



Persimmon Homes

Dapper's Lane, Angmering

Air Quality Assessment

September 2020

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Document Control

Project: Dapper's Lane, Angmering
Client: Persimmon Homes
Job Number: A118338
File Origin: O:\Acoustics Air Quality and Noise\Active Projects

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Issue	Date	Status
1	10 th September 2020	First Issue



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Executive Summary

WYG have undertaken an Air Quality Assessment for the proposed residential development at Land to the West of Dapper's Lane, Angmering.

Construction Phase

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

During the construction phase, the potential impacts from construction on air quality will be managed through site-specific mitigation measures detailed within this assessment. With these mitigation measures in place, the effects from the construction phase are not predicted to be significant.

Operational Phase

Detailed dispersion modelling of traffic pollutants has been undertaken for the proposed development. The impacts during the operational phase take into account exhaust emissions from additional road traffic generated due to the proposed development.

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

The long-term (annual) assessment of the effects associated with the proposed development with respect to Nitrogen Dioxide (NO₂) is determined to be 'negligible'. With respect to PM₁₀ and PM_{2.5} exposure, the effect is determined to be 'negligible' at all identified existing sensitive receptor locations.

All proposed receptor locations are expected to be exposed to air quality below the Air Quality Objective for NO₂, PM₁₀ and PM_{2.5}. No further mitigation is required to protect future occupants.



1. Introduction

Persimmon Homes commissioned WYG Environmental Planning and Transport (WYG) to prepare an Air Quality Assessment to support an application for the proposed residential development at Land to the West of Dapper's Lane, Angmering.

1.1 Site Location

The approximate United Kingdom National Grid Reference (NGR) is approximately 507201, 105191. The Site is bounded to the north by residential properties and woodland, to the east by Dapper's Lane and residential properties and farmland, to the south by residential properties on Woodlands Close, and to the west by open fields and St. Margret's Primary School. Reference should be made to Figure 1 for a map of the proposed development site and surrounding area.

1.2 Context

The primary source of the air quality associated with the proposed scheme is from vehicle movements, arriving and departing the proposed mixed-use development. The traffic data generated by the development (provided by WYG Transport Consultants) has been assessed at the surrounding sensitive receptors and proposed sensitive receptors.

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 using 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 impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).



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, Defra, 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, Highways England, November 2019
- ✧ Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- ✧ Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- ✧ 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/>);
- ✧ Arun District Council (<https://www.arun.gov.uk/>).

Site Specific Reference Documents

- ✧ 2019 Annual Air Quality Status Report for Arun District Council ; and,



- ✧ Arun District Council Local Plan 2011-2031, Adopted July 2018.

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 pollutant, 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. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2.1 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
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).

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 (para. 181) 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); and*
- *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."



3. Assessment Methodology

The potential environmental effects of the operational phase of the proposed development have been identified as proposed vehicle movements. The significance 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 Significance of the Air Quality Effects

The impact description 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 effects are provided as a percentage of the Air Quality Objective (AQO), which may be an AQO, 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 effects 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 Description of Effects Matrix

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 application 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 application site has been defined from several sources, as described in the following sections.

Local Air Quality Management (LAQM)

Based upon the location of the application site, a review of the monitoring within ADCC has been undertaken.

As required under section 82 of the Environment Act 1995, Arun District Council (ADC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction. The assessments have indicated that concentrations of NO₂ are above the relevant AQOs at a number of locations of relevant public exposure within the Council. ADC currently has no designated Air Quality Management Areas (AQMA).

Air Quality Monitoring

Monitoring of air quality within ADC 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.

Continuous Monitoring

ADC did not operate any automatic monitoring stations in 2019.

Non - Continuous Monitoring

ADC operates a network of passive diffusion tubes. The closest diffusion tube is diffusion tube 17, which is located approximately 4.14 km west of the application site. The most recently available diffusion tube data is from 2019 which is presented in Table 4.1.

Table 4.1 Monitored Annual Mean NO₂ Concentrations

Site ID	Site Name	X	Y	Site Type	NO ₂ Annual Mean Concentration 2019 (µg/m ³)
1	Litt01	502564	102149	Roadside	20
2	Litt02	503439	103364	Roadside	20
3	Litt03	502559	102888	Urban Background	-
4	Litt04	502730	101225	Roadside	21



Site ID	Site Name	X	Y	Site Type	NO ₂ Annual Mean Concentration 2019 (µg/m ³)
5	Arun05	501825	107165	Roadside	13
6	Arun06	502337	106555	Roadside	21
7	Arun07	501478	107052	Urban Background	-
8	Ford08	500301	104374	Roadside	15
9	Bog09	493778	99135	Roadside	20
10	Bog10	496168	100384	Roadside	20
11	Bog11	493429	100381	Urban Background	-
12	Bog12	493361	101225	Roadside	26
13	Bog13	493417	104374	Roadside	24
14	Arun14	501320	106901	Roadside	23
16	Arun16	502337	106555	Roadside	13
17	Arun17	502862	105338	Kerbside	31
18	Bog18	491815	101170	Roadside	18
19	Yap19	497607	103312	Roadside	15
20	Barn20	495975	104395	Roadside	18
21	Bog21	493367	101169	Roadside	26

Diffusion tubes Litt02 and Arun17 shown in Table 4.1 have been utilised for model verification.

4.2 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 (Atmospheric Dispersion Modelling System) model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data. The 2019 meteorological data used in the assessment is derived from Shoreham 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 2 for an illustration of the prevalent wind conditions at the Shoreham Meteorological Station site.

4.3 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 application 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.

4.4 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 4.3 and the spatial locations of all of the receptors are illustrated in Figure 1.

Table 4.3 Long-Term Modelled Existing Sensitive Receptor Locations

Discrete Sensitive Receptor		UK NGR (m)	
		X	Y
R1	33 Merryfield Crescent	507247	104641
R2	3-4 The Square	506804	104366
R3	Ross Cottage, Station Road	506805	104279
R4	Hammerpot House, Arundel Road	506714	105619
R5	5 Loxwood	507891	103178
R6	Orchard House, Roundstone Lane	507384	103226
R7	15 Darlington Walk	506467	103136
R8	3 Willowbank Cottages	504056	103475
R9	69 Worthing Road	503610	103304
R10	6 Lynmister Road	502697	103466
R11	1 Mill Lane	502761	104043
R12	245 Lynminster Road	502855	105307
R13	9 Arundel Road	504512	105841
PR1	Proposed Receptor	507202	105212
PR2	Proposed Receptor	507104	105272
PR3	Proposed Receptor	507059	105105



4.5 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) 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;
- 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. Following a search within a 2 km radius of the site boundary, four ecological receptors were identified.

Table 4.4 Ecological Receptors

Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Road Centre Line (m)
			X	Y		
E1	Groom's Copse	AW	507816	105061	0.58	117
E2	Groom's Copse	AW	507960	105115	0.72	98
E3	Groom's Copse	AW	508096	105197	0.86	96
E4	Groom's Copse	AW	507880	105448	0.67	165
E5	Groom's Copse	AW	507802	105446	0.60	173
E6	Charloe Furze	AW	505877	105710	1.21	15
E7	Charloe Furze	AW	505750	105709	1.33	15
E8	Charloe Copse	AW	505531	105733	1.54	17
E9	Charloe Copse	AW	505102	105808	1.98	17
E10	Polingdown Copse	AW	505048	105816	2.03	16
E11	Polingdown Copse	AW	504714	105874	2.37	16

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Site ID	Site	Designation	UK NGR (m)		Distance from Site (km)	Distance from Road Centre Line (m)
			X	Y		
E12	Poling Copse	AW	504662	105887	2.42	23
E13	Poling Copse	AW	504405	105899	2.67	17



5. Assessment of Air Quality Impacts - Construction Phase

5.1 Pollutant Sources

Other than negligible emissions from construction vehicles and equipment, 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 are 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. 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	~10-50 HDV Outward Movements	Medium

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
Demolition	N/A		N/A		N/A
Earthworks	Medium	10-100 receptors within 50m of the application site	Low	Annual Mean of <24 ug/m ³ for PM ₁₀ 10-100 Highly Sensitive Receptors within 50 m	N/A
Construction	Medium		Low		N/A
Trackout	Medium	10-100 receptors within roads up to 500m from the site	Low		N/A



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 development, without mitigation, is presented below.

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	Medium	Low	N/A
Construction	Medium	Low	N/A
Trackout	Low	Low	N/A

Appropriate mitigation measures are detailed and presented in Section 7. 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, transportation 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 and PM₁₀ 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, as contained within the supporting Traffic Assessment (TA), the operational phase assessment has been undertaken with an assumed operational opening year of 2021. The assessment scenarios are therefore:

- ✧ 2019 Baseline = Existing baseline conditions;
- ✧ 2021 "Do Minimum" = Baseline conditions + committed development flows; and
- ✧ 2021 "Do Something" = Baseline conditions + committed development flows + proposed development flows.

6.1 Existing and Predicted Traffic Flows

Baseline 2019 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).

2018 traffic data was sourced from the Department for Transport (DfT) road statistic database. To calculate the predicted 2021 "do minimum" year traffic flows, a TEMPro factor of 1.04 has been applied.

To calculate the 2021 "do something" operational year traffic flows, the proposed development traffic flows have been distributed across the model area and have been added onto the 2021 "do minimum" scenario flows.

Emission factors for the 2019 baseline and 2021 projected 'do minimum' and 'do something' scenarios have been calculated using the Emission Factor Toolkit (EFT) Version 10.1 (August 2020).

It is assumed the average vehicle speeds on the local road network in an opening year of 2021 will be broadly the same as the ones in 2019. A 50 m 20 km/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. Detailed traffic figures are provided in the Table 6.1.

Table 6.1 Traffic Data

Link	Speed (km/h)	2019		2021			
		AADT	HGV %	Do Minimum		Do Something	
				AADT	%HGV	AADT	%HGV
Dapper's Lane	48	4,266	2.0	4,418	2.0	4,607	2.0
Water Lane (West)	32	5,880	2.0	6,090	2.0	6,184	2.0
Station Road	48	5,880	2.0	6,090	2.0	6,137	2.0
A259	80	31,257	1.4	32,370	1.4	32,401	1.4
Lymister Road	48	12,480	4.6	12,924	4.6	12,934	4.6
A27	112	33,634	5.6	34,831	5.6	34,879	5.6
Arundel Road	48	2,051	2.0	2,124	2.0	2,171	2.0
The Causeway	64	32,121	5.0	33,264	5.0	33,285	5.0
A280	112	9,779	3.2	10,127	3.2	10,221	3.2
Water Lane (East)	48	5,880	2.0	6,090	2.0	6,184	2.0
Roundstone Bypass Road	48	32,074	1.5	33,216	1.5	33,248	1.5

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 Technical Guidance (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 an 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 2019

The background concentrations shown in Table 6.2 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 application site. In August 2020, Defra issued revised 2018 based background maps for nitrogen oxide (NO_x), NO₂, PM₁₀ and PM_{2.5}.

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

Receptor Location	2019			
	NO _x	NO ₂	PM ₁₀	PM _{2.5}
Local Authority Monitoring				
2	14.37	10.88	14.03	9.72
17	12.26	9.41	13.78	8.99
Existing Sensitive Receptors				
R1	12.40	9.50	13.83	9.39
R2	11.98	9.19	14.22	9.52
R3	11.98	9.19	14.22	9.52
R4	13.31	10.16	14.12	9.30
R5	13.90	10.57	13.93	9.64
R6	13.90	10.57	13.93	9.64
R7	13.66	10.39	13.95	9.65
R8	14.05	10.67	15.16	10.17
R9	14.37	10.88	14.03	9.72
R10	15.85	11.87	15.14	10.53
R11	12.43	9.52	14.09	9.27
R12	12.26	9.41	13.78	8.99
R13	13.02	9.95	14.83	9.30
PR1	13.44	10.26	14.11	9.28
PR2	13.44	10.26	14.11	9.28
PR3	13.44	10.26	14.11	9.28
Ecological Sensitive Receptors				
E1	13.44	10.26	14.11	9.28
E2	13.44	10.26	14.11	9.28
E3	14.25	10.84	14.37	9.36
E4	13.44	10.26	14.11	9.28
E5	13.44	10.26	14.11	9.28
E6	12.96	9.92	14.13	9.17
E7	12.96	9.92	14.13	9.17
E8	12.96	9.92	14.13	9.17
E9	12.96	9.92	14.13	9.17
E10	12.96	9.92	14.13	9.17
E11	13.02	9.95	14.83	9.30
E12	13.02	9.95	14.83	9.30
E13	13.02	9.95	14.83	9.30

All the Defra background concentrations detailed in Table 6.2 for 2019, 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	2019						
	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							
2	14.37	32.50	4.04	8.46	0.00	0.15	54.85
17	12.26	27.62	5.36	4.84	0.00	0.11	62.07
Modelled Receptor Locations							
R1	12.40	27.34	3.95	8.57	0.00	0.05	60.09
R2	11.98	23.39	4.30	9.22	0.00	0.06	63.03
R3	11.98	23.39	4.30	9.22	0.00	0.06	63.03
R4	13.31	34.20	4.16	5.16	0.00	0.05	56.43
R5	13.90	33.81	3.26	9.48	0.00	0.06	53.39
R6	13.90	33.81	3.26	9.48	0.00	0.06	53.39
R7	13.66	30.58	3.58	9.94	0.00	0.08	55.82
R8	14.05	32.57	3.65	9.31	0.00	0.15	54.32
R9	14.37	32.50	4.04	8.46	0.00	0.15	54.85
R10	15.85	29.78	4.98	9.78	0.00	0.15	55.31
R11	12.43	25.28	5.69	6.36	0.00	0.12	62.56
R12	12.26	27.62	5.36	4.84	0.00	0.11	62.07
R13	13.02	32.90	4.39	4.45	0.00	0.06	58.20
PR1	13.44	35.17	3.99	5.09	0.00	0.04	55.72
PR2	13.44	35.17	3.99	5.09	0.00	0.04	55.72
PR3	13.44	35.17	3.99	5.09	0.00	0.04	55.72
Ecological Sensitive Receptors							
E1	13.44	35.17	3.99	5.09	0.00	0.04	55.72
E2	13.44	35.17	3.99	5.09	0.00	0.04	55.72
E3	14.25	39.32	3.58	4.65	0.00	0.04	52.41
E4	13.44	35.17	3.99	5.09	0.00	0.04	55.72
E5	13.44	35.17	3.99	5.09	0.00	0.04	55.72
E6	12.96	33.28	4.12	4.51	0.00	0.05	58.04
E7	12.96	33.28	4.12	4.51	0.00	0.05	58.04
E8	12.96	33.28	4.12	4.51	0.00	0.05	58.04
E9	12.96	33.28	4.12	4.51	0.00	0.05	58.04
E10	12.96	33.28	4.12	4.51	0.00	0.05	58.04
E11	13.02	32.90	4.39	4.45	0.00	0.06	58.20
E12	13.02	32.90	4.39	4.45	0.00	0.06	58.20
E13	13.02	32.90	4.39	4.45	0.00	0.06	58.20

Table 6.3 shows that the major background source of NO_x at the monitoring, sensitive receptor locations and proposed sensitive receptor locations and where sources have been identified is mainly comprised of road sources.

A review of the Defra background site has determined that they are in line with the Local Authority monitoring within ADC.

Table 6.4 shows the background concentrations utilised within the assessment.

Table 6.4 Utilised Background Concentrations (µg/m³)



Receptor Location	Source	2019	
		NO ₂	NO _x
Local Authority Monitoring			
2	Defra Published Background Concentrations	10.88	14.37
17		9.41	12.26
Existing Sensitive Receptors			
R1	Defra Published Background Concentrations	9.50	12.40
R2		9.19	11.98
R3		9.19	11.98
R4		10.16	13.31
R5		10.57	13.90
R6		10.57	13.90
R7		10.39	13.66
R8		10.67	14.05
R9		10.88	14.37
R10		11.87	15.85
R11		9.52	12.43
R12		9.41	12.26
R13		9.95	13.02
PR1		10.26	13.44
PR2		10.26	13.44
PR3		10.26	13.44
Ecological Sensitive Receptors			
E1	Apis Background Concentrations	-	15.68
E2		-	15.68
E3		-	15.68
E4		-	15.68
E5		-	15.68
E6		-	15.19
E7		-	15.19
E8		-	15.19
E9		-	15.19
E10		-	15.19
E11		-	15.43
E12		-	15.43
E13		-	15.43

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 6.5 summarises the final model/monitored data correlation following the application of the model correction factor.

Table 6.5 Comparison of Roadside Modelling & Monitoring Results for NO₂

Tube location	NO ₂ µg/m ³		
	Monitored NO ₂	Modelled NO ₂	Difference (%)
2	20.00	22.99	14.95
17	31.00	29.17	-5.91

The final model produced data at the monitoring locations to within 25% of the monitoring results, in accordance with the requirement in TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 0.99¹. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

¹ This was achieved by applying a model correction factor of 2.2 to roadside predicted NO_x concentrations before converting to NO₂



6.4 Summary of Model Inputs

Table 6.6 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	Shoreham 2019 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 was used for both the Site and met. Measurement site.
Latitude	Allows the location of the model area to be set	United Kingdom = 50.8
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 the Site. With Mixed Urban / Industrial = 30m was used for the met. Measurement site.
Elevation of Road	Allows the height of the road link above ground level to be specified.	All other 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) settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
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 included in modelling.
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.	2019 data for verification and baseline Operational Phase Assessment. 2021 data for the Construction Phase Traffic Assessment. 2021 data for the Operational Phase Assessment.
Site Plan	Source: Bright Plan	Drawing Name: Site Plan Drawing No: 2017-3487-003 Date: May 2020

6.5 ADMS Modelling Results

Traffic Assessment

The ADMS Model has predicted concentrations of NO₂ and PM₁₀ at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.



Assessment Scenario:

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. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

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:

- ✧ 2019 Baseline = Existing Baseline conditions;
- ✧ 2021 "Do Minimum" = 2021 Baseline + Cumulative Developments
- ✧ 2021 "Do Something" = 2021 Baseline + Cumulative Developments + Development Traffic Flows.

Nitrogen Dioxide

Table 6.7 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 6.7 Predicted Annual Average Concentrations of NO₂ at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	14.09	13.43	13.51	0.08
R2	3-4 The Square	12.92	12.38	12.42	0.04
R3	Ross Cottage, Station Road	15.20	14.35	14.40	0.05
R4	Hammerpot House, Arundel Road	22.15	20.28	20.30	0.02
R5	5 Loxwood	28.49	25.92	26.16	0.24
R6	Orchard House, Roundstone Lane	21.31	19.81	19.89	0.08
R7	15 Darlington Walk	25.12	23.14	23.17	0.03
R8	3 Willowbank Cottages	22.80	21.21	21.21	0.00
R9	69 Worthing Road	23.95	22.24	22.25	0.01
R10	6 Lynmister Road	29.04	26.68	26.68	<0.01
R11	1 Mill Lane	17.86	16.51	16.51	<0.01
R12	245 Lynminster Road	20.00	18.28	18.28	<0.01
R13	9 Arundel Road	25.37	23.11	23.13	0.02
PR1	Proposed Receptor	-	-	12.46	-
PR2	Proposed Receptor	-	-	12.35	-



Receptor		NO ₂ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
PR3	Proposed Receptor	-	-	11.92	-
Annual Mean AQO not to be exceeded		40 µg/m ³			

All modelled existing receptors are predicted to meet the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

As indicated in Table 6.7, 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 0.24 µg/m³ at 5 Loxwood (R5). All modelled receptor locations are predicted to meet the AQO for NO₂ in both the 'do minimum' and 'do something' scenarios.

The significance 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 **Error! Reference source not found. 6.8.**

Table 6.8 Significance 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	0.08	0.20	0%	≤75% of AQO	Negligible
R2	0.04	0.10	0%	≤75% of AQO	Negligible
R3	0.05	0.12	0%	≤75% of AQO	Negligible
R4	0.02	0.05	0%	≤75% of AQO	Negligible
R5	0.24	0.60	1%	≤75% of AQO	Negligible
R6	0.08	0.20	0%	≤75% of AQO	Negligible
R7	0.03	0.07	0%	≤75% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	0.02	0.05	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 impact description of the effects of changes in traffic flow as a result of traffic flow associated with the 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'.

Dapper's Lane, Angmering Air Quality Assessment



Figure 6.1 Annual Average Long-Term Nitrogen Dioxide (NO₂) Contribution from Proposed Development (µg/m³)

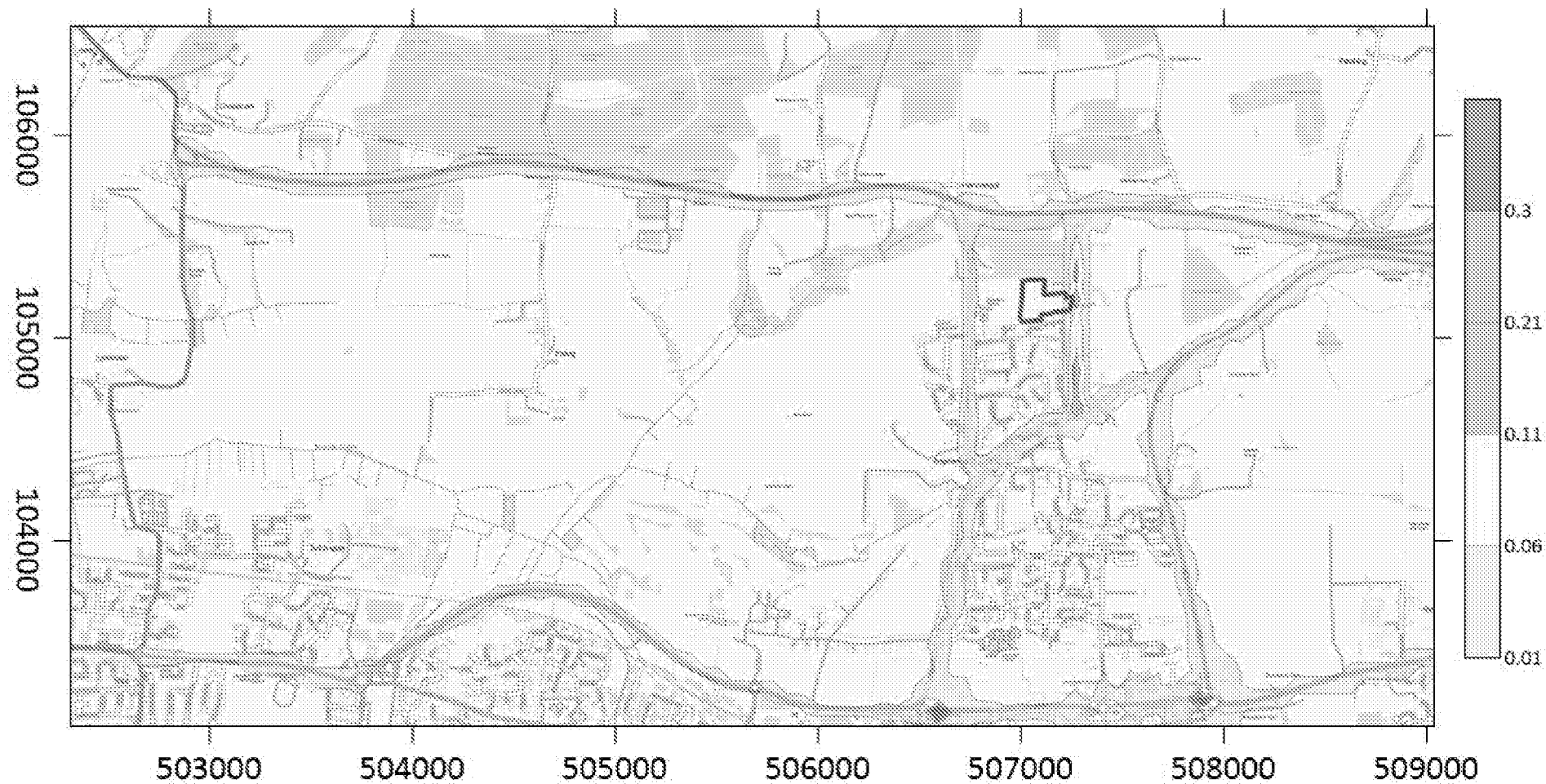




Figure 6.2 Annual Average Long-Term Nitrogen Dioxide (NO_2) Concentration at Across the Study Area ($\mu\text{g}/\text{m}^3$)

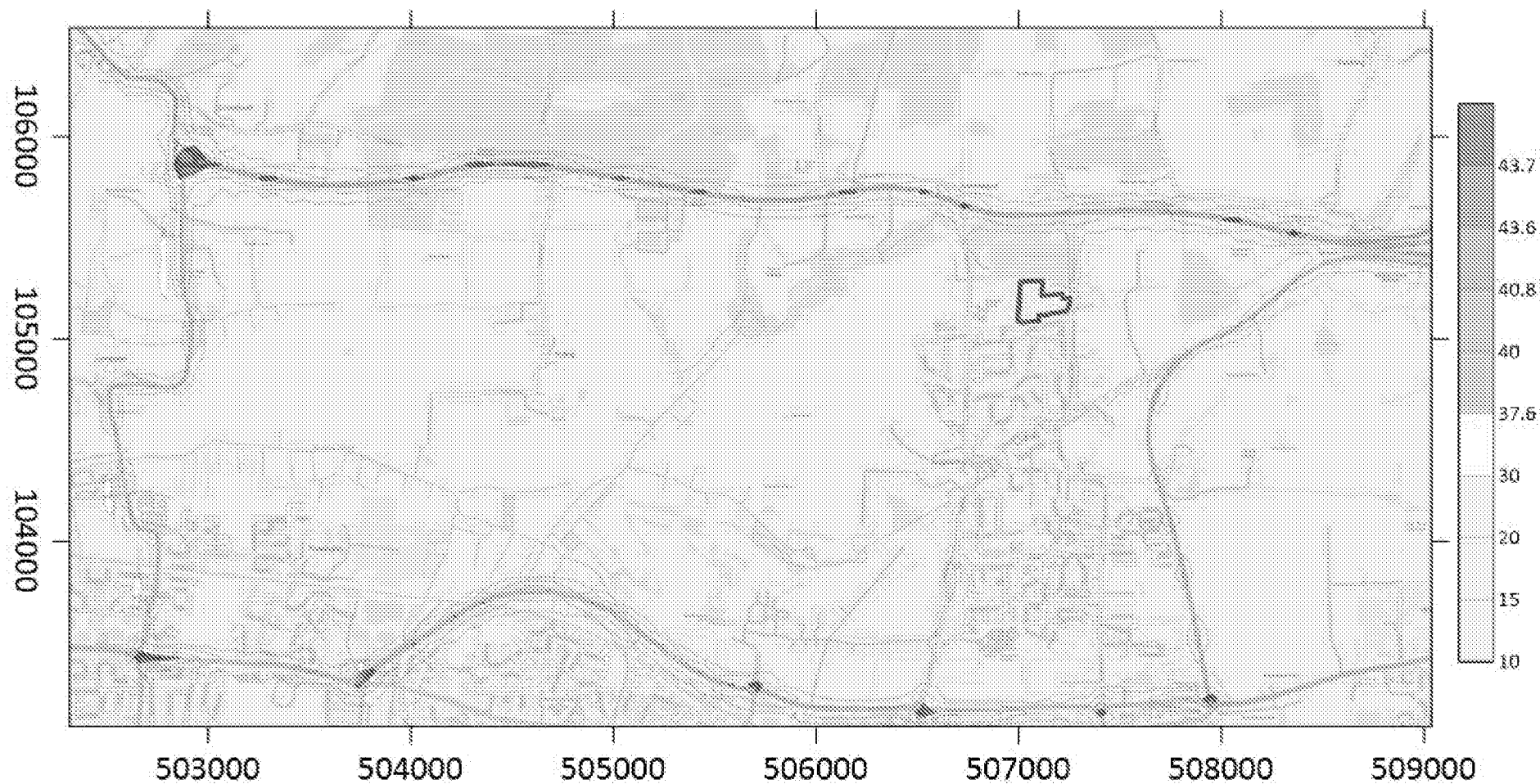
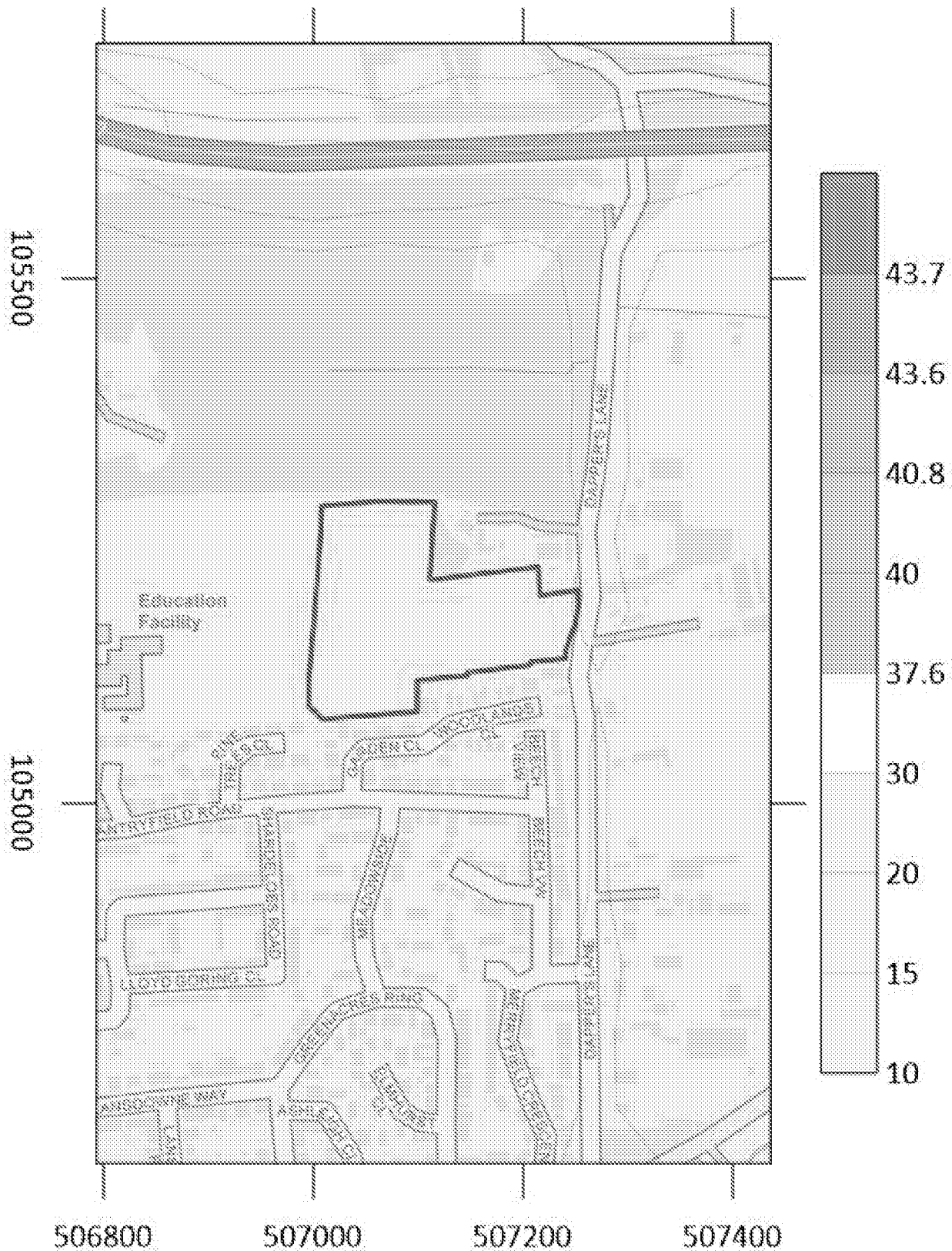




Figure 6.3 Annual Average Long-Term Nitrogen Dioxide (NO₂) Concentration at Across the Study Area (µg/m³)





Particulate Matter

Table 6.9 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 6.9 Predicted Annual Average Concentrations of PM₁₀ at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	14.56	14.56	14.58	0.02
R2	3-4 The Square	14.79	14.79	14.80	0.01
R3	Ross Cottage, Station Road	15.19	15.19	15.20	0.01
R4	Hammerpot House, Arundel Road	15.95	15.94	15.94	<0.01
R5	5 Loxwood	16.91	16.88	16.92	0.05
R6	Orchard House, Roundstone Lane	15.69	15.68	15.70	0.02
R7	15 Darlington Walk	16.42	16.42	16.43	0.01
R8	3 Willowbank Cottages	17.00	17.00	17.00	<0.01
R9	69 Worthing Road	16.56	16.60	16.60	<0.01
R10	6 Lynmister Road	17.81	17.82	17.82	<0.01
R11	1 Mill Lane	15.29	15.29	15.29	<0.01
R12	245 Lynminster Road	15.26	15.26	15.26	<0.01
R13	9 Arundel Road	17.34	17.33	17.33	<0.01
PR1	Proposed Receptor	-	-	14.53	-
PR2	Proposed Receptor	-	-	14.50	-
PR3	Proposed Receptor	-	-	14.42	-
Annual Mean AQO not to be exceeded		40 µg/m³			

As indicated in Table 6.9, the maximum predicted increase in the annual average exposure to PM₁₀ at any existing, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at 5 Loxwood (R5).

All modelled receptor locations are predicted to meet the AQO for PM₁₀ in both the 'do minimum' and 'do something' scenarios.

The significance 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 6.10.

Table 6.10 Significance of Effects at Key Receptors (Particulate Matter)

Impact Description of PM ₁₀ 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	0.02	0.04	0%	≤75% of AQO	Negligible
R2	0.01	0.02	0%	≤75% of AQO	Negligible
R3	0.01	0.02	0%	≤75% of AQO	Negligible

Impact Description of PM ₁₀ Effects at Key Receptors					
Receptor	Change Due to Development (DS-DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	0.05	0.12	0%	≤75% of AQO	Negligible
R6	0.02	0.04	0%	≤75% of AQO	Negligible
R7	0.01	0.01	0%	≤75% of AQO	Negligible
R8	<0.01	0.01	0%	≤75% of AQO	Negligible
R9	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	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

*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of traffic flow associated with the development, with respect to PM₁₀ 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'.

Table 6.11 Predicted Annual Average Concentrations of PM_{2.5} at Receptor Locations

Receptor		PM _{2.5} (µg/m³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	9.82	9.81	9.82	0.01
R2	3-4 The Square	9.86	9.85	9.85	<0.01
R3	Ross Cottage, Station Road	10.09	10.08	10.09	0.01
R4	Hammerpot House, Arundel Road	10.38	10.35	10.35	<0.01
R5	5 Loxwood	11.40	11.34	11.37	0.03
R6	Orchard House, Roundstone Lane	10.68	10.65	10.66	0.01
R7	15 Darlington Walk	11.11	11.08	11.08	<0.01
R8	3 Willowbank Cottages	11.27	11.23	11.23	<0.01
R9	69 Worthing Road	11.19	11.18	11.18	<0.01
R10	6 Lynmister Road	12.12	12.09	12.09	<0.01
R11	1 Mill Lane	9.99	9.97	9.97	<0.01
R12	245 Lynminster Road	9.88	9.86	9.86	<0.01
R13	9 Arundel Road	10.78	10.73	10.73	<0.01
PR1	Proposed Receptor	-	-	9.52	-
PR2	Proposed Receptor	-	-	9.50	-
PR3	Proposed Receptor	-	-	9.46	-
Annual Mean AQO not to be exceeded		40 µg/m³			

As indicated in Table 6.11, the maximum predicted increase in the annual average exposure to PM_{2.5} at any existing, due to changes in traffic movements associated with the development, is 0.03 µg/m³ at 5 Loxwood (R5).

All modelled receptor locations are predicted to meet the AQO for PM_{2.5} in both the 'do minimum' and 'do something' scenarios.

The significance 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 6.12.

Table 6.12 Significance of Effects at Key Receptors (Particulate Matter)

Impact Description of PM _{2.5} 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	0.04	0%	≤75% of AQO	Negligible
R2	0.00	0.02	0%	≤75% of AQO	Negligible
R3	0.01	0.02	0%	≤75% of AQO	Negligible
R4	<0.01	0.01	0%	≤75% of AQO	Negligible
R5	0.03	0.11	0%	≤75% of AQO	Negligible
R6	0.01	0.04	0%	≤75% of AQO	Negligible
R7	<0.01	0.01	0%	≤75% of AQO	Negligible
R8	<0.01	0.00	0%	≤75% of AQO	Negligible
R9	<0.01	0.01	0%	≤75% of AQO	Negligible
R10	<0.01	0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	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

*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

The impact description of the effects of changes in traffic flow as a result of traffic flow associated with the development, with respect to PM_{2.5} 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'.

Ecological Sensitive Receptor Locations

Background concentrations at each of the ecologically sensitive sites were 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).

Nitrogen Oxide

Table 6.13 presents a summary of the predicted change in NO_x 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 6.13 Predicted Annual Average Concentrations of NO_x at Ecological Receptor Locations

Receptor ID	Ecological Receptor	Predicted Maximum Annual Mean Concentration (µg/m ³)				
		Do Minimum 2021 NO _x	Do Something 2021 NO _x	Process Contribution (PC)	PC as %age of AQO	Background
E1	Groom's Copse	19.30	19.32	0.02	0.07	15.68
E2	Groom's Copse	19.68	19.70	0.02	0.07	15.68
E3	Groom's Copse	20.14	20.16	0.02	0.07	15.68
E4	Groom's Copse	22.11	22.12	0.02	0.06	15.68
E5	Groom's Copse	21.79	21.81	0.02	0.06	15.68
E6	Charloe Furze	42.07	42.13	0.05	0.17	15.19
E7	Charloe Furze	42.09	42.14	0.05	0.17	15.19
E8	Charloe Copse	40.44	40.49	0.05	0.16	15.19
E9	Charloe Copse	40.15	40.20	0.05	0.16	15.19
E10	Polingdown Copse	41.43	41.48	0.05	0.17	15.19
E11	Polingdown Copse	41.42	41.46	0.05	0.16	15.43
E12	Poling Copse	36.16	36.20	0.04	0.13	15.43
E13	Poling Copse	38.51	38.56	0.04	0.14	15.43
Annual Mean AQO/Critical Level (CL)				30 (µg/m ³)		

As indicated in Table 6.13, 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 0.05 µg/m³ at Charloe Furze (AW) (E6, E7, E8, E9), and Polingdown Copse (AW) (E10, E11).

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 at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Charloe Furze (AW) (E6, E7, E8, E9), and Polingdown Copse (AW) (E10, E11) which is below 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. As a result, no further assessment is required and the impact at Charloe Furze (AW) (E6, E7, E8, E9), and Polingdown Copse (AW) (E10, E11) is considered to be negligible.



7. Mitigation

7.1 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 description of dust emissions associated with the construction phase of the proposed development is 'medium risk' 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 7.1 and 7.2 below.

Table 7.1 Highly Recommended Construction Phase Mitigation Measures

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
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.
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.
Agree dust deposition, dust flux, or real-time PM ₁₀ continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
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.
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period
Avoid site runoff of water or mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.
Ensure all vehicles switch off engines when stationary - no idling vehicles.



Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
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.
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
Avoid bonfires and burning of waste materials.
Earthworks
No Action Required.
Construction
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.
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
Record all inspections of haul routes and any subsequent action in a site log book.
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.

Table 7.2 Desirable Construction Phase Mitigation Measures

Communication
No action required.
Dust Management
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.
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)
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing)
Earthworks
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
Only remove the cover in small areas during work and not all at once
Construction
Avoid scabbling (roughening of concrete surfaces) if possible.
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust
Trackout
No Action Required.

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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. Conclusions

WYG Environmental Planning and Transport (WYG) has prepared an Air Quality Assessment to support an application for the proposed residential development at Land to the West of Dapper's Lane, Angmering.

Construction Phase

Prior to the implementation of appropriate mitigation measures, the potential impact description of dust emissions associated with the construction phase of the proposed development has potential as 'medium' 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 dust emissions from the construction phase will not be significant.

Operational Assessment

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 0.24 µg/m³ at 5 Loxwood (R5).

At any proposed sensitive receptors, there is not predicted to be any exceedances of the NO₂, PM₁₀ or PM_{2.5} pollutant concentrations and therefore, mitigation is not required at the proposed development.

For PM₁₀, the maximum predicted increase in the annual average exposure is likely to be 0.05 µg/m³ at 5 Loxwood (R5). For PM_{2.5}, the maximum predicted increase in the annual average exposure is likely to be 0.02 µg/m³ at 5 Loxwood (R5).

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.

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'. In conclusion, the development is not considered to be contrary to any of the national and local planning policies.

Habitat Assessment

The maximum predicted increase in the annual average exposure to NO_x at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.05 µg/m³ at Charloe Furze (AW) and Polingdown Copse (AW) which below the 0.40 µg/m³ development contribution stated within the

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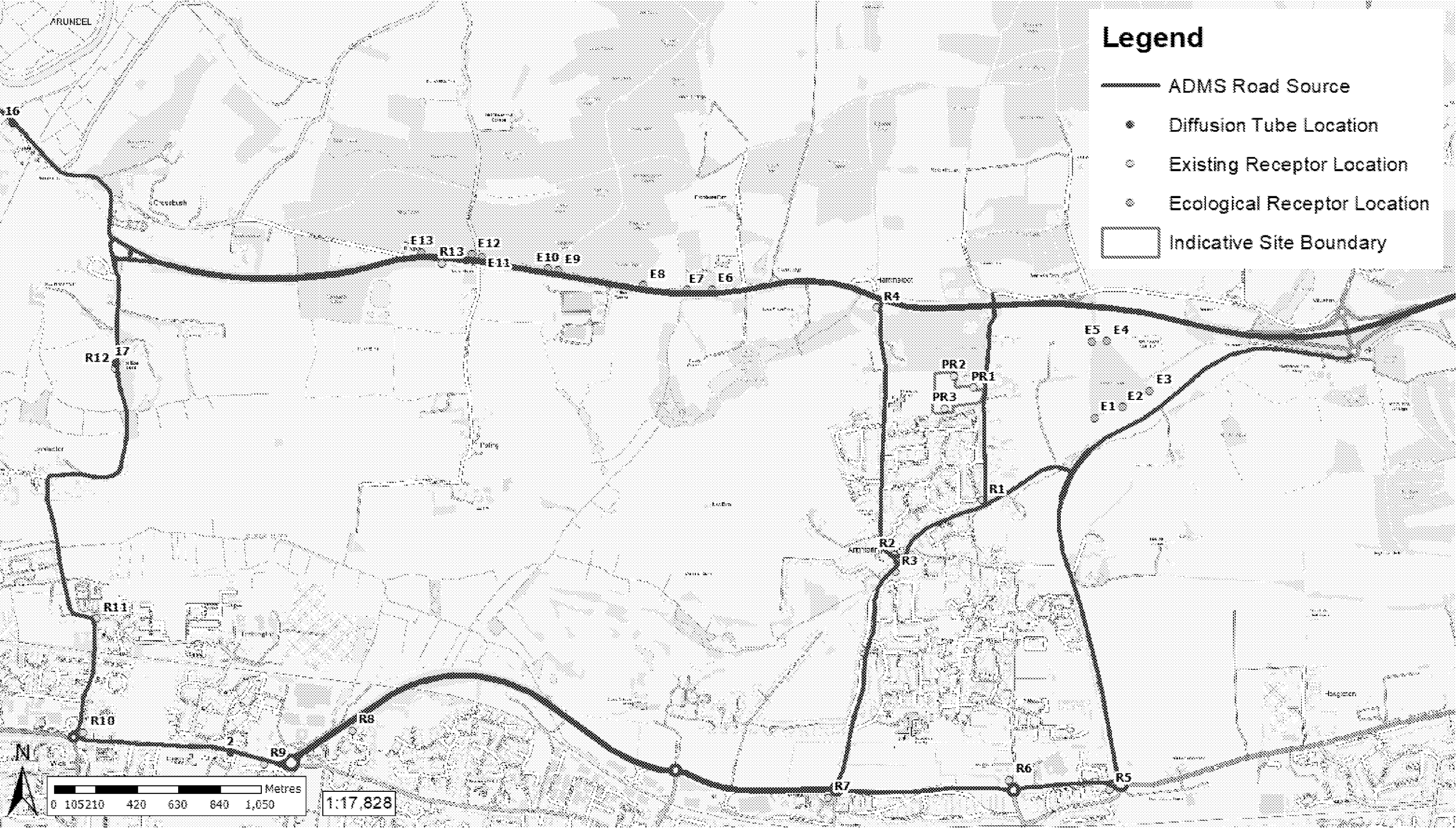
guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2019. As a result, no further assessment is required and the impact at Charloe Furze (AW) and Polingdown Copse (AW) is considered to be negligible.



Figures

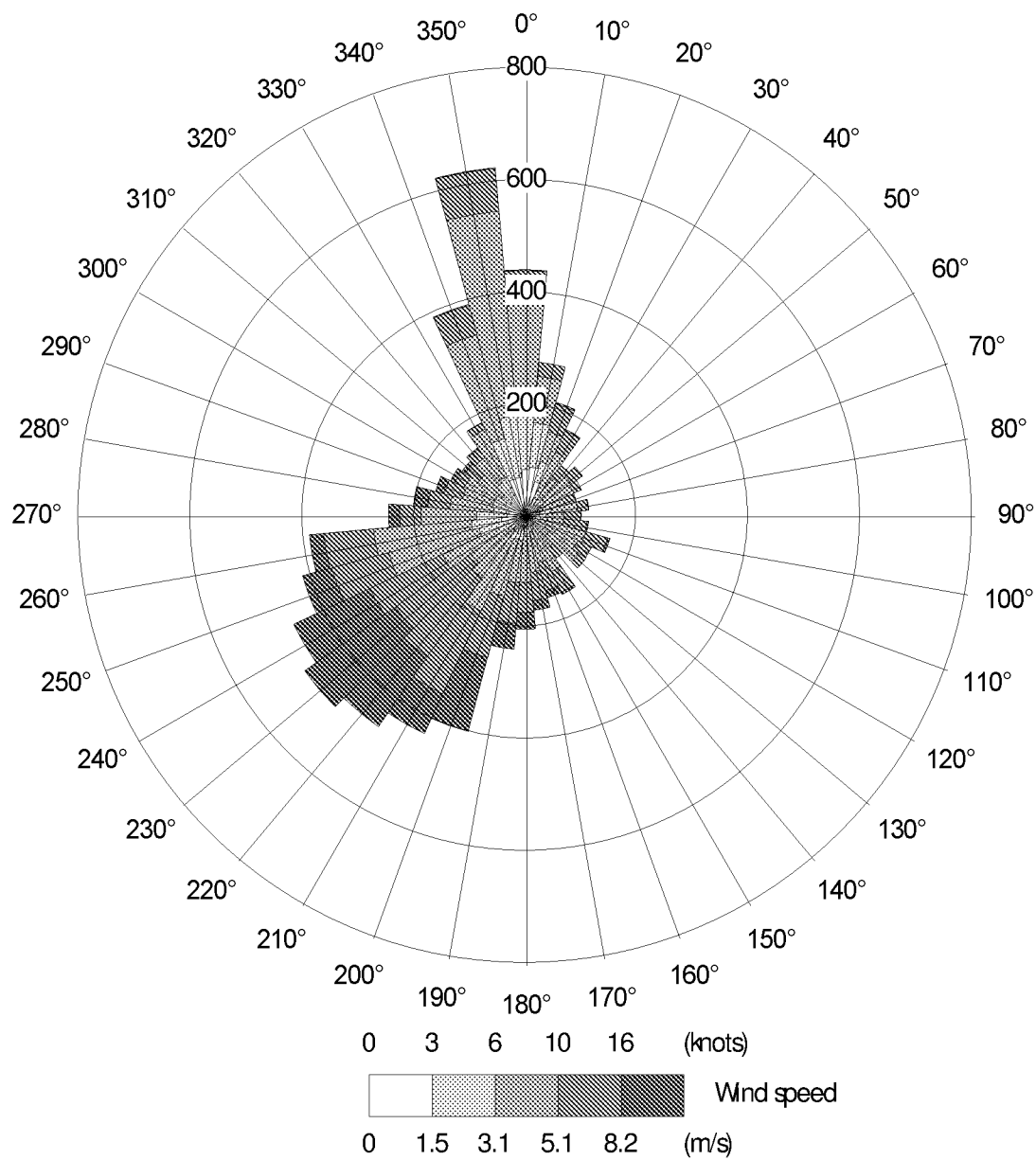


Figure 1 Air Quality Assessment Area



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Air Quality Assessment

Figure 2 Shoreham 2019 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 guidance².

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.

² Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction*.

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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.

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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 Results

Scenario Context

This additional theoretical scenario uses emission factors for 2019 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 2019 traffic emission factors**); and,
- ✧ 2021 'Do Something' Theoretical Scenario = Baseline conditions + Cumulative Development + The Proposed Development flows (**using 2019 traffic emission factors**).

Table B2 Theoretical Scenario NO₂ Results at Receptor Locations

Receptor		NO ₂ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	14.09	14.25	14.35	0.10
R2	3-4 The Square	12.92	13.04	13.10	0.06
R3	Ross Cottage, Station Road	15.20	15.40	15.46	0.06
R4	Hammerpot House, Arundel Road	22.15	22.52	22.58	0.06
R5	5 Loxwood	28.49	28.81	29.13	0.32
R6	Orchard House, Roundstone Lane	21.31	21.57	21.71	0.14
R7	15 Darlington Walk	25.12	25.55	25.59	0.04
R8	3 Willowbank Cottages	22.80	23.20	23.22	0.02
R9	69 Worthing Road	23.95	24.37	24.38	0.01
R10	6 Lynmister Road	29.04	29.55	29.55	<0.01
R11	1 Mill Lane	17.86	18.14	18.15	0.01
R12	245 Lynminster Road	20.00	20.34	20.35	0.01
R13	9 Arundel Road	25.37	25.87	25.90	0.03
PR1	Proposed Receptor	-	-	12.95	-
PR2	Proposed Receptor	-	-	12.82	-
PR3	Proposed Receptor	-	-	12.30	-
Annual Mean AQO		40 µg/m³			

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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 0.32 µg/m³ at 5 Loxwood (R5).

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	0.10	0.25	0%	≤75% of AQO	Negligible
R2	0.06	0.15	0%	≤75% of AQO	Negligible
R3	0.06	0.15	0%	≤75% of AQO	Negligible
R4	0.06	0.15	0%	≤75% of AQO	Negligible
R5	0.32	0.79	1%	≤75% of AQO	Negligible
R6	0.14	0.35	0%	≤75% of AQO	Negligible
R7	0.04	0.10	0%	≤75% of AQO	Negligible
R8	0.02	0.05	0%	≤75% of AQO	Negligible
R9	0.01	0.02	0%	≤75% of AQO	Negligible
R10	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	0.01	0.02	0%	≤75% of AQO	Negligible
R12	0.01	0.02	0%	≤75% of AQO	Negligible
R13	0.03	0.07	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 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 Theoretical Scenario PM₁₀ Results at Receptor Locations

Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	14.56	14.59	14.60	0.02
R2	3-4 The Square	14.79	14.81	14.82	0.01
R3	Ross Cottage, Station Road	15.19	15.22	15.23	0.01
R4	Hammerpot House, Arundel Road	15.95	16.01	16.01	<0.01
R5	5 Loxwood	16.91	16.97	17.02	0.05
R6	Orchard House, Roundstone Lane	15.69	15.74	15.75	0.02
R7	15 Darlington Walk	16.42	16.51	16.51	<0.01
R8	3 Willowbank Cottages	17.00	17.07	17.07	<0.01
R9	69 Worthing Road	16.56	16.66	16.66	<0.01
R10	6 Lynmister Road	17.81	17.91	17.91	<0.01
R11	1 Mill Lane	15.29	15.33	15.33	<0.01
R12	245 Lynminster Road	15.26	15.31	15.31	<0.01
R13	9 Arundel Road	17.34	17.43	17.43	<0.01
PR1	Proposed Receptor	-	-	14.55	-

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Receptor		PM ₁₀ (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
PR2	Proposed Receptor	-	-	14.52	-
PR3	Proposed Receptor	-	-	14.44	-
Annual Mean AQO		40 µg/m ³			

Table B5 Theoretical Scenario PM_{2.5} Results at Receptor Locations

Receptor		PM _{2.5} (µg/m ³)			
		Baseline 2019	Do Minimum 2021	Do Something 2021	Development Contribution
R1	33 Merryfield Crescent	9.82	9.84	9.85	0.01
R2	3-4 The Square	9.86	9.87	9.88	0.01
R3	Ross Cottage, Station Road	10.09	10.11	10.12	0.01
R4	Hammerpot House, Arundel Road	10.38	10.42	10.42	<0.01
R5	5 Loxwood	11.40	11.44	11.47	0.03
R6	Orchard House, Roundstone Lane	10.68	10.70	10.71	0.01
R7	15 Darlington Walk	11.11	11.16	11.16	<0.01
R8	3 Willowbank Cottages	11.27	11.31	11.31	<0.01
R9	69 Worthing Road	11.19	11.24	11.25	<0.01
R10	6 Lynmister Road	12.12	12.18	12.18	<0.01
R11	1 Mill Lane	9.99	10.01	10.01	<0.01
R12	245 Lynminster Road	9.88	9.91	9.91	<0.01
R13	9 Arundel Road	10.78	10.83	10.83	<0.01
PR1	Proposed Receptor	-	-	9.53	-
PR2	Proposed Receptor	-	-	9.52	-
PR3	Proposed Receptor	-	-	9.47	-
Annual Mean AQO		40 µg/m ³			

For PM₁₀, the maximum predicted increase in annual average exposure to PM₁₀ at any existing receptor, due to changes in traffic movements associated with the development is 0.05 µg/m³ at 5 Loxwood (R5).

For PM_{2.5}, the maximum predicted increase in annual average exposure to PM_{2.5} at any existing receptor, due to changes in traffic movements associated with the development is 0.03 µg/m³ at 5 Loxwood (R5).

Appendix C Report Terms & Conditions

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