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CONSULTING

COLD HARBOUR FARM, EMSWORTH

AIR QUALITY ASSESSMENT





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AUTHOR	GRANT MALY MSc BSc (Hons) ASSOCIATE	
REVIEWER	MATT DEAN BEng (HONS) CEng CEnv C.WEM MCIWEM DIRECTOR	
 LUSTRE CONSULTING Second Floor North Fitted Rigging House The Historic Dockyard Chatham Kent, ME4 4TZ t 01634 757 705 e info@lustreconsulting.com www.lustreconsulting.com  		
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1.0 INTRODUCTION

- 1.1 This Air Quality Assessment has been prepared for the site clearance and development of a site located off Coldharbour Farm Lane, in Emsworth, Hampshire, RH12 1DQ by Lustre Consulting Limited (Lustre) for Telstar Ltd. The assessment has been undertaken in accordance with our fee proposal dated 15/05/2019, which was formally approved by Telstar Ltd on 05/06/2019.
- 1.2 The site, irregular in plan, is centered at National Grid Reference 474530 106530, and occupies an approximate area of 1.92ha as shown in Figure 1. The site currently comprises open undeveloped land and is located to the north of Emsworth. The site is located on the edge of a predominantly residential area, with a recreational park to the east, residential to the south east, Emsworth East Services (and hotel) to the west and the A27 immediately adjacent to the southern boundary. Telstar Ltd requires this Air Quality Assessment to support the proposed development relating to the clearance of the site and subsequent construction of a low-rise residential housing development with private gardens. Figure 2 illustrates the proposed development scheme.

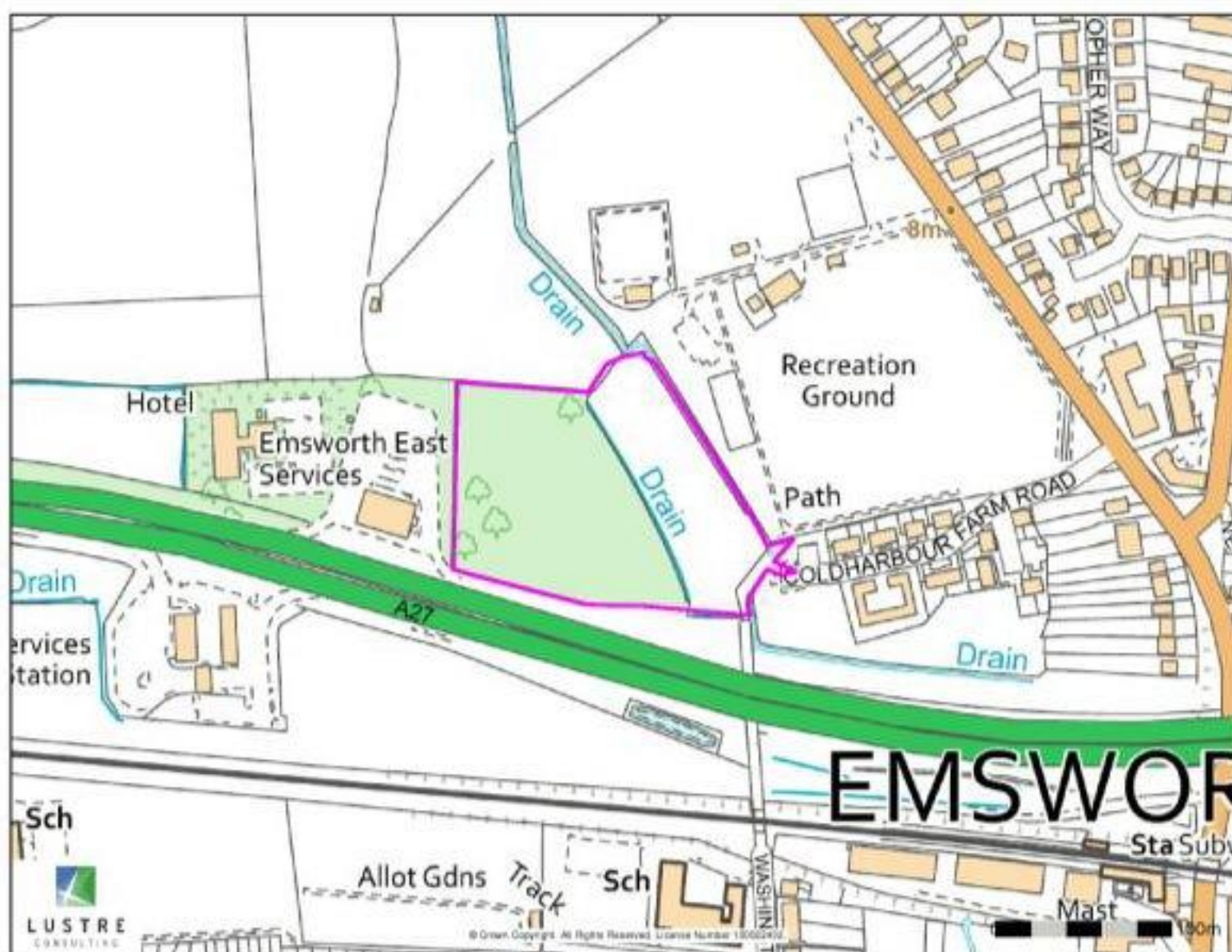


Figure 1: Site Location Plan





Figure 2: Proposed Site Layout

Objectives & Scope

- 1.3 This Air Quality Assessment will focus on potential impacts of existing and future traffic levels on the proposed residential development once completed. The pollutants modelled as part of this assessment are nitrogen oxides (NO_x) and particulate matter (PM_{10}).
- 1.4 If necessary, the assessment will also provide guidance on how the impacts of potential poor air quality can be reduced by way of mitigation measures. The potential impact on local air quality from demolition and construction activities at the site have also been assessed qualitatively.





- 1.5 The impacts of vehicle emissions have been assessed using the techniques detailed within Volume 11, Section 3 of the Design Manual for Roads and Bridges (DMRB)¹ and the Local Air Quality Management Technical Guidance (LAQM.TG16)². The impact of road traffic emissions will be assessed using the ADMS-Roads air dispersion model. This model has been devised by Cambridge Environmental Research Consultants (CERC) and is described as a *"comprehensive tool for investigating air pollution problems due to small networks of roads"*.
- 1.6 It should be noted that the short-term impacts of NO₂ and PM₁₀ emissions have not been modelled as dispersion models are inevitably poor at predicting short-term peaks in pollutant concentrations, which are highly variable from year to year, and from site to site. Notwithstanding this, general assumptions have been made about short term concentrations based on the modelled annual mean concentrations.
- 1.7 A full impact assessment has not been undertaken as the proposed development will not generate more than 500 daily vehicle movements (outside of an Air Quality Management Area). The Council agreed that the proposed development is *"unlikely to represent a material adverse impact upon any specific relevant receptor as regards air pollution levels"*. However, the Council recognises that developments can contribute to local emissions and a damage cost calculation has been undertaken to determine the level of mitigation required to offset these emissions.
- 1.8 The impact of benzene emissions from the nearby petrol station has been screened out using the Local Air Quality Management Technical Guidance (LAQM.TG16). Based on this guidance there is no exposure within 10 metres of the pumps.

Reliance and Limitations

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¹ Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 – HA207/07, Highways Agency, May 2007

² Part IV of the Environment Act 1995, Local Air Quality Management Technical Guidance (TG16), Defra, February 2018





- 1.11 Third party information which has been reviewed and used to inform the assessments presented herein, including public records held by various regulatory authorities and environmental database data has been assumed to be true and accurate.
- 1.12 This assessment has been carried out to determine the potential impacts posed to future end users, along with other key receptors, based on the current development. Should revisions in the development proposals result in a change any assessment parameters detailed in this report, a re-assessment of the impacts and associated mitigation measures should be carried out.





2.0 POLLUTANTS & LEGISLATION

Pollutant Overview

- 2.1 In most urban areas of the UK, traffic generated pollutants have become the most common pollutants. These are nitrogen dioxide (NO₂), fine particulates (PM₁₀), carbon monoxide (CO), 1,3-butadiene and benzene, as well as carbon dioxide (CO₂). This Air Quality Assessment focuses on NO₂ and PM₁₀, as these pollutants are least likely to meet their Air Quality Strategy objectives near roads.
- 2.2 **Table 1** Table 1 provides an overview of NO₂ and PM₁₀.

Table 1: Overview of NO₂ and PM₁₀

Pollutant	Properties	Anthropogenic Sources	Natural Sources	Potential Effects
Particles (PM₁₀)	Tiny particulates of solid or liquid nature suspended in the air	Road transport; Power generation plants; Production processes e.g. windblown dust	Soil erosion; Volcanoes; Forest fires; Sea salt crystals	Asthma; Lung cancer; Cardiovascular problems
Nitrogen Dioxide (NO₂)	Reddish-brown coloured gas with a distinct odour	Road transport; Power generation plants; Fossil fuels – extraction & distribution; Petroleum refining	No natural sources, although nitric oxide (NO) can form in soils	Pulmonary edema; Various environmental impacts e.g. acid rain

Air Quality Strategy

- 2.3 The UK Government and the devolved administrations published the latest Air Quality Strategy for England, Scotland, Wales and Northern Ireland on 17 July 2007³. The Strategy provides an over-arching strategic framework for air quality management in the UK.
- 2.4 With regards to this assessment, the Air Quality Strategy contains national air quality standards and objectives established by the Government to protect human health. The objectives for nitrogen dioxide and particulates (PM₁₀ and PM_{2.5}) have been set, along with seven other pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, PAHs, sulphur

³ The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Department for Environment, Food and Rural Affairs in partnership with the Scottish Executive, Welsh Assembly Government and Department of the Environment Northern Ireland, July 2007





dioxide and ozone). Those which are limit values required by EU Daughter Directives on Air Quality have been transposed into UK law through the Air Quality Standards Regulations 2010 which came into force on 11th June 2010.

2.5 Table 2 provides the UK Air Quality Objectives for NO₂ and PM.

Table 2: UK Air Quality Objectives for Nitrogen Dioxide and Particulate Matter

Pollutant	Objective	Concentration measured as
Particles (PM ₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean
	40µg/m ³	Annual mean
Particles (PM _{2.5})	25µg/m ³ (except Scotland)	Annual Mean
Nitrogen Dioxide (NO ₂)	200µg/m ³ not to be exceeded more than 18 times a year	1 hour mean
	40µg/m ³	Annual mean

2.6 Objectives for PM_{2.5} were also introduced by the UK Government and the Devolved Administrations in 2007. However, these are not included in Regulations as the Air Quality Strategy has adopted an "exposure reduction" approach for PM_{2.5} in order to seek a more efficient way of achieving further reductions in the health effects of air pollution by providing a driver to improve air quality everywhere in the UK rather than just in a small number of localised hotspot areas. As such, this assessment has not considered the impact on emissions of PM_{2.5}.

Clean Air Strategy

2.7 The Clean Air Strategy⁴ was published in January 2019 and sets out the comprehensive action that is required from across all parts of government and society to tackle all sources of air pollution. New legislation will create a stronger and more coherent framework for action to tackle air pollution. This will be underpinned by new England-wide powers to control major sources of air pollution, in line with the risk they pose to public health and the environment, plus new local powers to take action in areas with an air pollution problem. These will support the creation of Clean Air Zones to lower emissions from all sources of air pollution, backed up with clear enforcement mechanisms.

⁴ Clean Air Strategy 2019, Department for Environment, Food and Rural Affairs, January 2019





Local Air Quality Management

- 2.8 At the core of LAQM delivery are three pollutant objectives; these are: Nitrogen Dioxide (NO₂), Particulate Matter (PM₁₀) and Sulphur Dioxide (SO₂). All current Air Quality Management Areas (AQMAs) across the UK are declared for one or more of these pollutants, with NO₂ accounting for the majority. It is a statutory requirement for local authorities to regularly review and assess air quality in their area and take action to improve air quality when objectives set out in regulation cannot be met.

Havant Borough Council

- 2.9 Havant Borough Council currently does not have any AQMAs.





3.0 PLANNING POLICY AND GUIDANCE

National Planning Policy & Guidance

- 3.1 On a national level, air quality can be a material consideration in planning decisions. The updated National Planning Policy Framework (NPPF) for England, released in February 2019, is considered a key part of the Governments reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth.
- 3.2 Paragraph 103 within the NPPF states that the *"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making"*.
- 3.3 It goes on to state in paragraph 181 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"*.

Land-Use Planning & Development Control

- 3.4 In January 2017, Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) produced guidance to ensure that air quality is adequately considered in the land-use planning and development control processes⁵.

⁵ Land-Use Planning & Development Control: Planning for Air Quality. Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes, EPUK & IAQM. January 2017





- 3.5 The guidance document is particularly applicable to assessing the effect of changes in exposure of members of the public resulting from residential and mixed-use developments, especially those within urban areas where air quality is poorer. It is also relevant to other forms of development where a proposal could affect local air quality and for which no other guidance exists.

Local Planning Policy

Havant Borough Council

- 3.6 Policy E22 within the Councils emerging Local Plan 2036 refers specifically to air quality and states the following:

“Development proposals will be permitted where:

- a) Projected levels of noise, odour, vibration, light, water or air pollution do not have a likely significant negative effect on the amenity of existing and future users if the site, nearby occupiers or the wider environment; or*
- b) Measures are provided which are suitable for the purposes intended and will ensure that any likely significant negative effect on receptor(s) are mitigated to an acceptable level”.*





4.0 ASSESSMENT METHODOLOGY

Construction Phase

4.1 The Institute of Air Quality Management (IAQM) has published guidance on the assessment of dust from construction and demolition⁶. Based on this guidance, the main air quality impacts that may arise during construction activities are:

- Dust deposition, resulting in the soiling of surfaces;
- Visible dust plumes, which are evidence of dust emissions;
- Elevated PM₁₀ concentrations, as a result of dust generating activities on site; and
- An increase in concentrations of airborne particles and nitrogen dioxide due to exhaust emissions from diesel powered vehicles and equipment on site.

4.2 In relation to the most likely impacts, the guidance states the following:

4.3 *"The most common impacts are dust soiling and increased ambient PM₁₀ concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of particulate matter in all size fractions.*

4.4 *Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed".*

4.5 The guidance continues by providing an assessment procedure. This includes sub-dividing construction activities into four types to reflect their different potential impacts. These are as follows:

- Demolition;
- Earthworks;
- Construction; and
- Track out.

⁶ Holman et al (2014). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf





- 4.6 With regards to the proposed development the potential for dust emissions is assessed for each activity that is likely to take place. The assessment procedure assumes no mitigation measures are applied. The conditions with no mitigation thus form the baseline or “do-nothing” situation for a construction site. The assessment procedure uses the steps provided in the guidance and summarised in Figure 3.

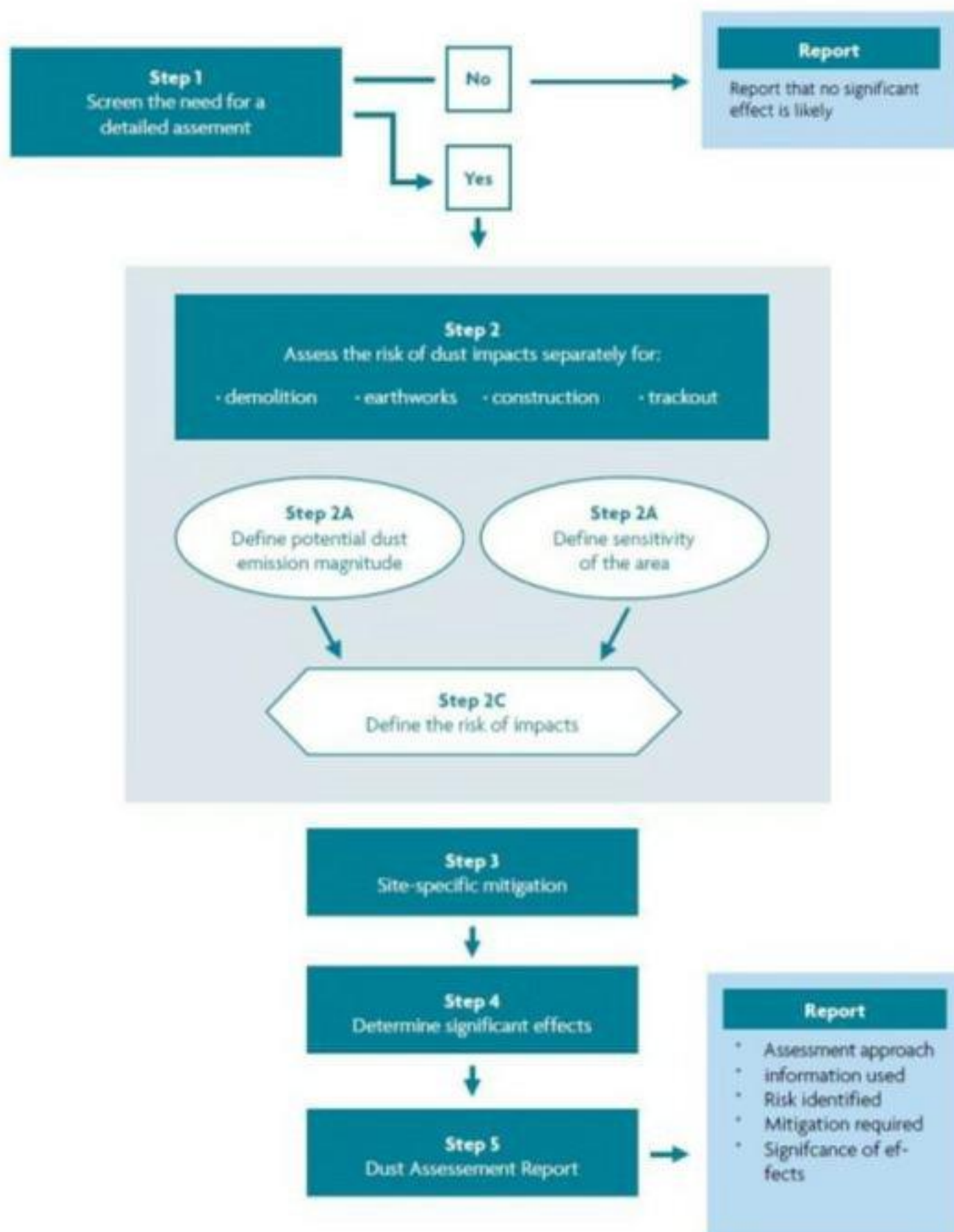


Figure 3: Dust Assessment Procedure



Operational Phase (Traffic Emissions)

Modelled Scenarios

- 4.7 A future year has been chosen (2022) for the assessment, along with the baseline year (2017). The future year represents the assumed first full year of occupation following completion of the development. Two scenarios have been adopted as part of the assessment. These are as follows:
- Scenario 1 – existing levels of air quality / model verification (2017); and
 - Scenario 2 – future impact of traffic emissions on the proposed development i.e. introduction of new exposure (2022).
- 4.8 Predicted concentrations will be compared to the Air Quality Strategy objectives. Background pollutant concentrations and vehicle emission rates for all modelled years are based on the latest data issued by Defra. These background concentrations and emission factors are discussed further in the following sections.

ADMS-Roads

- 4.9 Modelling the impact of traffic emissions on the proposed development will be undertaken using the latest version of the ADMS-Roads model⁷. ADMS-Roads is significantly more advanced than that of most other air dispersion models in that it incorporates the latest understanding of the boundary layer structure, and goes beyond the simplistic Pasquill-Gifford stability categories method with explicit calculation of important parameters. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions.

Emission Factors

- 4.10 Defra and the devolved administrations have provided an updated Emission Factors Toolkit (Version 9.0) which incorporates updated NO_x emissions factors and vehicle fleet information⁸. These emission factors have been integrated into the latest ADMS-Roads modelling software. However, in order to undertake a worst-case assessment emission factors for 2017 have been used for all modelled years.

⁷ Model Version: 4.1.1.0 Interface Version 4.1.1 (18/01/2018)

⁸ https://laqm.defra.gov.uk/documents/EFT2019_v9.0.xlsb





Traffic Data

- 4.11 Baseline flows along the local road network are available from the Department for Transport (DfT)⁹. Baseline (2017) data has been projected to 2022. Projection of traffic data has been undertaken using growth factors specific to Havant Borough Council, obtained from TEMPro¹⁰. The projected flow rates are provided in Table 3. It is assumed that the percentage HDV and speed will remain unchanged in future years. The B2148 Horndean Road has been modelled for the purposes of model verification.

Table 3 – Annual Average Daily Traffic Flows, Percentage HDV and Speeds for Selected Roads

Link	AADT 2017	AADT 2022	HDV (%)	Speed (kph)
A27 Eastbound	24,741	26,023	5.8%	113
A27 Westbound	24,522	25,792	6.1%	113
B2148 Horndean Road	6,052	6,365	0.9%	48

Street Canyons

- 4.12 A street canyon may be defined as a relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road. Street canyons may result in elevated pollutant concentrations from road traffic emissions due to a reduced likelihood of the pollutants becoming dispersed in the atmosphere. Street canyons have not been modelled as part of this assessment.

Background Concentrations

- 4.13 Background NO_x, NO₂ and PM concentrations have been obtained from Defra¹¹. These 1 km x 1 km grid resolution maps are derived from a base year of 2017 (for NO_x, NO₂, PM₁₀ and PM_{2.5} only), which are then projected to future years, if necessary. Background concentrations of NO_x, NO₂ and PM derived from Defra are provided in Table 4.

⁹ <http://www.dft.gov.uk/traffic-counts/>

¹⁰ Tempro (Trip End Model Presentation Program) version 7, Department for Transport

¹¹ <http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015>



**Table 4 – Background NO_x, NO₂, PM₁₀ and PM_{2.5} Concentrations**

Pollutant	Defra Mapped Location		2017
	X	Y	
NO ₂	474500	106500	17.3
NO _x			24.9
PM ₁₀			15.0
PM _{2.5}			10.4

- 4.14 In order to undertake a worst-case assessment, 2017 background concentrations have been assumed for all modelled scenarios.

Surface Roughness

- 4.15 A surface roughness of 0.5 metre has been used in the model. This value is provided by ADMS-Roads as a typical roughness length for open suburbia. This value has been used across the modelled domain.

Meteorological Data

- 4.16 Hourly sequential meteorological data from the Shoreham meteorological station has been used. Wind speed and direction data from the Shoreham meteorological station has been plotted as a wind rose in Figure 4.

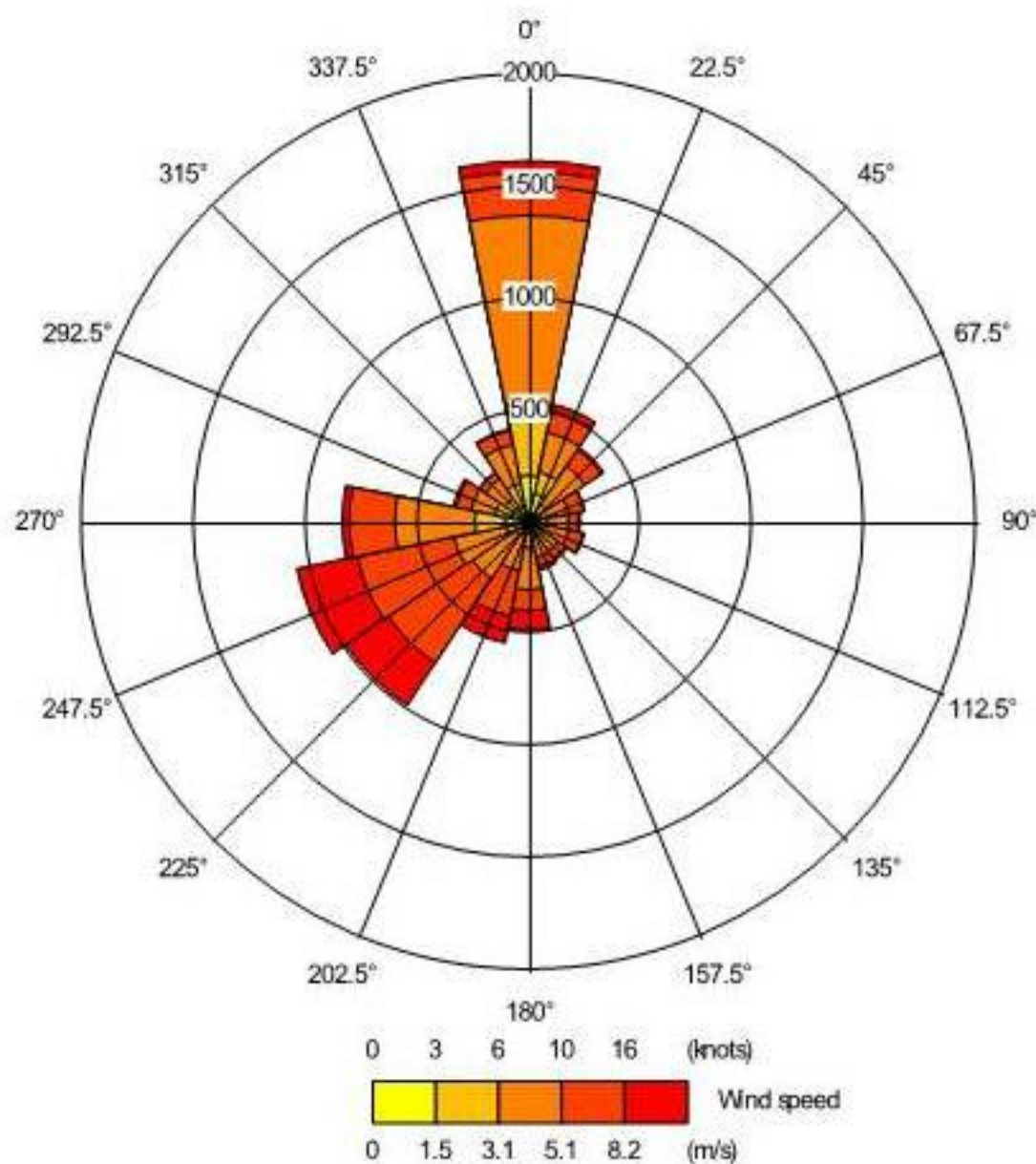


Figure 4: Wind Speed and Direction Data, Shoreham



Model Output

NO_x/NO₂ Relationship

- 4.17 Recent evidence shows the proportion of primary NO₂ in vehicle exhaust has increased¹². As such, a new NO_x to NO₂ calculator has been devised¹³. This new calculator has been used to determine NO₂ concentrations for this assessment, based on predicted NO_x concentrations using ADMS-Roads. Converted NO₂ concentrations are initially compared to local monitoring data in order to verify the model output. If the model performance is considered unacceptable then the NO_x concentrations are adjusted before conversion to NO₂.

Predicted Short Term Concentrations

- 4.18 As discussed in the introduction, it has not been possible to model the short-term impacts of NO₂ and PM₁₀. Research undertaken in 2003¹⁴ has indicated that the hourly NO₂ objective is unlikely to be exceeded at a roadside location where the annual mean NO₂ concentration is less than 60 µg/m³.
- 4.19 For PM₁₀, a relationship between the annual mean and the number of 24-hour mean exceedances has been devised and is as follows:
- No. 24-hour mean exceedances = $-18.5 + 0.00145 \times \text{annual mean}^3 + (206/\text{annual mean})$

- 4.20 This relationship has been applied to the modelled annual mean concentrations in order to estimate the number of 24-hourly exceedances.

Model Verification

- 4.21 The Council undertakes monitoring of NO₂ at a diffusion tube located adjacent to the B2148 Horndean Road, approximately 250 metres east of the proposed development. Monitored concentrations from the site has been used for the purposes of model verification. The location of this verification site is provided in Table 5.

¹² Trends in Primary Nitrogen Dioxide in the UK, Air Quality Expert Group, 2007

¹³ https://laqm.defra.gov.uk/documents/NOx_to_NO2_Calculator_v7.1.xlsm

¹⁴ Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Marnier, 2003



**Table 5 – Modelled Verification Locations**

Site ID	Location	X	Y	Height (m)
4	New Brighton Road	474866	106425	2.65

Receptor Locations

- 4.22 In order to assess the potential impact of the traffic emissions from the local road network, a number of receptors have been identified representing the different facades of the proposed development. The location of these receptors, together with their height above ground level is provided in Table 6 and represented in Figure 5.

Table 6 – Modelled Receptor Locations

AQA ID	X	Y	Height (m)
R1	474457	106496	1.5
R2	474487	106496	
R3	474507	106493	
R4	474527	106489	
R5	474540	106480	
R6	474556	106482	



Figure 5: Modelled Receptor Locations



Significance Criteria

Construction Phase

4.23 The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A development is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (see Table 7); and
- the sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity. These risk categories are defined in detail within Boxes 6 to 8 of the IAQM guidance.

4.24 These two factors are combined to determine the risk of dust impacts with no mitigation applied (see Table 8). The risk category assigned to the development can be different for each of the four potential activities (demolition, earthworks, construction and track out).

Table 7 – Dust Emission Magnitude

Activity	Dust Emission Class		
	Large	Medium	Small
Demolition	Total building volume >50,000 m ³ , potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level	Total building volume 20,000 – 50 000m ³ , potentially dusty construction material, demolition activities 10-20 m above ground level	Total building volume <20,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months
Earthworks	Total site area >10,000 m ² , potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes	Total site area 2,500 – 10,000 m ² , moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes	Total site area <2,500 m ² , 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	Total building volume >100,000 m ³ , piling, on site concrete batching, sandblasting	Total building volume 25,000 m ³ – 100,000 m ³ , potentially dusty construction material (e.g. concrete), piling, on site concrete batching	Total building volume <25,000 m ³ , construction material with low potential for dust release (e.g. metal cladding or timber)
Track out	>50 HDV (>3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m	10 – 50 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100 m;	<10 HDV (>3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50 m.



Table 8 – Risk of Dust Impacts

Construction Activity	Sensitivity of Area	Dust Emission Magnitude		
		Large	Medium	Small
Demolition	High	High Risk	Medium Risk	Medium Risk
	Medium	High Risk	Medium Risk	Low Risk
	Low	Medium Risk	Low Risk	Negligible
Earthworks	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
Construction	High	High Risk	Medium Risk	Low Risk
	Medium	Medium Risk	Medium Risk	Low Risk
	Low	Low Risk	Low Risk	Negligible
Track out	High	High Risk	Low Risk	Low Risk
	Medium	Medium Risk	Low Risk	Negligible
	Low	Low Risk	Low Risk	Negligible

Operational Phase

- 4.25 The significance of emissions will be determined by comparing the predicted results to the Air Pollution Exposure Criteria (APEC) detailed in the *Air Quality and Planning Guidance* written by the London Air Pollution Planning and the Local Environment (APPLE) working group¹⁵. The Air Pollution Exposure Criteria is considered appropriate to describe the significance of the impacts predicted, together with an indication as to the level of mitigation required in order for the development to be approved. The APEC table is set out in Table 9.

¹⁵ Air Quality and Planning Guidance, written by the London Air Pollution Planning and the Local Environment (APPLE) working group, January 2007



**Table 9 – Air Pollution Exposure Criteria (APEC)**

APEC Category	NO2	PM10	Recommendations
A	>5% below national annual mean objective	>5% below national annual mean objective >1-day less than national 24-hour objective	No air quality grounds for refusal; however, mitigation of any emissions should be considered.
B	Between 5% below or above national annual mean objective	Between 5% above or below national annual mean objective Between 1-day above or below national 24-hour objective	May not be sufficient air quality grounds for refusal, however appropriate mitigation must be considered
C	>5% above national annual mean objective	>5% above national annual mean objective >1-day more than national 24-hour objective	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated

4.26 Furthermore, the guidance released by Environmental Protection UK also provides steps for a Local Authority to follow in order to assess the significance of air quality impacts of a development proposal. This procedure, shown in Figure 6, has also been applied to the modelled results.

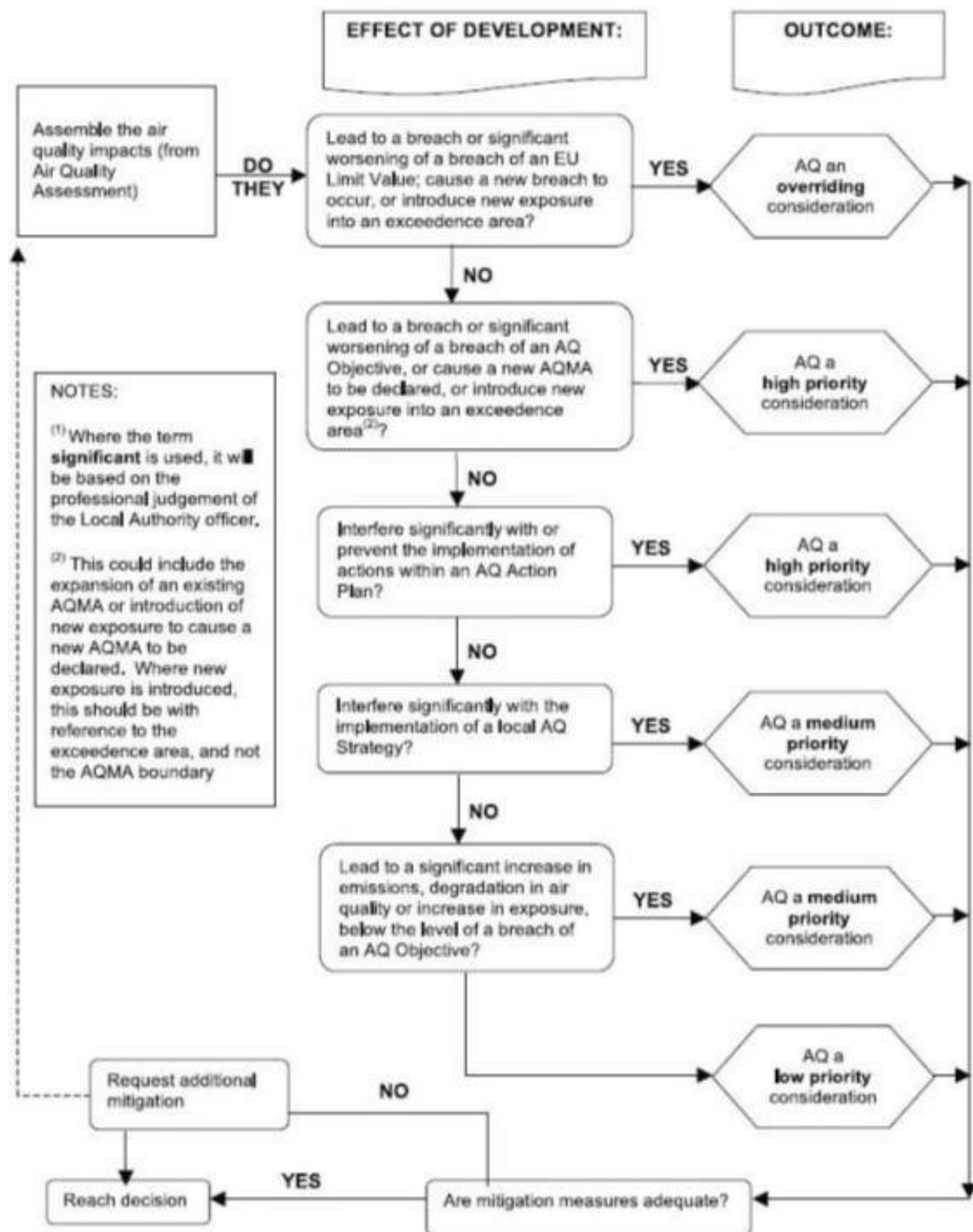


Figure 6: Assessing the Significance of Air Quality Impacts of a Development Proposal



5.0 AIR QUALITY ASSESSMENT

Impact from Construction Activities

5.1 The assessment of construction activities has focused on demolition, earthworks, construction and track out activities at the site. Using the criteria provided in Table 8 the dust emission magnitude for each activity is as follows:

- Demolition = N/A;
- Earthworks = Medium;
- Construction = Medium; and
- Track out = Medium.

5.2 Based on the IAQM guidance the sensitivity of the surrounding area is summarised in Table 10.

Table 10 – Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low	Low	Low
Human Health	N/A	Low	Low	Low

5.3 The dust emission magnitudes and sensitivity of the surrounding area are combined to determine the risk of dust impacts with no mitigation applied. These are summarised in Table 11.

Table 11 – Summary of Dust Risk

Potential Impact	Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Low Risk
Human Health	N/A	Low Risk	Low Risk	Low Risk

5.4 It should also be noted that the likelihood of an adverse impact occurring is correlated to wind speed and wind direction. As such, unfavourable wind speeds and wind directions must occur at the same time as a dust generating activity in order to generate an adverse impact. The overall impacts also assume that the dust generating activities are occurring over the entirety of the site meaning that as an activity moves further away from a potential receptor the magnitude and significance of the impact will be further reduced.





Impact from Vehicle Emissions

Model Verification

- 5.5 Using the guidance provided in the Local Air Quality Management Technical Guidance TG(16), the modelled output has been verified against the monitoring data obtained from the sites listed in Table 5. The following tables provide a summary of the model verification process for NO_x/NO₂ concentrations.

Table 12 – Comparison of Modelled and Monitored NO₂ Concentrations (µg/m³), 2017

Site ID	Modelled Concentration	Monitored Concentration	Difference [(modelled - monitored)/monitored] x100
4	22.7	20.4	11.3%

- 5.6 As described in the Technical Guidance (LAQM.TG(16)), in order to provide more confidence in the model predictions and the decisions based on these, the majority of results should be within $\pm 25\%$ (ideally $\pm 10\%$) of the monitored concentrations. The modelled NO₂ concentrations are outside $\pm 10\%$. However, they represent an overprediction and a worst-case assessment across the modelled domain. As such, no model adjustment has been undertaken.

Nitrogen Dioxide

- 5.7 Predicted annual mean concentrations for NO₂ in 2017 and 2022 are provided in Table 13. As mentioned in paragraph 4.17, NO₂ concentrations have been calculated from the predicted NO_x concentrations using the latest NO_x-NO₂ conversion spreadsheet available from the Air Quality Archive.

Table 13 – Predicted NO₂ Concentrations, Annual Mean (µg/m³)

Receptor ID	2017	2022
R1	22.5	22.8
R2	21.5	21.7
R3	21.2	21.4
R4	21.1	21.3
R5	21.5	21.7
R6	21.0	21.2
Objective	40.0	

- 5.8 The predicted concentrations of NO₂ in 2017 and 2022 are achieved at all modelled receptors.
- 5.9 Nitrogen dioxide also has an hourly objective of 200 µg/m³ not to be exceeded more than 18 times in one year. However, the hourly mean concentration has not been calculated directly





by ADMS-Roads model. This is as a result of an evaluation of continuous monitoring data from across the UK that revealed that the relationship between the annual mean and hourly mean NO₂ concentrations was very weak. Nonetheless, research undertaken in 2003¹⁶ has indicated that the hourly NO₂ objective is unlikely to be exceeded at a roadside location where the annual mean NO₂ concentration is less than 60 µg/m³. Given that predicted NO₂ concentrations in 2017 and 2022 using all scenarios are below 60 µg/m³ at all the modelled receptors, the short-term objective for NO₂ is unlikely to be exceeded in these years.

Particulate Matter

- 5.10 Predicted annual mean concentrations for PM₁₀ in 2017 and 2022 are provided in Table 14.

Table 14 – Predicted PM₁₀ Concentrations, Annual Mean (µg/m³)

Receptor ID	2017	2022
R1	15.8	15.8
R2	15.6	15.6
R3	15.6	15.6
R4	15.5	15.6
R5	15.6	15.6
R6	15.5	15.6
Objective	40.0	

- 5.11 The ADMS predictions for annual mean PM₁₀ concentrations in 2017 and 2022 indicate that the annual mean objective (40 µg/m³) would be achieved at all the modelled receptor locations. In addition, the maximum number of days when PM₁₀ concentrations are more than 50 µg/m³ is 0, less than the 35 exceedences allowed in the regulations.

Damage Cost Calculation

- 5.12 A damage cost calculation was undertaken for NO_x, PM₁₀ and PM_{2.5} to determine the level of mitigation to be implemented as part of the scheme. The damage cost (without mitigation) was calculated using the following procedure:

1. Identifying the additional trip rates generated by the proposed development;

¹⁶ Analysis of Relationship between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbside Monitoring Sites, Laxen and Mamer, 2003.





2. The emissions calculated for the pollutants of concern (NO_x, PM₁₀ and PM_{2.5}) using the latest Emissions Factor Toolkit (EFT)¹⁷;
3. The air quality damage costs calculation for the specific pollutant emissions.

- 5.13 The damage cost (without mitigation) has been calculated over five years from the modelled and verified baseline year (2017) using the latest damage cost guidance¹⁸. This is an estimate of the costs to society due to impact of increases in emissions associated with the proposed development. It should be noted that this calculation assumes no improvement in vehicle emissions (as contained in the EFT) following completion of the proposed development and is therefore worst case.
- 5.14 Bellamy Roberts LLP have advised that the proposed development would generate 193 daily vehicle movements (0.0% HDVs). This input is summarised in Table 15 along with the subsequent calculations.
- 5.15 The total damage cost is £27,821 over five years from 2017. This is an **estimate** of the costs to society due to the impact of increases in emissions associated with the proposed development. As defined by the IAQM/EPUK guidance¹⁹ the damage cost relates to the value of mitigation that should be applied, preferably on-site.

¹⁷ https://iaqm.defra.gov.uk/documents/EFT2017_v8.0.zip

¹⁸ Air Quality Damage Cost Guidance, Defra, January 2019

¹⁹ Land-Use Planning & Development Control: Planning for Air Quality. Guidance from Environmental Protection UK and the Institute of Air Quality Management for the consideration of air quality within the land-use planning and development control processes. EPUK & IAQM. January 2017





Table 15 – Input Data and Calculations for Damage Costs

EFT Input Parameter	EFT Input
Road Type	Urban (not London)
Traffic flow	193
%HDV	0.0%
Speed (kph)	48
No of Hours	24
Link Length (km)	10
EFT Output (NOx)	
Annual Emissions	249 kg/annum
Central Damage Cost	£6,199
1-year Damage Cost	£1,541
5-year Damage Cost	£7,704
EFT Output (PM10)	
Annual Emissions	24 kg/annum
Central Damage Cost	£105,836
1-year Damage Cost	£2,527
5-year Damage Cost	£12,637
EFT Output (PM2.5)	
Annual Emissions	14 kg/annum
Central Damage Cost	£105,836
1-year Damage Cost	£7,480
5-year Damage Cost	£7,480
TOTAL 5-year Damage Cost (All Pollutants)	£27,821



6.0 CONCLUSIONS AND RECOMMENDATIONS

Impact Construction Activities

- 6.1 A qualitative assessment of dust levels associated with the proposed development has been carried out. The impact of dust soiling and PM₁₀ can be reduced to negligible through appropriate mitigation measures, which are listed in Table 16 and are applicable to a low risk site. Implementation of these Best Practice Measures will help reduce the impact of the construction activities to an acceptable level.
- 6.2 With these mitigation measures enforced, the likelihood of nuisance dust episodes occurring at those receptors adjacent to the development are considered low. Notwithstanding this, the developer should take into account the potential impact of air quality and dust on occupational exposure standards (in order to minimise worker exposure) and breaches of air quality objectives that may occur outside the site boundary. Monitoring is not recommended at this stage, however, continuous visual assessment of the site should be undertaken and a complaints log maintained in order determine the origin of a particular dust nuisance. Keeping an accurate and up to date complaints log will isolate particular site activities to a nuisance dust episode and help prevent it from reoccurring in the future.





Table 16 – Mitigation of Construction Activities

Construction Activity	Mitigation Measures
Communications	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
	Display the head or regional office contact information.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make a complaints log available to the local authority when asked.
	Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation is recorded in the log book.
Monitoring	Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked.
	Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions.
Preparing and maintaining the site	Plan site layout: machinery and dust causing activities should be located away from receptors.
	Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site.
	Avoid site runoff of water or mud.
Operating vehicle/machinery	Ensure all non-road mobile machinery (NRMM) comply with standards.
	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 possible.
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the site for effective dust/particulate matter mitigation (using recycled water where possible).
	Use enclosed chutes, 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.
Waste Management	Reuse and recycle waste to reduce dust from waste materials
	Avoid bonfires and burning of waste materials.



Impact of Vehicle Emissions

- 6.3 The predicted concentrations of PM₁₀ and NO₂ in all modelled years are below the relevant objectives. Predicted concentrations at all the modelled receptors fall within APEC Category A, which states that there are "no air quality grounds for refusal, however, mitigation of any emissions should be considered". Overall, using the flow chart presented in Figure 6, air quality is a low priority consideration at the modelled locations in each of the modelled years.

Building Mitigation

- 6.4 Based on the results and discussion above there is no need to consider specific building mitigation to protect future occupiers from poor air quality at the site.

Additional Mitigation

- 6.5 The mitigation measures provided below could be adopted to help mitigate any potential air quality impacts associated with the new development. The cost for implementing these measures should be offset against the damage costs calculated in the previous section:
- All gas-fired boilers to meet a minimum standard of <40mgNO_x/kWh;
 - 1 Electric Vehicle rapid charge point (dwelling with dedicated parking) or 1 charging point per 10 spaces (unallocated parking). More detail is provided in Appendix A in relation to the installation of EV charging points; and
 - Provision of a detailed travel plan (with provision to measure its implementation and effect) which sets out measures to encourage sustainable means of transport (public, cycling and walking) via subsidised or free-ticketing, improved links to bus stops, improved infrastructure and layouts to improve accessibility and safety.



APPENDIX A: EV CHARGING POINT SPECIFICATION

This shall be the best technology available at the time of planning approval.

EV ready domestic installations:

- Cable and circuitry ratings should be of adequate size to ensure a minimum continuous current demand for the vehicle of 16A and a maximum demand of 32A (which is recommended for Eco developments).
- A separate dedicated circuit protected by an RCBO should be provided from the main distribution board, to a suitably enclosed termination point within a garage, or an accessible enclosed termination point for future connection to an external charge point.
- The electrical circuit shall comply with the Electrical requirements of BS7671: 2008 as well as conform to the IET code of practice on Electric Vehicle Charging Equipment installation 2012 ISBN 978-1-84919-515-7 (PDF).
- If installed in a garage all conductive surfaces should be protected by supplementary protective equipotential bonding. For vehicle connecting points installed such that the vehicle can only be charged within the building, e.g. in a garage with a (non-extended) tethered lead, the PME earth may be used. For external installations the risk assessment outlined in the IET code of practice must be adopted and may require an additional earth stake or mat for the EV charging circuit. This should be installed as part of the EV ready installation to avoid significant on cost later.



LUSTRE
CONSULTING

Admirals Offices

The Historic Dockyard

Chatham, Kent, ME4 4TZ

www.lustreconsulting.com

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