McCarthy and Stone (Developments) Ltd

Site 7a, Pacific Drive, Sovereign Harbour, Eastbourne

Air Quality Assessment

Report No. 444918-01 (02)

APRIL 2023

RSK

RSK GENERAL NOTES

Report No.: 444918-01 (02)

Title: Air Quality Assessment for Pacific Drive, Eastbourne

Client: McCarthy and Stone (Developments) Ltd

Date: 25th April 2023

Office: Hemel Hempstead

Status: Final

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Date:	25th April 2023	Date:	25th April 2023

Summary

RSK Environment Limited (RSK) has been commissioned by McCarthy & Stone (Developments) Limited to undertake an air quality assessment for the erection of an apartment retirement living development (Use Class C3), access, car parking and landscaping at Site 7a at Pacific Drive, Sovereign Harbour, Eastbourne. Hereafter referred to as the site.

The site forms a single parcel of land within the wider study area which will be brought forward for three separate planning applications: ALDI, McCarthy Stone and LNT Care Developments, representing a foodstore, retirement living home and a care home. RSK has been commissioned across all three parcels forming the wider study area with a separate report prepared to support each application for ease of reference. The effects of the three developments have been assessed cumulatively. The site is within the administrative area of Eastbourne Borough Council (EBC).

The assessment considered the impact of existing sources of air pollution at the proposed development site (governed by background pollutant levels and vehicle movements along the local highway network), and the impacts of the proposed development on the local area. Significant stationary combustion sources such as CHP plant or boilers are not proposed.

Construction phase impacts of the proposed development on local air quality may have the potential to occur, due to dust and particulate matter emissions generated from earthworks, construction and trackout. The risk of dust impacts was predicted to be a maximum of 'medium risk' during the construction phase. Prior to commencement of construction activities, it is anticipated that a dust management plan (DMP) or a dust and air quality-related contribution to a construction environmental management plan (CEMP) will be agreed with the local authority. It is recommended that it incorporates appropriate mitigation measures, such as those recommended in Appendix B of this document as appropriate, to ensure that the potential for adverse environmental effects on local receptors is minimised. With appropriate mitigation, the residual impact of construction phase air quality impacts should be viewed as 'not significant'.

To assess the effects of road traffic emissions associated with the development on local air quality, the following three scenarios were assessed using the ADMS Roads Extra dispersion modelling software:

- S1: 'Base case' scenario, for model verification purposes;
- S2: 'Without Proposed development 2025' scenario; and,
- S3: 'With Proposed development 2025' scenario.

The annual mean nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$, daily mean PM_{10} and hourly mean NO_2 concentrations at the proposed development site are predicted to meet the relevant objectives, therefore ambient air quality has been assessed as likely to have an insignificant effect on future site users. The development has been assessed as likely to have an insignificant effect on air quality at existing sensitive receptor locations, in the absence of mitigation.

In accordance with the Sussex-air partnership guidance document '*Air Quality and Emissions Mitigation Guidance for Sussex*' (2020), the development is classified as a 'major' development. Therefore, an Emission Mitigation Assessment has been undertaken. The 'damage cost calculation' was undertaken for NO_x and PM, the major pollutants associated with road traffic emissions. The calculated central damage cost value is **£6,161**.

The client have advised of mitigation measures proposed for the development. The value of the additional mitigation is greater than the £6,161 calculated above therefore no further mitigation or monetary contribution is required.

Abbreviations

AADT	Annual Average Daily Traffic
ADMS-Roads	Atmospheric Dispersion Modelling System – Roads (a dispersion modelling software application)
AQMA	Air Quality Management Area
AQS	Air Quality Standard
Defra	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
EBC	Eastbourne Borough Council
EC	European Commission
EPUK	Environmental Protection UK
EU	European Union
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LAQM TG.16	Local Air Quality Management Technical Guidance (2016)
LDV	Light Duty Vehicle
NAQS	National Air Quality Strategy
NPPF	National Planning Policy Framework
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5mm diameter
PM_{10}	Particulate matter of size fraction approximating to <10mm diameter
RSK	RSK Environment Limited
UK-AIR	UK Atmospheric Information Resource

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APPENDICES

1 INTRODUCTION

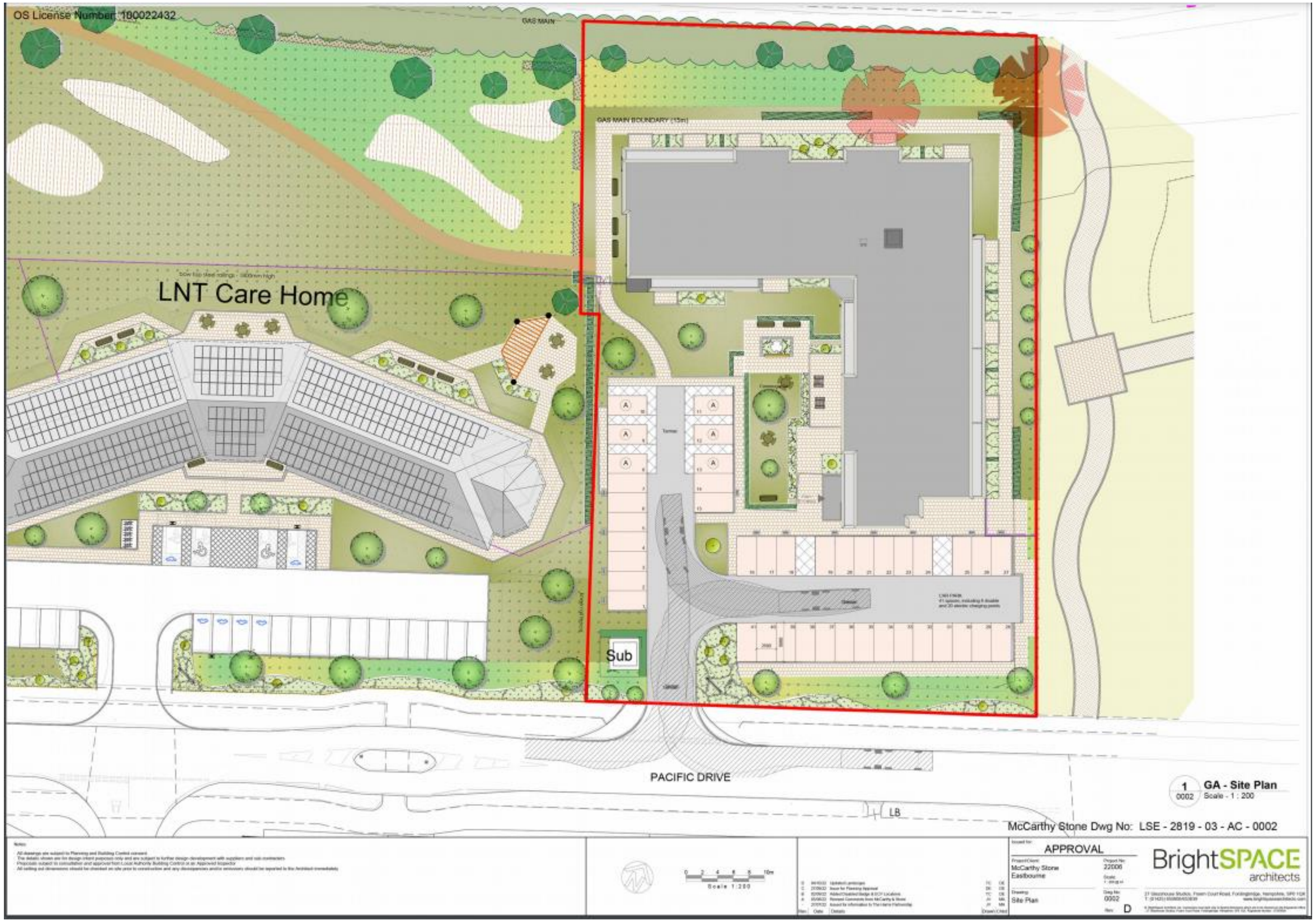
RSK Environment Limited (RSK) has been commissioned by McCarthy & Stone (Developments) Limited to undertake an air quality assessment for the erection of an apartment retirement living development (Use Class C3), access, car parking and landscaping at Site 7a at Pacific Drive, Sovereign Harbour, Eastbourne. Hereafter referred to as the site.

The site forms a single parcel of land within the wider study area which will be brought forward for three separate planning applications: ALDI, McCarthy Stone and LNT Care Developments, representing a foodstore, retirement living home and a care home. RSK has been commissioned across all three parcels forming the wider study area with a separate report prepared to support each application for ease of reference. The effects of the three developments have been assessed cumulatively.

The site is within the administrative area of Eastbourne Borough Council (EBC) and the approximate grid reference of the centre of the site is 564273, 102612. Figure 1.1 shows the proposed development site location plan.

This report presents the findings of an assessment of existing/baseline air quality conditions, potential air quality impacts during the construction phase and predicted air quality impacts once the development is occupied. Mitigation measures are recommended where appropriate.

Figure 1.1: Proposed Development Site Plan



2 LEGISLATION, PLANNING POLICY AND GUIDANCE

2.1 Air Quality Strategy

UK air quality policy is published under the umbrella of the Environment Act 1995, Part IV and specifically Section 80, the National Air Quality Strategy. The latest *Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Working Together for Clean Air*, published in July 2007, sets air quality standards and objectives for ten key air pollutants to be achieved between 2003 and 2020.

The EU (European Union) Air Quality Framework Directive (1996) established a framework under which the EU could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been or will be set in subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

The Clean Air Strategy 2019 supersedes the policies outlined in the 2007 strategy. This latest strategy aims to have a more joined-up approach, outlining actions the Government plans to take to reduce emissions from transport, homes, agriculture and industry. However, the air quality objectives remain as previously detailed within the 2007 strategy.

2.1.1 Air Quality Objectives

The air quality standards (AQSs) in the United Kingdom are derived from European Commission (EC) directives and are adopted into English law via the Air Quality (England) Regulations 2000 and Air Quality (England) Amendment Regulations 2002. The Air Quality Limit Values Regulations 2003 and subsequent amendments implement the EU Air Quality Framework Directive into English Law. Directive 2008/50/EC was translated into UK law in 2010 via the Air Quality Standards Regulations 2010.

The relevant[1] AQSs for England and Wales to protect human health are summarised in Table 2.1.

Table 2.1: Air Quality Objectives Relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200

[1] Relevance, in this case, is defined by the scope of the assessment.

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit ($\mu g/m^3$)
Particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 calendar year	-	20

2.1.2 The Environment Act, 1995

Local authorities are required to review and assess air quality in their areas under Section 82 of the Environment Act (1995). If exceedances of the air quality objectives are measured or predicted, the local authority must declare an air quality management area (AQMA) and prepare an air quality action plan to outline how air quality is to be improved.

2.1.3 The Environment Act, 2021

The new Environment Act (2021) amends the Environment Act (1995) to reinforce the local air quality management (LAQM) framework in order to encourage cooperation at the local level and broaden the range of organisations that play a role in improving local air quality. The Environment Act requires targets to be set for fine particulate matter $PM_{2.5}$, but at the time of writing, these have not been finalised.

2.2 Planning Policy

The land use planning process is a key means of improving air quality, particularly in the long term, through the strategic location and design of new developments. Any air quality concern that relates to land use and its development can, depending on the details of the proposed development, be a material consideration in the determination of planning applications.

2.2.1 National Planning Policy Framework

In July 2021, the revised National Planning Policy Framework (NPPF) was published, superseding the previous 2012 NPPF (revised in July 2018 and updated in February 2019) with immediate effect. The revised NPPF aims to "place greater emphasis on beauty, place-making, the environment, sustainable development and underlines the importance of local design codes."

Section 15 of the revised NPPF deals with Conserving and Enhancing the Natural Environment, and states that the intention is that the planning system should prevent '*development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability*'.

Paragraph 185 states that '*new development* [should be] *appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development*.'

With specific regard to air quality, paragraph 186 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 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."*

2.2.2 Local Planning Policy

A new Local Plan for Eastbourne is currently in preparation. This new Plan will look ahead to 2039 but at the time of writing is at an early stage (Regulation 18) and does not yet include any specific policies against which to assess the proposed development'.

The current adopted plan 'EASTBOURNE CORE STRATEGY LOCAL PLAN' adopted in 2013 lays out the current policies which are carried over into the adopted development plan. There are no policies specific to air quality however PolicyNE13: Pollution Mitigation Measures, states: *Planning approval for developments which pose a risk of pollution to air, land or water, will be required to incorporate adequate pollution control measures. Planning permission will be refused where it is considered that a development poses an unacceptable risk of pollution.*

2.3 Guidance Documents

2.3.1 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note '*Land-Use Planning & Development Control: Planning for Air Quality*' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes methods for undertaken an air quality assessment and an approach for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

2.3.2 Guidance on the Assessment of Dust from Demolition and Construction (Institute of Air Quality Management, 2014) ('the IAQM 2014 guidance')

Published by the Institute of Air Quality Management (IAQM), this gives guidance on the assessment of the risk of dust and particulate matter from construction activities affecting air quality and amenity at nearby sensitive receptors during the construction phase of a development. It is used to define the appropriate level of mitigation required to minimise impacts.

2.3.3 Local Air Quality Management Review and Assessment Technical Guidance (Department for Environment, Food and Rural Affairs, 2016) ('LAQM TG.16')

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment work. This guidance, referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2016) ('LAQM TG.16'), has been used where appropriate.

2.3.4 Air Quality and Emissions Mitigation Guidance for Sussex (2020)

EBC is a participating member of Sussex-air partnership, which has developed a guidance document for developers on how to assess and mitigate the air quality impacts from development and transport-related emissions.

3 ASSESSMENT SCOPE AND METHOD

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the proposed development may be summarised as follows:

- Consultation with EBC;
- Baseline characterisation of local air quality;
- Qualitative assessment of the construction phase of the development using the IAQM 2014 guidance;
- Quantitative assessment of road traffic air quality impacts during the operational phase of the proposed development using detailed dispersion modelling; and
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

It is understood that no significant combustion sources such as combined heat and power (CHP) or biomass boilers are proposed as part of the scheme. Therefore, stationary emissions have been 'scoped out' from this assessment.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken including a review of monitoring data available from EBC and estimated background data from the Local Air Quality Management (LAQM) Support website maintained by the Department of Environment, Food and Rural Affairs (Defra). Consideration has also been given to potential sources of air pollution in the vicinity of the application site.

3.3 Construction Phase Impact Assessment

3.3.1 Construction Dust and Particulate Matter

Demolition and construction work for the proposed development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the impacts of construction phase dust and particulate matter at sensitive receptors has therefore been undertaken following the IAQM's construction dust guidance.

In order to assess the potential impacts construction activities are divided into four types:

- Demolition;
- Earthworks;
- Construction; and

- Trackout[2].

Appendix A details how the 'dust emission magnitude', associated with each of these activities, is combined with the sensitivity of receptors (human or ecological), to determine the overall 'dust risk'. Once the level of risk has been determined, mitigation proportionate to the level of risk can be identified.

3.3.2 Emissions to Air from Construction Traffic and Plant

Exhaust emissions from construction phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the application site and in the vicinity of the application site itself.

Detailed information on the number of vehicles and plant associated with the construction phase is not available at this stage (and would not be until after appointment of the main construction contractors), therefore a qualitative impact assessment has been undertaken based on professional judgement and considering the following factors:

- The likely duration of the construction phase;
- The potential number and type of construction traffic and plant that could be required; and
- The number and proximity of sensitive receptors to the application site and along the likely construction vehicle routes.

3.4 Operational Phase Assessment

Once occupied, the proposed development will generate additional traffic on the surrounding road network and the emissions to air associated with this traffic have the potential to impact on nearby sensitive receptors.

The EPUK-IAQM 2017 guidance provides an approach for determining the significance of air quality impacts associated with a development in relation to emissions from traffic. To assess the impacts of a development on the surrounding area, the guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion. The approach is further described in **Appendix C** including the descriptors for the impact significance.

There are two aspects of air quality impact to be considered for the proposed development.

- The impacts of the proposed development on local air quality; and
- The impact of existing sources in the local area on the proposed development.

[2] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

The main potential air quality impact once the proposed development is complete and occupied is likely to be emissions from road traffic associated with the proposed development (i.e. changes in flow volume and distribution). Thus, detailed dispersion modelling has been carried out to predict pollutant concentrations across the application site and the surrounding area. The following scenarios were modelled:

- Scenario 1 (S1): '2019 Baseline'[3] for model verification purposes;
- Scenario 2 (S2): '2025 Without Development' (without the proposed development in place, but with committed developments); and,
- Scenario 3 (S3): '2025 With Development' (with the proposed development and other committed developments in place).

2019 is used as the baseline year in this assessment, for the purpose of model verification (i.e. S1) as the most recent year for which a full year of bias-adjusted and ratified local monitoring data is available, without the impacts of the Corona Virus pandemic.

The development is anticipated to be complete and occupied in 2025. Therefore, 2025 has been used as the opening year in this assessment. The following subsections provide further information regarding input to the dispersion model including traffic emissions sources, meteorological data and receptors included.

3.4.1 Modelling Software

ADMS-Roads is an advanced dispersion model developed by the UK consultancy CERC (Cambridge Environmental Research Consultants). ADMS-Roads is widely used and validated within the UK and Europe. The model allows for the skewed nature of turbulence within the atmospheric boundary layer. ADMS-Roads is capable of processing hourly sequential meteorological data, whilst taking the turbulence caused by vehicles into account in calculating the dispersion profiles of emitted pollutants. ADMS-Roads enables the user to predict concentrations of pollutants of concern at multiple receptor locations.

ADMS-Roads (Version 5.0.0.1) has been used for assessing potential road traffic emission air quality impacts resulting from the operational phase of the proposed development, and the potential exposure of future occupiers at the proposed development to poor air quality.

3.4.2 Traffic Data

The AADT flows, %HDVs and speeds (km/h) adopted for roads in each of the modelled scenarios are presented in Appendix D of this report. Figure 3.1 presents the roads and receptors included in the dispersion modelling and the roads and diffusion tubes included for verification in Figure 3.2.

[3] Due to the Covid-19 pandemic in 2020, it was not considered appropriate to use 2020 as a baseline year.

The data were supplied by the project traffic consultants Connect Consultants Ltd. The road network modelled in this assessment was determined on the basis of whether additional traffic attributable to the proposed development was expected to lead to an exceedance of the screening criteria for when an air quality assessment is required, in accordance with the EPUK-IAQM guidance. These screening criteria are:

- A change in the AADT of light duty vehicles of more than 500 outside an AQMA, or 100 within or adjacent to an AQMA; and,
- A change in the AADT of heavy duty vehicles of more than 100 outside an AQMA, or 25 within or adjacent to an AQMA.

The future year scenarios account for committed developments where appropriate, and the ‘S3 with development’ scenario includes traffic contributions from the foodstore, retirement living home and a care home. The project traffic consultants are not aware of other specific committed/consented developments, however the TEMPRO software used for the growth factor does take into consideration committed/consented developments local to the area.

The AADT values and %HDVs applied on roundabouts were estimated by taking half of the maximum flow from all roads flowing into the roundabout.

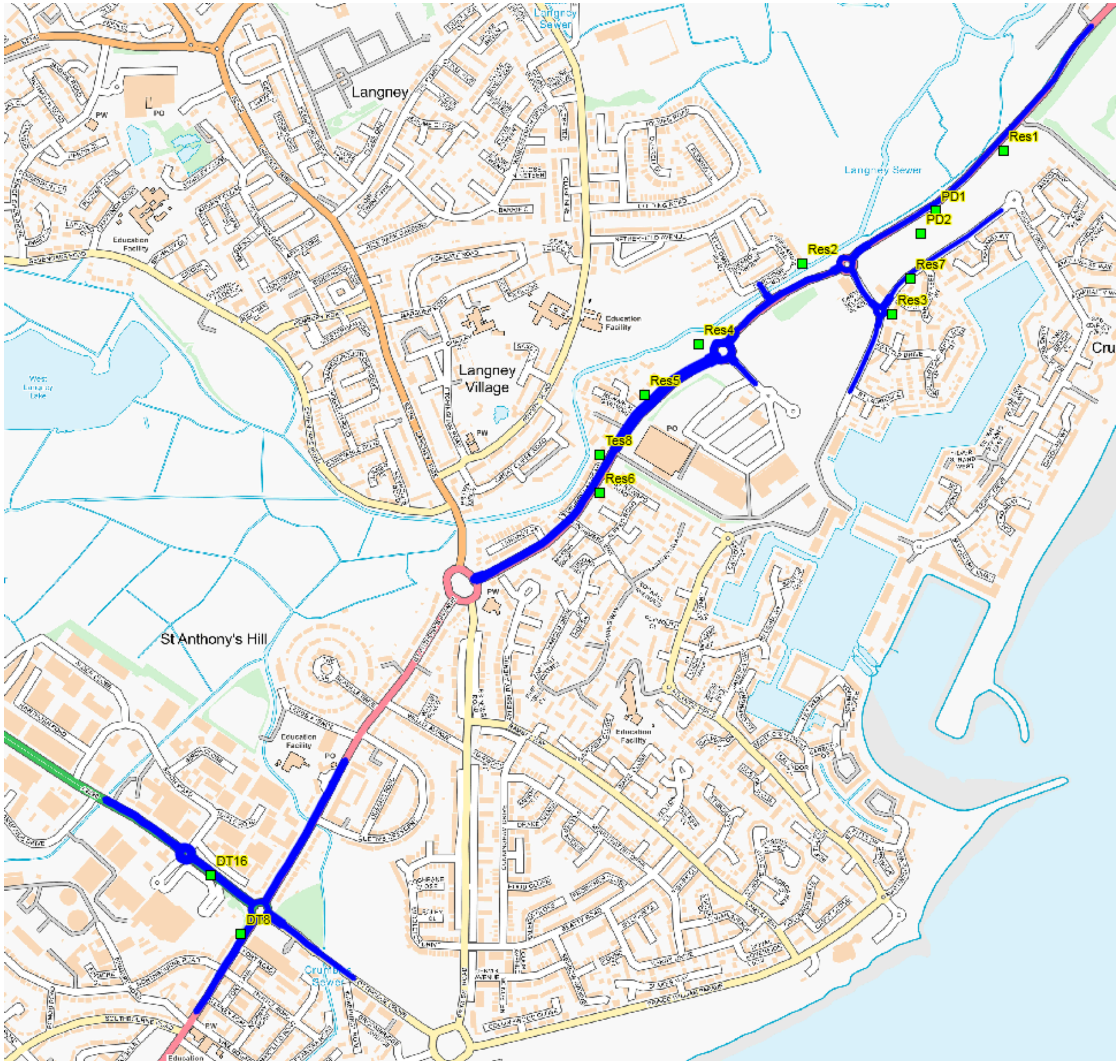
Professional judgement and guidance in LAQM.TG (22) were used to determine speeds for use within the model, including reduced speeds at junctions.

3.4.3 Emission Factors

Version 11.0 of the emissions factor toolkit (EFT), published by DEFRA, has been used to derive vehicle emissions factors for NOx, PM_{10} and $PM_{2.5}$. The EFT serves to estimate pollutant concentrations emitted, depending on the volume and composition of traffic, its speed, the road type and its location within the country.

Within the EFT, emission factors are available for 2018 through to 2050 for England (not London), and 2018 to 2030 for Wales, Scotland, Northern Ireland and London. EFT version 11.0 takes into account the most recent evidence relating to factors such as advances in vehicle and exhaust technology and changes in composition of the vehicle fleet. The emission factors consequently reduce over time. Hence, emissions factors for 2019 were used to estimate vehicle emissions for S1 modelling scenario and 2025 emissions factors were used for S2 and S3.

Figure 3.1: Roads and receptors included in the dispersion modelling assessment.



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3.4.4 Time-Varying Profile

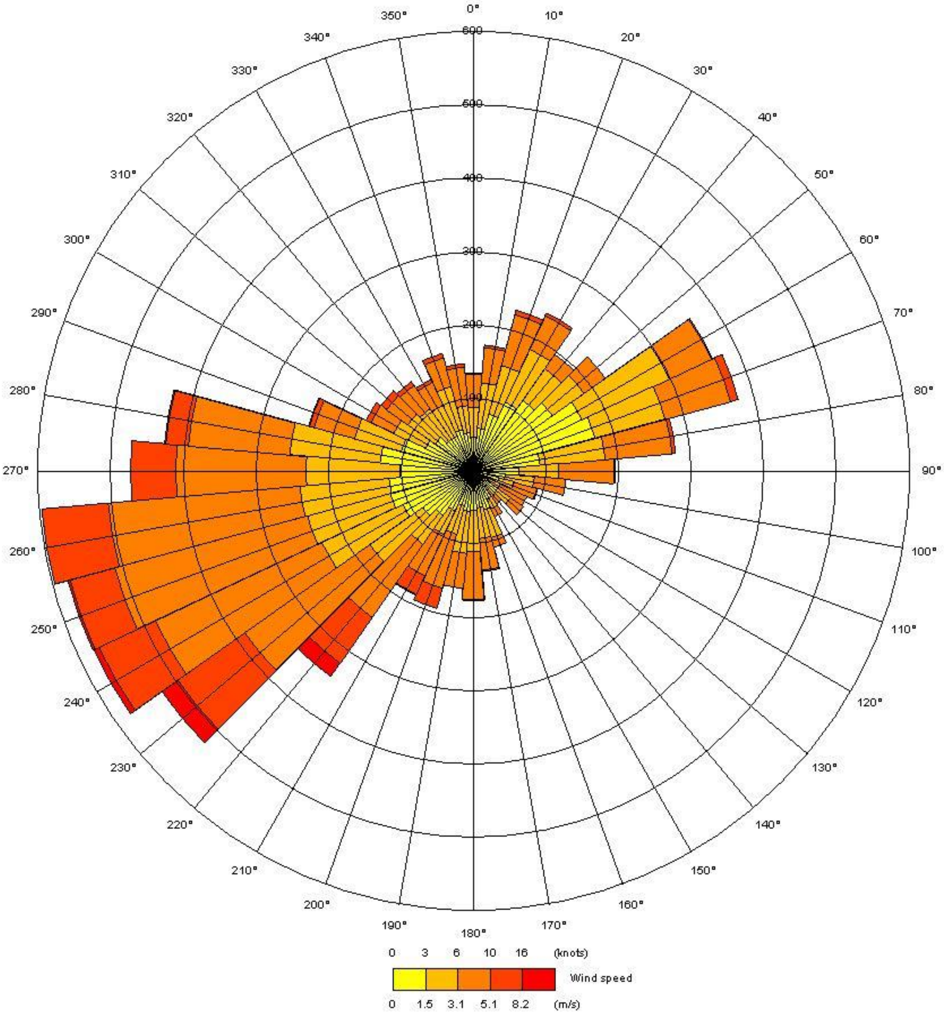
Vehicle movements vary with time. Diurnal profiles for the modelled roads were not available, therefore, the UK National Profile 2019 published by the DfT has been applied to all of the assessed roads. The profile serves to multiply the emissions factors in each hour of each day upward or downward, depending on anticipated variations in traffic volumes on the road network during the day. The applied road emissions profiles are displayed in Figure D1 in Appendix D.

3.4.5 Meteorological Data

Hourly sequential meteorological data obtained from Hertsmonceux meteorological monitoring station were employed in the dispersion model. This meteorological station is located approximately 11.3km west of the application site and is considered likely to be the most representative station of the proposed development site with reliable data. The data were recorded in 2019 at the Hertsmonceux meteorological monitoring station.

The windrose derived from the 2019 dataset is presented in Figure 3.3. The predominant wind direction was from the southwest.

Figure 3.3: Windrose from the Hertsmonceux Meteorological Station in 2019



3.4.6 Background Air Quality Data Used in the Modelling

A review of the EBC 2022 Air Quality Annual Status Report suggested no representative background monitoring locations within the immediate vicinity of the site, therefore 2019 annual mean NO_2, PM_{10} and $PM_{2.5}$ data from the DEFRA estimated background concentrations for the grid square in which the receptor falls were used.

The Defra LAQM background concentration maps assume that background concentrations will improve (i.e. reduce) over time, in line with predicted reductions in vehicle and other emissions.

For a conservative approach, the Defra background data for 2019 was used for both the 2019 baseline scenario and 2025 opening year scenarios. Table E4 in Appendix E shows the background concentrations applied at each receptor location.

3.4.7 Receptor Locations

Pollutant concentrations were predicted at a number of receptors locations at both existing locations and future properties within the application site. The existing receptors were selected to represent the sensitive receptors (e.g. residential dwellings) at locations near to the application site, and junctions and main roads in the vicinity, to ensure that 'worst-case' impacts were captured. Details of all discrete receptors included in the modelling study (and hence the air quality impacts assessed) are summarised in Appendix E. The locations of all assessed receptors are shown in Figure 3.1.

3.4.8 Other Model Input Parameters

The modelling input parameters for the dispersion modelling assessment are presented in Table 3.1.

Table 3.1: Summary of Inputs to the Dispersion Model

Parameter	Brief Description	Input into model
Road elevation	Elevation of road above ground level	No roads elevated and no terrain file used.
Road width	Width of road (m)	Road widths determined based on approximate measurement of roads (based on mapping data).
Canyon heights	Height of canyons effects turbulent flow patterns; these are greater with larger canyon heights	No canyons included.
Road type	Selection of different types of road to be assessed, inputted into the EFT and CURED toolkit calculations	Urban (not London) settings used for all roads
Road speeds	Speed of the road effects the vehicle emissions to air	These were estimated based on local speed limits, with reduced speeds at junctions.
Meteorology	Representative hourly sequential meteorological data	Hertsmonceux 2019 data

Parameter	Brief Description	Input into model
Latitude	Allows the location of the model area to be determined	50.7°
Surface roughness	This defines the surface roughness of the model area	0.5 at dispersion site and 0.3 at meteorological site
Monin-Obukhov length	A boundary layer parameter required to precisely describe the atmospheric stability conditions and to predict dispersion of pollutants released from road traffic.	30m at dispersion site and 10m at meteorological site

3.4.9 Model Verification and Results Processing

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is considered to be fit for purpose. Model validation undertaken by the software developer may not have included validation in the vicinity of the development considered in this assessment.

To determine the performance of the model at a local level, a comparison of modelled results with the results of monitoring carried out within the study area was undertaken. This process of 'verification' attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results and was carried out following the methodology specified in LAQM.TG (22). Full details of the verification calculations are presented within **Appendix E**.

Local monitoring data are not available for concentrations of PM_{10} and $PM_{2.5}$ and consequently, the predicted road-PM_{10} and road-$PM_{2.5}$ contributions were adjusted using the factor calculated for road-NO_x, before adding the appropriate background concentrations. This approach is consistent with guidance given in LAQM.TG(22).

An adjustment factor of 2.81 was obtained for the NO_2 verification process and applied to the modelled road-NO_x component predicted at assessment receptors. Annual mean NO_2 concentrations were estimated from modelled NO_X, using the NO_x to NO_2 calculator (version 8.1) available from the Defra website.

LAQM.TG(22) advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

To estimate the number of days per annum where the daily mean PM_{10} air quality standard may be exceeded, the following formula, derived from the Local Air Quality Management Technical Guidance (2022), was used:

Number of exceedances =-18.5+0.00145*([N] ^3)+(206/[N]).

where [N] is the predicted annual mean concentration at each receptor location.

3.4.10 Interpretation of Modelled Results

To determine whether ambient air quality with the development in place could impact upon future users of the proposed site, or may cause an AQS to be exceeded with the development in place (where an exceedance is not predicted without the development), the total modelled annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations predicted at each of the modelled discrete receptor locations (representative of ‘relevant exposure’) in S3 were compared to the relevant annual mean air quality objectives (as listed in Table 2.1).

The potential for the hourly mean NO_2 and daily mean PM_{10} AQS to be exceeded was assessed using the criteria referenced in LAQM TG.22.

To assess the magnitude of impacts of a development on the surrounding area (associated with changes in annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations), the mechanism referenced in the EPUK-IAQM 2017 guidance was used. This guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change as a proportion of the relevant air quality assessment level (i.e. the relevant annual mean AQS), and examining this change in the context of the predicted total concentration with the development in place, relative to the AQS. The approach is further described in **Appendix C**, including the impact magnitude descriptors.

The overall significance of effects was determined using professional judgement, with reference to the impact magnitudes assigned at each receptor, and to the number and extent of any modelled exceedances of any of the abovementioned AQSs.

The results of the dispersion modelling are presented in Section 5.2 and Appendix E.

3.5 Additional Uncertainties and Assumptions

The following uncertainties and assumptions have been made in the air quality assessment:

- Background pollution concentrations were taken from the Defra LAQM background maps. it is assumed that background data obtained from Defra’s website are likely to reasonably represent conditions at site;
- Emissions from the average vehicle fleet using the local road network cannot be known, and therefore it is assumed those generated by the EFT provided an accurate representation of emissions generated by vehicles which currently and will use the modelled roads;
- There will be uncertainties introduced because the modelling has simplified real-world processes into a series of algorithms. For example, it has been assumed that meteorological conditions measured during 2019 at the Hertsmonceux meteorological monitoring station are representative of conditions throughout the modelled domain. Furthermore, it has been assumed that the subsequent dispersion of emitted pollutants will conform to a Gaussian distribution over flat terrain in order to simplify the real-world dilution and dispersion conditions;
- An important step in the assessment is verifying the dispersion model against measured data. The model verification was based on the comparison of model results based on 2019 traffic data with 2019 measured roadside NO_2 diffusion tube data. As

no PM_{10} or $PM_{2.5}$ monitoring data were available near the site area, the adjustment factors used for the predicted roadside NO_x concentrations have been applied to the predicted PM_{10} and $PM_{2.5}$ concentrations, as per guidance provided in the LAQM.TG(16). and,

- There is an element of uncertainty in all measured and modelled data. All values presented in this report are best estimates available.

4 BASELINE AIR QUALITY CHARACTERISATION

4.1 Emissions Sources and Key Air Pollutants

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. The following sources of baseline information have been investigated to characterise the air quality baseline:

- The presence of air quality management areas (AQMAs) at and around the site;
- Air quality monitoring data from EBC; and,
- Estimated background concentrations in the LAQM Support website operated by Defra.

4.2 Presence of AQMAs

The proposed development site is not located within an AQMA. EBC has no current declared AQMA.

4.3 Baseline Monitoring Data

A review of the monitoring data available from the EBC 2022 Annual Status Report suggests that EBC operates a network of 21 diffusion tubes, of which there are four within 3km of the proposed site. These are reproduced in Table 4.1 below. No exceedances of the annual mean NO_2 objective were recorded between 2017 and 2021.

Table 4.1: Monitored Annual mean NO_2 Concentrations at the Monitoring Locations within 3km of the Proposed Development Site

Site ID	Site Description	Site Type[1]	Approximate Distance from Site (miles)	Annual Mean NO_2 Concentration ($\mu g/m^3$)				
				2017	2018	2019	2020	2021
7	61 Royal Parade Princes Park	Kerbside	2.9	27.2	-	31.9	16.6	20.9
8	53- Seaside (Tesco)	Kerbside	2.3	26.9	-	24.2	22.4	25.9
9	ESCC102/EB6 Friday St/Larkspur Dr	Kerbside	2.7	25.4	-	23.8	15.0	17.5
16	Lottbridge Drove Tesco	Kerbside	2.3	-	-	39.3	18.9	22.2
Air Quality Strategy Objectives				40				

[1] Site type as classified by the EBC Annual Status Report

4.4 Defra UK-AIR Estimated Background

In addition to the local monitoring data, estimated background air quality data are available from the LAQM Support website operated by the Defra. The website provides estimated annual average background concentrations of NO_x, NO_2, PM_{10} and $PM_{2.5}$ on a 1 km^2 grid basis.

Table 4.2 reproduces estimated annual average background NO_x, NO_2, PM_{10} and $PM_{2.5}$ concentrations at the proposed development site for the years 2023 - 2025. None of the NO_2, PM_{10} or $PM_{2.5}$ estimated background concentrations exceed their respective annual mean standards.

As background concentrations are predicted to fall with time, background concentrations in future years would not be expected to exceed their respective annual mean standards.

Table 4.2: Estimated Background Annual Average NO_x, NO_2, PM_{10} and $PM_{2.5}$ Concentrations at Proposed Development Site (2023 to 2025)

Assessment Year	Estimated Annual Average Pollutant Concentrations Derived from the LAQM Support Website (µg/m^3)		
	Annual Average NO_2	Annual Average PM_{10}	Annual Average $PM_{2.5}$
2023	8.1	13.5	8.9
2024	7.8	13.3	8.8
2025	7.5	13.1	8.6
Air Quality Objective	**40**	**40**	**20**

Notes: Presented concentrations for 1km^2 grid centred on 564500, 102500; approximate centre of development site is 564273, 102612; ^air quality objective designated for the protection of vegetation and ecosystems only.

5 IMPACT ASSESSMENT

5.1 Construction Phase

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- exhaust emissions from site plant, equipment and vehicles; and,
- fugitive dust / particulates emissions from site activities.

5.1.1 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing pollutants including NO_x, PM_{10}, $PM_{2.5}$, volatile organic compounds and carbon monoxide. The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Construction traffic will comprise haulage/construction vehicles and vehicles used for workers' trips to and from the site. Regarding haulage and construction vehicles, it is estimated that between 10-50 HDV outward movements per day, which is considered unlikely to bring about a significant change in local air quality. Due to the transient nature of the works, traffic generated by employee vehicle movements are also unlikely to have significant effects on air quality.

The operation of plant and machinery will also result in emissions to atmosphere of exhaust gases, but with suitable controls and site management such emissions are unlikely to be significant (as per guidance within LAQM TG(16)).

5.1.2 Fugitive Dust Emissions

Fugitive dust and particulate matter emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Construction activities that are considered to be the most significant potential sources of fugitive dust emissions are:

- Earth moving, due to the handling, storage and disposal of soil and subsoil materials;
- Construction aggregate usage, due to the transport, unloading, storage and use of dry and dusty materials (such as cement and sand);
- Movement of heavy site vehicles on dry or untreated haul routes; and,
- Movement of vehicles over surfaces where muddy materials have been transferred off-site (for example, on to public highways).

Fugitive emissions arising from construction activities mainly comprise dust of a particle size greater than the PM_{10} fraction (the fraction which can potentially impact upon human health); however, it is noted that construction activities may contribute to local PM_{10} concentrations. Appropriate dust control measures can be highly effective for controlling emissions from potentially dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

5.1.3 Potential Dust Emission Magnitude

With reference to the IAQM guidance criteria outlined in **Appendix A**, the dust emissions magnitude for earthworks, construction and trackout activities are summarised in Table 5.1 to 5.3.

Demolition works have been screened out of this assessment as demolition works are not planned.

Table 5.4 summarises the emissions magnitude categories assigned to each type of construction related activity prior to the implementation of mitigation. Any assumptions made have been identified.

Table 5.1: Summary of Dust Emissions Magnitude of Earthworks Activities (Before Mitigation)

Earthworks Criteria	Dust Emissions Class	Evaluation of the Effects
Total site area	Large	>10,000m^2
Soil type	Medium	The site is located on Loamy and clayey soils
Earth moving vehicles at any one time	Medium	It is assumed that 5-10 is the maximum which would operate at one time.
Height of bunds/ stockpiles	Medium	Conservatively estimated as be 4-8m in height
Total material moved	Medium	Conservatively estimated as 20,000 – 100,000 tonnes of material to be moved.
Work times	Medium	It is assumed that work could occur throughout the year.
Overall Rating	**Medium**	

Table 5.2: Summary of Dust Emissions Magnitude of Construction Activities (Before mitigation)

Construction Criteria	Dust Emissions Class	Evaluation of the Effects
Total building volume	Medium	The total building volume is estimated to be 25,000m^3 to 100,000m^3
On-site concrete batching proposed	Small	Assumed concrete batching is not proposed.
On-site sandblasting proposed	Small	Assumed concrete batching is not proposed.

Construction Criteria	Dust Emissions Class	Evaluation of the Effects
Dust potential of construction materials	Large	Assumed some potentially dusty materials will be used at site.
Overall Rating	**Medium**	

Table 5.3: Summary of Dust Emissions Magnitude of Trackout Activities (Before mitigation)

Trackout Criteria	Dust Emissions Class	Evaluation of the Effects
Number of HDV (heavy duty vehicles) >3.5t per day	Medium	Conservatively estimated as 10-50 outward HDV movements per day (maximum) can be anticipated.
Surface type of the site	Medium	The site is located on Loamy and clayey soils
Length of unpaved road	Large	Assumed that unpaved roads could be 50 to 100m.
Overall Rating	**Medium**	

Table 5.4: Summary of Dust Emission Magnitude of the Site (Before mitigation)

Construction Activities	Dust Emissions Class
Earthworks	Medium
Construction	Medium
Trackout	Medium

5.1.4 Sensitivity of the Area

As per the IAQM 2014 guidance, the sensitivity of the area takes into account a number of factors, including:

- The sensitivity of individual receptors in the area;
- The proximity and number of those individual receptors;
- In the case of PM_{10}, the local background concentration; and,
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

The area sensitivity was determined by reviewing the number of individual human and ecological receptors classified as 'high', 'medium' and 'low' sensitivity (using the classifications outlined in the IAQM guidance), and identifying the distance of these receptors from either:

(i) the area of the site to be developed (for construction and earthworks activities as it is assumed that construction-related activities will be confined to the developable area); or (

(ii) ii) the assumed routes along which trackout may occur.

It was assumed that trackout may occur either west along Pacific Drive and then north after the Pacific Drive/ Harbour Quay roundabout. The area sensitivity has been considered for three types of potential impact: a loss of amenity arising from dust deposition; the impact of additional PM_{10} on human health; and impacts on ecological receptors caused by dust deposition.

The MAGIC Maps website was used to determine the presence of sites designated for their ecological sensitivity, such as Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSI), Ancient Woodlands, and National & Local Nature Reserves. No Such sites were identified therefore impacts to ecological receptors were screened out of this assessment.

Construction activities are considered relevant up to 350m from the proposed development site boundary, and it is assumed that HDVs may cause trackout anywhere in the area of the site being developed, and up to 50m from local roads within 200m of the site entrance, as per the IAQM guidance.

Table 5.5: Sensitivity of the area

Potential Impact		Phase of construction works		
		Earthworks	Construction	Trackout
Dust deposition and loss of amenity	Receptor sensitivity	High	High	High
	Number of receptors	10-100	10-100	10-100
	Distance from the source	50m	50m	20m
	Sensitivity of the area	**Medium**	**Medium**	**High**
Human health	Receptor sensitivity	High	High	High
	Background annual mean PM_{10} concentration	<24µg/m^3	<24µg/m^3	<24µg/m^3
	Number of receptors	10-100	10-100	10-100
	Distance from the source	50m	50m	20m
	Sensitivity of the area	**Low**	**Low**	**Low**
Ecological	Screened out as no relevant ecologically designated sites identified within 50m of site or routes along which trackout may occur.			

5.1.5 Risk of Impacts

Using the risk categories from the IAQM guidance (replicated in **Appendix A**), the dust emission magnitudes summarised in Table 5.4 has been compared to the area sensitivities in Table 5.5 to determine the scale of risk that construction-related activities may generate dust and air quality impacts on human and ecological receptors.

The risk of dust impacts from construction activities is identified in Table 5.6. Mitigation measures to reduce construction phase impacts are identified, based on this assessment, in Section 6.

Table 5.6: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Medium risk	Medium risk	Medium risk
Human health		Low risk	Low risk	Low risk
Ecological		N/A		

5.2 Operational Phase

Once operational, the main potential impact of the proposed development is considered to be emissions from increased road traffic associated with the proposed development. Figure 3.1 shows the roads and sensitive receptors included in the dispersion modelling assessment.

5.2.1 Impact of the Development on Local Air Quality

Nitrogen Dioxide – NO_2

Table 5.7 shows a comparison of predicted annual mean NO_2 concentrations between S2 and S3 at the assessed receptor locations representative of relevant exposure (as defined in LAQM TG.16). The results as percentages of the Air Quality Assessment Level (AQAL) (i.e. the annual mean objective/limit value) are also presented which are used in the determination of magnitude of impacts (based on the EPUK-IAQM guidance).

The changes in annual mean NO_2 concentrations at existing receptor locations, as a result of the proposed development and traffic redistribution, are predicted to be 'negligible' at all receptor locations. Therefore, the effect of the proposed development on annual mean NO_2 concentrations, prior to mitigation, is considered to be not significant.

LAQM.TG(16) notes that 'exceedances of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60μg/m^3 or above'. In the opening year of 2025, annual mean NO_2 concentrations are not predicted to exceed 60μg/m^3 at any receptors. EPUK-IAQM guidance recommends it is not normally necessary to consider impacts on short-term concentrations unless there is a risk of AQAL being exceeded due to the proposed development. As the annual mean NO_2 concentrations are well below 60μg/m^3, the significance of short-term results is likely to be **negligible** and has not been assessed further.

Table 5.7: Comparison of Predicted Annual Mean NO_2 Concentrations between S2- S3

Receptor ID	Without Development (S2)		With Development (S3)		% Change NO_2 concentration relative to AQAL*	Predicted Impact
	Total ($\mu g/m^3$)	% of AQAL	Total ($\mu g/m^3$)	% of AQAL		
DT8	22.1	55.2	22.1	55.2	0	Negligible
DT16	26.0	65.1	26.0	65.1	0	Negligible
Res1	12.7	31.9	12.8	32.0	0	Negligible
Res2	13.3	33.4	13.5	33.7	0	Negligible
Res3	12.8	32.0	13.3	33.3	1	Negligible
Res4	14.9	37.1	15.0	37.4	0	Negligible
Res5	14.7	36.8	14.8	37.0	0	Negligible
Res6	15.6	39.0	15.7	39.3	0	Negligible
PD1	15.8	39.5	15.9	39.6	0	Negligible
PD2	13.5	33.9	13.6	34.1	0	Negligible
Res7	15.9	39.6	16.6	41.6	2	Negligible
Res8	14.4	36.0	14.5	36.2	0	Negligible
* Rounded to a whole number						

Particulate matter – PM_{10}

The objective for annual mean PM_{10} concentrations is 40µg/m^3. The results of the assessment indicate that in the anticipated opening year of 2025, annual mean PM_{10} concentrations for all receptor locations will be well below the objective.

Table 5.8 shows the comparison of annual mean PM_{10} concentrations between the S2 '2025 without proposed development' and S3 '2025 with proposed development' scenarios at existing sensitive receptor locations. The results as percentages of the AQAL are also presented which are used in the determination of significance of impacts (based on the EPUK-IAQM guidance).

The results indicate that in the opening year of 2025, no exceedances of the annual mean PM_{10} objective concentration are predicted at any of the proposed receptors within the development site.

The changes in annual mean PM_{10} concentrations at existing receptor locations, as a result of the proposed development and traffic redistribution, are predicted to be 'negligible' at all receptor locations.

As shown in Table E5 in Appendix E, the number of exceedances of the daily mean PM_{10} objective is estimated to be fewer than the permissible 35 at all of the receptor locations. The effect of the proposed development on PM_{10} concentrations, prior to mitigation, is considered to be not significant.

Table 5.8: Comparison of Predicted Annual Mean PM_{10} Concentrations between S2 and S3

Receptor ID	Without Development ($\mu g/m^3$)		With Development ($\mu g/m^3$)		% Change NO_2 concentration relative to AQAL*	Predicted Impact
	($\mu g/m^3$)	% of AQAL	($\mu g/m^3$)	% of AQAL		
DT8	18.6	46	18.6	46	0	Negligible
DT16	19.9	50	19.9	50	0	Negligible
Res1	15.5	39	15.5	39	0	Negligible
Res2	15.5	39	15.6	39	0	Negligible
Res3	15.2	38	15.4	38	0	Negligible
Res4	15.9	40	15.9	40	0	Negligible
Res5	16.1	40	16.2	40	0	Negligible
Res6	16.5	41	16.6	41	0	Negligible
PD1	16.0	40	16.0	40	0	Negligible
PD2	15.2	38	15.2	38	0	Negligible
Res7	15.9	40	16.2	41	1	Negligible
Tes8	15.9	40	16.0	40	0	Negligible
* Rounded to a whole number						

Particulate matter – $PM_{2.5}$

The air quality objective for annual mean $PM_{2.5}$ concentrations is 20µg/m^3. The results of the assessment indicate that in the anticipated opening year of 2025, annual mean $PM_{2.5}$ concentrations for all receptor locations will be well below the objective.

Table 5.9 shows the comparison of annual mean $PM_{2.5}$ concentrations between the S2 '2025 without proposed development' and S3 '2025 with proposed development' scenarios at existing sensitive receptor locations. The results as percentages of the AQAL are also presented which are used in the determination of significance of impacts (based on the EPUK-IAQM guidance).

The results indicate that in the opening year of 2025, no exceedances of annual mean $PM_{2.5}$ concentrations are predicted at any of the proposed receptors within the development site. The changes in annual mean $PM_{2.5}$ concentrations at existing receptor locations, as a result of the proposed development and traffic redistribution, are predicted to be '**negligible**' at all receptor locations. The effect of the proposed development on $PM_{2.5}$ concentrations, prior to mitigation, is considered to be not significant.

Table 5.9: Comparison of Predicted Annual Mean $PM_{2.5}$ Concentrations between S2 and S3

Receptor ID	Without Development		With Development		% Change NO_2 concentration relative to AQAL*	Predicted Impact
	($\mu g/m^3$)	% of AQAL	Total ($\mu g/m^3$)	% of AQAL		
DT8	12.4	62	12.4	62	0	Negligible
DT16	13.2	66	13.2	66	0	Negligible

Receptor ID	Without Development		With Development		% Change NO_2 concentration relative to AQAL*	Predicted Impact
	($\mu g/m^3$)	% of AQAL	Total ($\mu g/m^3$)	% of AQAL		
Res1	10.2	51	10.2	51	0	Negligible
Res2	10.8	54	10.8	54	0	Negligible
Res3	10.1	50	10.2	51	0	Negligible
Res4	11.0	55	11.0	55	0	Negligible
Res5	11.1	56	11.1	56	0	Negligible
Res6	11.3	57	11.3	57	0	Negligible
PD1	10.5	53	10.5	53	0	Negligible
PD2	10.1	50	10.1	50	0	Negligible
Res7	10.5	52	10.6	53	1	Negligible
Tes8	11.0	55	11.0	55	0	Negligible
* Rounded to a whole number						

5.2.2 Impact of Future Air Quality on Future Sensitive Receptors

As shown in Table E5 of Appendix E, concentrations of the annual mean NO_2, PM_{10} or $PM_{2.5}$, hourly mean NO_2 or daily mean PM_{10} are not expected to exceed the relevant AQSs at either of the proposed development receptor locations. The predicted annual mean NO_2 concentrations do not exceed 60µg/m^3 at any of the modelled receptors at the proposed development site. Therefore, as per LAQM TG.22, it is unlikely that future site users would be exposed to air which exceeds the hourly mean NO_2 AQS. As a result, future ambient air quality at the proposed development site is expected to be acceptable.

5.2.3 Significance of Effects

The AQS objectives for NO_2, PM_{10} and $PM_{2.5}$ are predicted to be met at all receptor locations considered in the assessment. In accordance with EPUK-IAQM guidance, the impacts of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ concentrations, prior to mitigation, are predicted to be 'negligible' at all receptor locations. Therefore, the effect of the proposed development on NO_2, PM_{10} and $PM_{2.5}$ concentrations, prior to mitigation, is considered to be not significant.

Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at proposed receptors on the development site itself show that future residents are not predicted to be exposed to air quality exceeding the UK AQS objectives.

Based on above, it is considered that the impacts of the proposed development on local air quality is 'not significant'. However, as pe the Air Quality and Emissions Mitigation Guidance for Sussex (2020) an emissions mitigation assessment has been undertaken in Section 6.2 of the report.

6 MITIGATION MEASURES

6.1 Construction Phase Mitigation

The dust emitting activities outlined in Section 5 can be effectively controlled by appropriate dust control measures and any adverse effects can be greatly reduced or eliminated. Prior to commencement of construction activities, it is anticipated that a dust management plan (DMP) or a dust and air quality-related contribution to a construction environmental management plan (CEMP) will be agreed with the local authority. It is recommended that it incorporates appropriate mitigation measures, such as those recommended in Appendix B of this document as appropriate, to ensure that the potential for adverse environmental effects on local receptors is minimised. The DMP or CEMP contribution should include *inter alia*, measures for controlling dust and general pollution from site construction operations, and include details of any monitoring scheme, if appropriate. Controls should be applied throughout the construction period to ensure that emissions are mitigated.

It is recommended that an appropriate selection of best practice mitigation measures are implemented to minimise the effects of construction traffic moving to and from site have on local air quality where practicable, viable and feasible. Such measures may include:

- Considering mechanisms to minimise the number of vehicle movements taking place to and from the site, such as encouraging goods deliveries by non-road methods, discouraging on-site idling and encouraging that as many goods are ordered/ collected from the same place at one time as is practicable;
- Minimising on-site parking (with due regard for unloading goods and equipment, fitness of employees, etc.); and
- Providing secure cycle parking and encouraging the use of public transport, at site inductions or similar.

With implementation of the proposed construction phase mitigation measures (as above and detailed in **Appendix B**), the residual impacts are considered to be negligible.

6.2 Operational Mitigation

As identified in Section 5.2.3, the proposed development is not expected to have a significant effect on local air quality in the absence of mitigation. However in accordance with the Sussex-air 2020 guidance, the development is classified as a major development. Therefore, an emission mitigation assessment has been undertaken to provide a valuation of additional emissions related to traffic from the development scheme.

6.2.1 Emission Mitigation Assessment

The following tools were used for the damage cost calculation:

- Defra '*Emission Factors Toolkit v11.0*' (available online at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/emissions-factors-toolkit/); and
- Defra 'Air quality appraisal: damage cost toolkit' (available online at: https://www.gov.uk/government/publications/assess-the-impact-of-air-quality).

Step 1: Quantify change in emissions for NO_x and $PM_{2.5}$

- **Pollutants: NOx and $PM_{2.5}$** – road traffic is expected to be the main source of air pollutants once the development is operational. The principal pollutants relevant to this assessment are therefore considered to be nitrogen oxides (NO_x) and particulate matter (PM), which are generally regarded as the most significant air pollutant released by vehicular combustion processes. $PM_{2.5}$ has been used for PM in line with the Defra Air Quality Appraisal guidance.
- **Road Type: Urban (not London)**
- **Traffic Flow: 95 Annual Average Daily Trips (AADT)** – data provided by project Transport Consultants
- **2% HGV**
- **Average speed: 50 kph** (in accordance with Sussex-air 2020 guidance)
- **Trip length used: 10km**
- **Years: 2025-2029** - 2025 is the anticipated opening year of the development. 5 years of emissions, in line with the Sussex-air guidance, have then been used up to 2029.

Table 6.1 presents the EFT output with the emissions converted from kg/yr to tonnes/yr.

Table 6.1: Converted EFT output

	Emissions (tonnes/yr)				
	2025	**2026**	**2027**	**2028**	**2029**
NO_x	0.060	0.054	0.049	0.044	0.039
$PM_{2.5}$	0.0064	0.0064	0.0063	0.0063	0.0063

Step 2: Calculate damage costs for NO_x and $PM_{2.5}$

The Defra Damage Cost Appraisal Toolkit (updated March 2021) was used with the following input:

- Start year: 2025
- End year: 2029
- Price Based Year: 2023
- Number of Pollutants: 2 (NO_x and $PM_{2.5}$)
- Source: Road transport

Table 6.2 presents the damage cost calculation outputs. The calculated central damage cost value over a five-year period is **£120,333**.

Table 6.2 Damage Cost Appraisal Toolkit Output

Output from Damage Cost Appraisal Toolkit						
	2025	**2026**	**2027**	**2028**	**2029**	**Total**
Central Value NO_x	£721	£638	£563	£498	£443	**£2,862**
Central Value $PM_{2.5}$	£685	£671	£659	£647	£636	**£3,298**
					Total Central Value Costs	**£6,161**

The damage cost calculation is considered to provide a basis for quantifying the financial commitment required for offsetting potential development-generated emissions. The calculated central damage cost value over a five-year period is £6,161, which can be used to fund onsite mitigation measures or to contribute to off-site mitigation measures. This cost should be used as an indicator to the level of emissions offsetting measures required as part of the proposed development scheme and it is considered that appropriate measures can be provided on site.

The client have advised that mitigation measures as outline in Table 6.3 below are proposed for the development. The value of the additional mitigation is greater than the £6,161 calculated above therefore no further mitigation or monetary contribution is required.

Table 6.2 Proposed Mitigation Measures

Mitigation Measures	£ Value
Electric Vehicles Charge points – 20 Active Spaces, 21 Passive Spaces According to EBC's 'Electric Vehicle Charging Points Planning Policy Technical Advice Note (2021), non-residential development with 21-50 car parking spaces would be expected to have 1 space with EVCP. Therefore 5 of the proposed spaces can be viewed as additional mitigation.	Cost: £30,585 (20 active / 21 passive) £50,535 (41 active) Total Cost: £81,120
Covered Secure Cycle Store (4 spaces)	Total Cost of £1,000
Green travel plan will be agreed including monitoring and co-ordination	Total Cost of £1,750

Mitigation Measures	£ Value
Mechanical ventilation with heat recovery (MVHR) in all apartments	Total Cost of £122,898 (including communals) £113,658 (excluding communals)
Green infrastructure – New landscaping and planting including planting approx. 20 trees	Total Cost of £447,370 planting / turf and £48,405 topsoil
Improvements to pedestrian environment including new pavements within the site	Total Cost of £13,576.30 for paving

6.3 Residual Impacts: Significance

If appropriate mitigation, such as those recommended in Appendix B of this report and in any DMP or CEMP, are implemented, the residual impact of any fugitive dust and PM emissions generated from earthworks, construction and trackout occurring as the development undergoes construction should be viewed as 'not significant'.

For operational phase, the proposed development is not expected to have a significant effect on local air quality in the absence of mitigation. However in accordance with the Sussex-air 2020 guidance mitigation to the value of £6,161 is required, as demonstrated in Table 6.2 this value has been exceeded by the proposed mitigation.

7 SUMMARY AND CONCLUSIONS

RSK Environment Limited (RSK) has been commissioned by McCarthy & Stone (Developments) Limited to undertake an air quality assessment for the erection of an apartment retirement living development (Use Class C3), access, car parking and landscaping at Site 7a at Pacific Drive, Sovereign Harbour, Eastbourne. Hereafter referred to as the site.

The site forms a single parcel of land within the wider study area which will be brought forward for three separate planning applications: ALDI, McCarthy Stone and LNT Care Developments, representing a foodstore, retirement living home and a care home. RSK has been commissioned across all three parcels forming the wider study area with a separate report prepared to support each application for ease of reference. The effects of the three developments have been assessed cumulatively. The site is within the administrative area of Eastbourne Borough Council (EBC).

The assessment considered the impact of existing sources of air pollution at the proposed development site and the impacts of the proposed development on the local area.

Construction phase impacts of the proposed development on local air quality may have the potential to occur, due to dust and PM emissions generated from earthworks, construction and trackout. The potential risk of dust impacts was predicted to be a maximum of ‘**medium risk**’ during the construction phase. Prior to commencement of construction activities, it is anticipated that a dust management plan (DMP) or a dust and air quality-related contribution to a construction environmental management plan (CEMP) will be agreed with the local authority. It is recommended that it incorporates appropriate mitigation measures, such as those recommended in **Appendix B** of this document as appropriate, to ensure that the potential for adverse environmental effects on local receptors is minimised. With appropriate mitigation, the residual impact of construction phase air quality impacts should be viewed as ‘not significant’.

To assess the impact of increased road traffic associated with development on local air quality, the following three scenarios were modelled using the ADMS Roads Extra dispersion modelling software:

- **S1:** ‘Base case’ scenario, for model verification purpose;
- **S2:** ‘Without Proposed development 2025’ scenario; and,
- **S3:** ‘With Proposed development 2025’ scenario.

The annual mean NO_2, PM_{10} and $PM_{2.5,}$ daily mean PM_{10} and hourly mean NO_2 concentrations at the proposed development site are predicted to meet the relevant air quality standards, therefore ambient air quality at the development site has been assessed as having an insignificant effect on future site users.

The development is predicted to having an **insignificant impact** on air quality at existing sensitive receptor locations in the absence of mitigation.

In accordance with the Sussex-air partnership guidance document '*Air Quality and Emissions Mitigation Guidance for Sussex*' (2020), the development is classified as a 'major' development. Therefore, an Emission Mitigation Assessment has been undertaken. The 'damage cost calculation' was undertaken for NO_x and PM, the major pollutants associated with road traffic emissions. The calculated central damage cost value is **£6,161**.

The client have advised of mitigation measures proposed for the development. The value of the additional mitigation is greater than the £6,161 calculated above therefore no further mitigation or monetary contribution is required.

APPENDIX A – CONSTRUCTION DUST ASSESSMENT METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM 2014 guidance. The assessment follows the steps recommended in the guidance.

<u>Step 1</u>: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

- a 'human receptor' within:
  - 350m of the boundary of the site; or
  - 50m of the route used by construction vehicles on the public highway, up to 500m from the site entrance(s).
- an 'ecological receptor':
  - 50m of the boundary of the site; or
  - 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

<u>Step 2A</u>: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total building volume >50,000m^3, potentially dusty construction material, on-site crushing and screening, demolition activities >20m above ground level;
- **Medium**: Total building volume 20,000m^3 – 50,000m^3, potentially dusty construction material, demolition activities 10m – 20m above ground level; and,
- **Small**: Total building volume <20,000m^3, construction material with low potential for dust release, demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total site area >10,000m^2, potentially dusty soil type (e.g. clay), >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 2,500 – 10,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 8m in height, total material moved 20,000 – 100,000 tonnes; and,

- **Small**: Total site area < 2,500m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10,000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: Total building volume >100,000m^3, piling, on site concrete batching;
- **Medium**: Total building volume 25,000 – 100,000m^3, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and,
- **Small**: Total building volume <25,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

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

<u>Step 2B</u>: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and,
- Site-specific factors, such as whether here are natural shelters such as trees, to reduce the risk of wind-blown dust.

Table A1 was used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
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. • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (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) • 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.	• 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. • 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	• Users would 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. • Examples include parks and places of work.	• Locations where the people exposed are workers and exposure is over a time period relevant to the air quality objective for PM_{10} (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). • Examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.	• 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. • Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
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. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distances 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

Table A3: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High		>100	High	High	High	Medium	Low

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
	>32□g/m^3	10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 □g/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 □g/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 □g/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32□g/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32□g/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28□g/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 □g/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	$\geq$1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

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

<u>Step 2C</u>: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from 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

Table A6: Risk of Dust Impacts from Earthworks/Construction

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

Table A7: Risk of Dust Impacts from Trackout

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

APPENDIX B - CONSTRUCTION PHASE RECOMMENDED MITIGATION MEASURES

The IAQM 2014 guidance divides site-specific mitigation measures are divided into general measures applicable to all sites, and measures specific to earthworks, construction and trackout. Depending on the level of risk assigned in relation to each type of construction activity, different mitigation is assigned. The method for assigning mitigation measures as detailed in the IAQM guidance has been used. For those ‘general’ mitigation measures, the greatest risk category assigned to the assessed construction activities should be applied. Therefore, in this case, the ‘high risk’ ‘general’ site mitigation measures have been recommended.

There are two categories of mitigation measure – ‘highly recommended’ and ‘desirable’, which are indicated according to the dust risk level identified in Table 5.3. Desirable measures are presented in *italics*.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of people 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 DMP (which may be incorporated within a Construction Environmental Management Plan), 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. The desirable measures should be included as appropriate for the site.

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 the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site or the action taken to resolve the situation in the logbook.

Monitoring

- *Undertake periodic 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 if asked.*

- Carry out regular site inspections to monitor compliance with any dust management plan or similar, 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 PM10 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.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors as far as 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 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.

Operating Vehicles/Machinery

- 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.
- *Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas.*
- Implement a plan to manage the sustainable delivery of goods and materials.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a plan that supports and encourages sustainable travel (public transport, cycling, walking and car-sharing).

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- 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 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 as soon as reasonably practicable after the event using wet clean methods.

Waste Management

- Avoid bonfires or burning of waste materials.

Measures Specific to Earthworks

- *Re-vegetate earthworks and exposed areas/ soil stockpiles to stabilise surfaces as soon as practicable. Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or re-cover with topsoil as soon as practicable. As explained above, where this is not possible, alternatives may include covering, sheeting or putting fences/ barriers around the exposed areas/ soil stockpiles/ site boundary*
- *Only remove the cover in small areas during work and not all at once*

Measures Specific to Construction

- *Avoid scabbling (roughening of concrete surfaces) if possible.*
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- *Ensure bulk cement ab dither 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 powder materials ensure bags are sealed after use and stored appropriately to prevent dust*

Measures Specific to 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 the 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 any inspections of haul routes and subsequent action in site logbook.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

APPENDIX C - OPERATION IMPACT ASSESSMENT METHODOLOGY

This appendix contains the methodology used in the assessment for the operational impact assessment to include reference to EP-UK & IAQM guidance.

The EPUK & IAQM guidance makes reference to the Town and Country Planning (Development Management Procedure) Order (England) 2010 [(Wales) 2012] definition of a 'major' development when scoping assessments required for the planning process. A 'major' development includes developments where:

- The number of dwellings is 10 or above;
- The residential development is carried out of a site of more than 0.5ha where the number of dwellings is unknown;
- The provision of more than 1,000m^2 commercial floorspace; or,
- Development carried out on land of 1ha or more.

Consideration of air quality impacts and approaches to reduce impacts from any 'major' developments is therefore recommended.

There are two types of air quality impact to be considered:

- The impact of existing sources in the local area on the proposed development (governed by background pollutant levels and proximity to sources of air pollution); and,
- The impacts of the proposed development on the local area.

With regard to the changes in air quality or exposure to air pollution, the guidance indicates that each local authority will be likely to have their own view on the significance of this; these are to be described in relation to whether an air quality objective is predicted to be met, or at risk of not being met. Exceedances of these objectives are considered as **significant** if not mitigated.

As part of the impact of the proposed development on the local area, a two-staged assessment is recommended as per guidance.

Stage 1: Determines whether an air quality assessment is required. Requires any of the criteria under (A) coupled with any of the criteria under (B) in Table C1 to apply to be required to proceed to Stage 2.

Stage 2: Where an assessment is deemed to be required, this may take the form of a Simple Assessment or a Detailed Assessment, taking reference to the criteria in Table B2.

Table C1: Stage 1 Criteria to proceed to Stage 2

Criteria to Proceed to Stage 2
A. If any of the following apply: • 10 or more residential units of a site area of more than 0.5ha • More than 1,000m^2 of floor space for all other uses or a site area greater than 1ha
B. Coupled with any of the following: • The development has more than 10 parking spaces • The development will have a centralised energy facility or other centralised combustion process

Table C2: Indicative Criteria for Requiring an Air Quality Assessment

The Development will	Indicative Criteria to Proceed to an Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic slows on local roads with relevant receptors.	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere.
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A Change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA
4. Introduce a new junction or remove an existing junction near to relevant receptors.	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100AADT elsewhere.
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors.	Typically, any combustion plant where the single or combined NOx emission rate is less than 5 mg/sec is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing nitrogen dioxide concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.

The impacts of a development are usually assessed at selected 'receptors'. The magnitude of impacts is derived by the percentage of change in pollutant concentration relative to an Air Quality Assessment Level (AQAL) and long term average pollutant concentration at receptor, as presented in Table C3.

Table C3: Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% of less of AQAL	Negligible	Negligible	Slight	Moderate
79 – 94% of AQAL	Negligible	Slight	Moderate	Moderate
95 – 102% of AQAL	Slight	Moderate	Moderate	Substantial
103 – 109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

APPENDIX D - TRAFFIC DATA

This appendix contains the traffic data used in the dispersion modelling assessment. Included are traffic flow data in AADT, %HDV and free-flowing speed (km/h).

Table D1 AADT Traffic Flows for Model Scenarios used in the dispersion modelling assessment

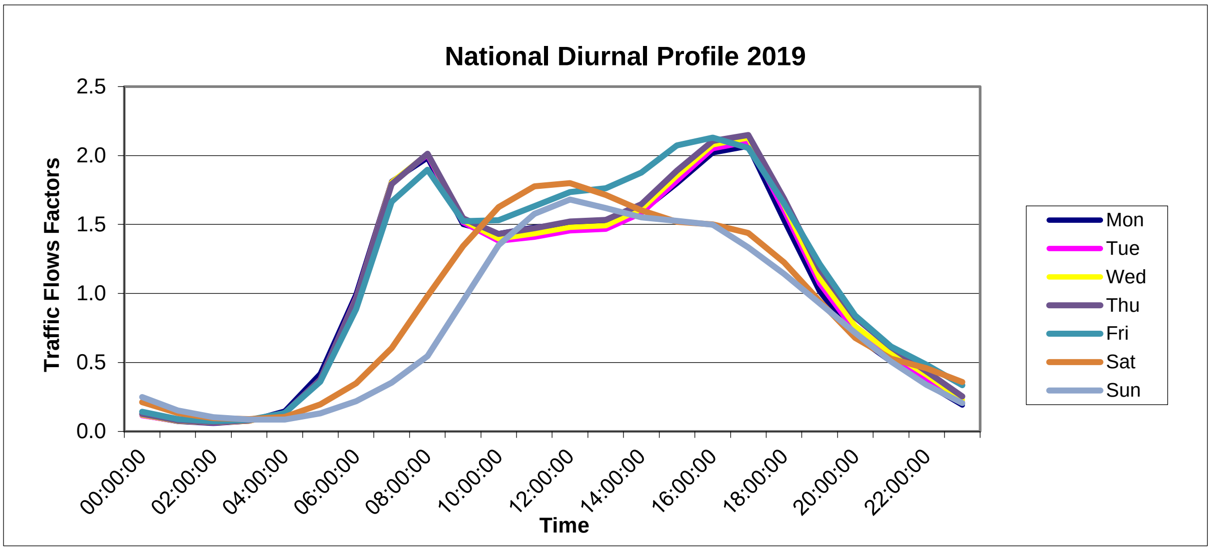
Figure D1 National diurnal Profile for other roads utilised in modelling assessment

Table D1: AADT Traffic Flows for Model Scenarios used in the dispersion modelling assessment

Road	S1 AADT	S1 HDV%	S2 AADT	S2 HDV%	S3 AADT	S3 HDV%
Aldi	0	0%	0	0%	1920	0%
Pacific Drive / East of Aldi / West of LNT / West of Barrier Reef Way	6484	1%	6812	1%	7071	1%
East Pacific Drive / West of Aldi	6478	1%	6806	1%	8618	1%
LNT	0	0%	0	0%	94	2%
Pacific Drive / East of LNT / East of Barrier Reef Way / West of MCS	6484	1%	6812	1%	6978	1%
MCS	0	0%	0	0%	95	2%
Pacific Drive / East of MCS / West of Tasmania Way	6484	1%	6812	1%	6883	1%
Pacific Drive / East of Tasmania Way	6484	1%	6812	1%	6883	1%
South of Pacific Drive	6484	1%	6812	1%	6883	1%
Harbour Quay west	1103	0%	1159	0%	1199	0%
Pacifc Drive North / Pacific Drive South of Martello Roundabout	7645	1%	8031	1%	9736	1%
East of A259 Pevensey Bay Road off Martello Roundabout	13356	1%	14034	1%	14152	1%
West of A259 Pevensey Bay Road off Martello Roundabout / East of Tanbridge Road	20288	1%	21317	1%	22341	1%
Tanbridge Road	770	4%	808	4%	808	4%
West of Tanbridge Road / East of A259 Pevensey Bay Road off Harbour Roundabout	21149	2%	17692	2%	18717	2%
Sovereign Harbour Retail Park south of Harbour Roundabout	12119	0%	12748	0%	12402	0%
West of A259 Pevensey Bay Road off Harbour Roundabout / East A259	24313	2%	21027		21620	2%

Pevensey Bay Road off Langney Roundabout						

Figure D1: National Diurnal Profile applied to all modelled roads within the Dispersion Modelling Assessment



APPENDIX E - MODELLING OF OPERATIONAL PHASE – VERIFICATION METHODOLOGY AND MODEL RESULTS

The dispersion model results were verified following the relevant guidance in the Local Air Quality Management Technical Guidance (2022) (LAQM.TG(22)). Predicted results from a dispersion model may differ from measured concentrations for a variety of reasons, these are identified in TG(22) to include:

- Estimates of background concentrations;
- Meteorological data uncertainties;
- Uncertainties in source data for example, traffic flow data, stack emissions and emission factors;
- Model input parameters such as roughness length, minimum Monin-Obukhov and overall model limitations; and,
- Uncertainties associated with monitoring data, including locations.

A comparison of modelled versus monitored NO_2 concentrations at the sites is presented in Table E1. As the model underpredicted by 36.2%, model verification was undertaken.

Table E1: Modelled versus Monitored NO_2 Concentrations

Site	Background NO2	Monitored total NO2	Modelled total NO2	% Difference [(modelled – monitored)/ monitored]x100
DT8	10.67935	24.2	17.89	-26.1
DT16	12.75528	39.3	21.07	-46.4

Modelled versus measured road NO_2 at the diffusion tube monitoring sites are shown in Table E2. This indicated that the model under-predicted road NO_x concentrations by a factor of 2.81. No PM_{10} or $PM_{2.5}$ monitors were available to verify results therefore the NO_X factor of 2.81 was also used for PM_{10} and $PM_{2.5.}$

Table E2: Modelled versus Monitored NO_x/NO_2

Site	Monitored total NO_2	Background NO_2	Monitored Road Contribution NO_2	Monitored Road Contribution NOx	Modelled road contribution NOx	Ratio of Modelled and Measured Road NOx
DT8	24.2	10.68	13.52	25.65	13.32	1.93
DT16	39.3	12.76	26.54	53.84	15.57	3.46

An adjustment factor of **2.81** was obtained and applied to the modelled road-NO_x component predicted at all receptors. The verified annual average modelled road contribution NO_x concentrations have then been converted into annual average road NO_2 by using the Defra NO_x to NO_2 spreadsheet; a comparison of monitored and model adjusted NO_2 is presented in Table

E3. This shows that, following adjustment, all modelled NO_2 results are within +/- 25% of monitored NO_2 concentrations. In accordance with the LAQM.TG(22) guidance, it is not considered that further verification is required.

Table E3: Modelled versus Monitored NO_2 Concentrations

Site	Background NO_2	Monitored total NO_2	Modelled total NO_2 after adjustment	% Difference [(modelled – monitored)/monitored]x100
DT8	10.7	24.2	29.9	23.7
DT16	12.8	39.3	34.8	-11.5

It is noted that there was no PM_{10} or $PM_{2.5}$ monitoring data available in the vicinity of the proposed development. Therefore, as per the recommendations in LAQM.TG(22), adjustment factors used for the predicted roadside NO_x concentrations were applied to the modelled PM_{10} and $PM_{2.5}$ concentrations.

A list of the receptor locations included in the dispersion model is displayed in Table E4.Verified model results are shown in Table E5 for all scenarios.

Table E4: Receptors Included in the Dispersion Modelling Assessment

Receptor Name	Receptor Type	X	Y	Z
DT8	Diffusion Tube	562656.12	100968.98	2.8
DT16	Diffusion Tube	562581.75	101107.77	2.7
Res1	Existing Residential	564467	102827.19	1.5
Res2	Existing Residential	563987.56	102558.31	1.5
Res3	Existing Residential	564200.12	102439.68	1.5
Res4	Existing Residential	563742.75	102366.61	1.5
Res5	Existing Residential	563612.75	102246.66	1.5
Res6	Existing Residential	563508.19	102014.55	1.5
PD1	Proposed Development Residential	564304.12	102684.31	1.5
PD2	Proposed Development Residential	564268.31	102631.03	1.5
Res7	Existing Residential	564244.38	102523.51	1.5
Res8	Existing Residential	563506.5	102105.55	1.5

Model results for long-term and short-term PM_{10}, and long-term NO_2 and $PM_{2.5}$, concentrations at receptors are presented in Table E5, for all modelling scenarios.

Table E5: Predicted Pollutant Concentrations at Modelled Receptor Location

Receptor ID	NO_2 Annual Average Concentrations (µg/m^3)				PM_{10} Annual Average Concentrations (µg/m^3)				No. days PM_{10} 24-Hour Average Concentrations (µg/m^3)			$PM_{2.5}$ Annual Average Concentrations (µg/m^3)			
	Background	S1	S2	S3	Background	S1	S2	S3	S1	S2	S3	Background	S1	S2	S3
DT8	10.68	29.93	22.09	22.09	2	2	2	14.84	18.48	18.59	18.59	10.36	12.48	12.45	12.45
DT16	12.76	34.78	26.03	26.03	3	3	3	15.26	19.74	19.87	19.87	10.64	13.24	13.21	13.21
Res1	9.32	15.25	12.74	12.78	0	0	0	14.26	15.47	15.46	15.48	9.55	10.25	10.22	10.23
Res2	10.47	15.63	13.34	13.47	0	0	0	14.61	15.57	15.52	15.57	10.27	10.82	10.78	10.80
Res3	9.32	15.34	12.79	13.32	0	0	0	14.26	15.25	15.22	15.37	9.55	10.14	10.09	10.18
Res4	10.47	18.96	14.85	14.96	0	0	0	14.61	16.05	15.86	15.90	10.27	11.11	10.97	10.99
Res5	10.47	19.02	14.70	14.81	0	0	0	14.61	16.39	16.13	16.18	10.27	11.29	11.11	11.13
Res6	10.47	20.83	15.59	15.73	1	1	1	14.61	16.84	16.51	16.56	10.27	11.55	11.32	11.35
PD1	9.32	19.40	15.78	15.85	0	0	0	14.26	16.03	16.02	16.04	9.55	10.58	10.53	10.54
PD2	9.32	15.60	13.54	13.63	0	0	0	14.26	15.19	15.17	15.20	9.55	10.09	10.06	10.08
Res7	9.32	19.49	15.85	16.64	0	0	0	14.26	15.95	15.93	16.21	9.55	10.54	10.49	10.64
Res8	10.47	18.11	14.40	14.49	0	0	0	14.61	16.15	15.93	15.96	10.27	11.15	10.99	11.02