation at the site.

12.6.3 During the screening bund construction, consideration will be given to meteorological conditions at the time of the works, and additional water suppression will be used if visible dust emissions occur. Bund construction will be paused if water suppression does not control dust emissions close to dust sensitive receptors.

12.6.4 During adverse weather conditions, such as prolonged dry weather and/or high winds, additional water suppression will be used to prevent dust emissions from the site. Activities with the potential to cause dust emissions will be monitored, and should visible dust be generated, corrective will be taken, including the use of water suppression.

12.7 Assessment Summary and Likely Significant Residual Environmental Effects

12.7.1 It is considered that the effects on air quality and dust due to the operation of the proposed development would not be significant and a residual impact assessment is not required.

12.8 Cumulative Impacts

12.8.1 The baseline traffic data provided for the air quality assessment includes committed developments (see Appendix 7.1, Transport Assessment); therefore, cumulative impacts due to transport emissions have been included in the assessment.

12.8.2 No other dust sources have been identified that might lead to cumulative effects at local receptors.

12.9 Conclusion

12.9.1 The operational impacts of increased emissions arising from the additional traffic on local roads due to the development have been assessed. Concentrations have been modelled at ten existing receptors, representing properties where the impacts are expected to be greatest. It is concluded that concentrations of NO_2, PM_{10} and $PM_{2.5}$ will remain below the AQALs at all existing receptors in 2023, whether the scheme is developed or not, and that the impacts will be negligible.

12.9.2 The operational phase dust risk assessment has determined that, with the designed in mitigation measures, the magnitude of the dust effect from the extraction of the minerals is also negligible.

12.9.3 Given that the impact of the proposed development is negligible, it is considered that the effects of the operation of the proposed development on air quality and dust will be insignificant.

12.9.4 There should be no constraints to the development of the site, with regard to the air quality and dust effects on local receptors, as the proposed development is consistent with the relevant parts of:

- The NPPF;
- Policy 10 of the Hampshire Minerals and Waste Plan; and
- Policy 32.ES and Policy 33.ES of the Eastleigh Local Plan Review (2001-2011).

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