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**GLADMAN DEVELOPMENTS LTD**

**THE HILL, LITTLEBOURNE**

**AIR QUALITY ASSESSMENT**

**FEBRUARY 2023**

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**THE HILL, LITTLEBOURNE**

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**FEBRUARY 2023**

**PREPARED BY:**

Dr P M Sanderson Senior Environmental  
(MIEnvSc, MIAQM) Scientist (Air Quality)



**CHECKED BY:**

Mariam Weatherley Associate Director  
(CEnv MIEnvSc MIAQM)



**APPROVED BY:**

M T Walton (MCIEH, Technical Director  
AMIOA)



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<b>DRAWINGS</b>	<b>TITLE</b>	<b>SCALE</b>
GM11368-001	Existing and Proposed Sensitive Receptor Locations	1:30,175

## EXECUTIVE SUMMARY

An air quality assessment has been undertaken to accompany a residential planning application off The Hill, Littlebourne, Canterbury. It is understood that the proposals are for up to 300 residential dwellings and associated infrastructure.

The assessment has considered dust and fine particulate matter during the construction phase, and road traffic emissions during the operational phase.

During the construction phase, the risk of dust soiling effects is classed as medium for earthworks and construction, and is classed as high for trackout; the risk of human health effects is classed as low for earthworks, construction and trackout. Mitigation measures have been proposed to further reduce any potential impacts based on best practice guidance.

For the operational phase assessment, annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been modelled at eleven existing and three proposed receptor locations, using the most recent Emission Factor Toolkit available from DEFRA (EFT v11.0). Predicted annual mean concentrations have been compared to the relevant air quality objectives and target level.

The operational phase assessment has concluded that the development will result in concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> remaining below the air quality objectives/target values, both without and with the development for the proposed 2026 opening year and 2032 future year. The impact of the development is predicted to be negligible at all eleven existing sensitive receptors that were assessed. Pollutant concentrations at proposed receptor locations within the development site are predicted to be well below the air quality objectives/target levels. Air quality effects are therefore considered to be 'not significant'.

The assessment has demonstrated that the Proposed Development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives. Therefore, there are no material reasons in relation to air quality why the proposed scheme should not proceed, subject to appropriate planning conditions.

## **1 INTRODUCTION**

### **1.1 Background**

1.1.1 Wardell Armstrong LLP (WA) has been commissioned by Gladman Developments Ltd to undertake an air quality assessment to accompany an outline planning application for a proposed residential development at The Hill, Littlebourne, Canterbury.

1.1.2 The proposals comprise up to 300 residential dwellings and associated infrastructure.

1.1.3 This report details the results of the air quality assessment undertaken to accompany an outline planning application for the proposed development. The report discusses the potential dust and fine particulate matter impacts associated with the construction phase, and an assessment of the potential air quality impacts of the additional road traffic generated by the proposed development. Air pollutant concentrations are considered at existing sensitive receptor locations in the vicinity of the proposed development, and also at three proposed receptor locations within the development site itself.

## 2 LEGISLATION AND POLICY CONTEXT

### 2.1 Relevant Air Quality Legislation and Guidance

2.1.1 The air quality assessment has been undertaken in accordance with the following legislation and guidance:

- The Environment Act 1995, as amended 2021;
- Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007;
- The Air Quality Standards Regulations 2010;
- Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(22), August 2022;
- Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021; and
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, November 2019.

2.1.2 Further details of these documents are included in **Appendix A**.

### 2.2 Assessment Criteria

2.2.1 The relevant air quality objectives and limit values for this assessment are included within Table 1.

<b>Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*</b>			
<b>Pollutant</b>	<b>Objective/Limit Value</b>	<b>Averaging Period</b>	<b>Obligation</b>
Nitrogen Dioxide (NO <sub>2</sub> )	200µg/m <sup>3</sup> , not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m <sup>3</sup>	Annual mean	All local authorities
Particulate Matter (PM <sub>10</sub> )	50µg/m <sup>3</sup> , not to be exceeded more than 35 times a year	24-hour mean	England, Wales and Northern Ireland
	40µg/m <sup>3</sup>	Annual mean	England, Wales and Northern Ireland
	18µg/m <sup>3</sup>	Annual mean	Scotland only
Particulate Matter (PM <sub>2.5</sub> )	Limit Value of 20µg/m <sup>3</sup>	Annual mean	England, Wales and Northern Ireland
	10µg/m <sup>3</sup>	Annual mean	Scotland only
<i>*In accordance with the Air Quality Standards Regulations 2010</i>			

2.2.2 Further details of where these objectives and limit values apply are detailed in **Appendix A**.

### 3 ASSESSMENT METHODOLOGY

#### 3.1 Consultation and Scope of Assessment

3.1.1 The assessment methodology was discussed and agreed with Ms Kelly Haynes, Principal Policy Officer (Climate and Environment) at Canterbury City Council (CCC), via email correspondence, between 28<sup>th</sup> September and 4<sup>th</sup> October 2022.

3.1.2 A summary of the consultation undertaken is provided in Table 2.

Table 2: Summary of Consultation		
Assessment Stage	Proposed Method	Response
Construction phase assessment to consider dust and fine particulate matter (PM <sub>10</sub> )	Qualitative assessment in accordance with Institute of Air Quality Management (IAQM) guidance	No objection to method
Operational phase assessment to consider nitrogen dioxide (NO <sub>2</sub> ) and fine particulate matter (PM <sub>10</sub> and PM <sub>2.5</sub> )	Detailed assessment using the ADMS-Roads atmospheric dispersion model, in accordance with Environmental Protection UK (EPUK)/IAQM guidance, and with all predicted concentrations compared to air quality objectives/limit values	No objection to method
	2019 meteorological data from Manston recording station	No objection to method
	Background concentrations from 2018 - based DEFRA default maps	No objection to method
	Assessment undertaken using EFT v11.0 emission factors.	No objection to method
	Unverified model results to be used; sensitivity analysis to be carried out to ensure robust assessment	No objection to method

3.1.3 In her response Ms Haynes advised that CCC requires an Emissions Mitigation Assessment (Damage Cost Calculation) to be carried out as part of the assessment to inform the appropriate level of mitigation. In addition, the following mitigation measures are required for developments:

- Electric Vehicle charging - 1 active charging point per dwelling with dedicated parking and 10% active charging points for unallocated parking. Charging points should be Mode 3 (providing up to 7kw) and SMART (enabling Wifi connection). Passive charging points should be provided to all remaining parking spaces to allow for future installation of charging points.
- Low NO<sub>x</sub> boilers conforming to the ultra-low emission standard of below 40mg/kWh NO<sub>x</sub>.

3.1.4 As the proposed development site is distant from the nearest available air quality monitoring locations it was initially proposed that the models be unverified, as stated in Table 2 above. Review of the final traffic data at a later stage indicated that the

study area would include monitoring locations in Canterbury and the methodology was modified accordingly.

### 3.2 Construction Phase Assessment

3.2.1 To assess the impacts associated with dust and fine particulate matter releases during the construction phase of the development, an assessment has been undertaken in accordance with guidance from the Institute of Air Quality Management (IAQM)<sup>1</sup>. Further details of the construction assessment methodology are provided in **Appendix B**.

3.2.2 The closest sensitive human receptors to where construction phase activities will take place are mostly residential and are detailed in Table 3. However, it should be noted that the assessment includes consideration of all sensitive receptors within 350m of the site boundary, in accordance with IAQM guidance.

Table 3: Closest Existing Sensitive Receptors Considered in the Construction Phase Assessment		
Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing Residential Dwellings along The Hill	North; north-east	<15m at closest point
Canterbury Lodges and Glamping	East	Approximately 25m at closest point
Howletts Wild Animal Park	South	<10m at closest point
Little Acres	North-west	Approximately 50m at closest point

3.2.3 There is one dust-sensitive ecological receptor, Pine Wood (Ancient Woodland), which is located approximately 150m west of the proposed development at the closest point. As this lies over 50m from the site boundary, it does not need to be considered within the construction phase assessment.

3.2.4 The criteria used to assess the construction impact of the proposed development, and the associated significance of effects at existing sensitive receptors, are included in **Appendix B**.

<sup>1</sup> Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (v1.1), June 2016

### 3.3 Operational Phase Assessment

3.3.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the impacts associated with road traffic emissions during the operational phase assessment. The impacts have been assessed in accordance with guidance from Environmental Protection UK (EPUK) and the IAQM<sup>2</sup>. Further details of the modelling and assessment methodology are provided in **Appendix C**.

3.3.2 NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations have been predicted at existing and proposed sensitive receptors, as these are the pollutants considered most likely to exceed the objectives and limit values.

3.3.3 Air dispersion modelling has been carried out to estimate pollutant concentrations, due to road traffic emissions, for five assessment scenarios as follows:

- **Scenario 1:** 2019 Verification and Base Year, the most recent year for which reliable traffic flow information, local monitored pollution data and meteorological data is available;
- **Scenario 2:** 2026 Opening Year, including committed developments and **without** the proposed development in place;
- **Scenario 3:** 2026 Opening Year, including committed developments and **with** the proposed development in place;
- **Scenario 4:** 2032 Future Year, including committed developments and **without** the proposed development in place; and
- **Scenario 5:** 2032 Future Year, including committed developments and **with** the proposed development in place.

#### ***Existing Sensitive Receptors***

3.3.4 A number of representative existing sensitive receptors (identified as ESR 1 to ESR 11) have been selected for consideration in the air quality assessment. These have been chosen based on their sensitivity and their proximity to roads which will be affected by development generated traffic.

3.3.5 Details of these receptors considered are provided in Table 4, and their locations are shown on drawing GM11368-001.

<b>Table 4: Existing Sensitive Receptors Considered in Operational Phase Assessment</b>				
<b>Receptor</b>	<b>Address</b>	<b>Grid Reference</b>		<b>Receptor Type</b>
		<b>Easting</b>	<b>Northing</b>	
ESR 1	King William Day Centre, High Street	620970	157384	Residential
ESR 2	Bekesbourne Lane	620614	157271	Residential
ESR 3	Loddington Cottages, Bekesbourne Lane	620161	156904	Residential
ESR 4	The Evenhill, The Hill	620485	157661	Residential
ESR 5	Polo Farm, Littlebourne Road	617886	157882	Residential
ESR 6	St. Martin's Hill	616367	157754	Residential
ESR 7	Barton Court Grammar School	615852	157684	Educational
ESR 8	Longport	615500	157635	Residential
ESR 9	Copperfield Court	615375	157433	Residential
ESR 10*	Lady Woottons Green	615310	157850	Residential
ESR 11*	The Kings School, Broad Street	615295	157998	Educational

*\*Situated within an Air Quality Management Area*

3.3.6 The criteria used to assess the operational impact of the proposed development, and the associated significance of effects at existing sensitive receptors, are included in **Appendix C**.

***Proposed Sensitive Receptors***

3.3.7 A number of proposed sensitive receptors (referred to as PSR 1 – PSR 3) have been selected within the development site boundary. These receptors are considered to be representative of the proposed residential areas which will be closest to the main existing source(s) of pollution. In this case, the main source is considered to be vehicle emissions from the A514 The Hill and Bekesbourne Lane.

3.3.8 Pollutant concentrations at the proposed receptors have been predicted for scenarios 3 and 5 only (as detailed in paragraph 3.3.3). It is only necessary to consider the ‘with development’ scenarios for the proposed receptors as they will not experience any ‘without development’ conditions. It is not therefore necessary to consider the changes in pollutant concentrations at the proposed receptors.

3.3.9 Details of the proposed sensitive receptors are provided in Table 5, and their locations are shown on drawing GM11368-001.

<b>Table 5: Proposed Sensitive Receptors Considered in the Operational Phase Assessment</b>			
<b>Receptor Point</b>	<b>Location</b>	<b>Grid Reference</b>	
		<b>Easting</b>	<b>Northing</b>
PSR 1	Location considered to be representative of the closest proposed residential property to The Hill	620528	157600
PSR 2	Location considered to be representative of the closest proposed residential property to Bekesbourne Lane	620510	157205
PSR 3	Location considered to be representative of centre of the residential site area	620250	157427

3.3.10 Pollutant concentrations associated with road traffic emissions are expected to be highest at lower floor levels, and therefore, each of the proposed receptors (i.e. PSR 1 – PSR 3) have been modelled at ground level (i.e. 1.5m).

3.3.11 The predicted concentrations at the proposed receptors have been assessed against the air quality objectives and limit values detailed in Table 1.

### **3.4 Limitations and Uncertainties**

3.4.1 Air quality assessments make use of official sources of information (i.e. vehicle emission factors and background concentrations) which have historically been considered to be overly optimistic. Monitoring data collected by the UK Government and local authorities over the past few years has shown that annual mean NO<sub>2</sub> concentrations remained higher than previously expected (especially in roadside locations). This was widely thought to be due to the lower than expected decline in NO<sub>x</sub> emissions from diesel vehicles (even as new Euro standards have been introduced), coupled with an overall increase in the number of diesel vehicles on the road.

3.4.2 The vehicle emission factors used in this assessment are from Defra’s Emission Factor Toolkit (EFT v11.0)<sup>3</sup>, which is the most up-to-date version available.

3.4.3 A position statement was produced by the IAQM in 2018 which dealt specifically with the use of EFT v8.0 and the consideration of uncertainties in predicting future air quality<sup>4</sup>. The statement concluded that the approaches for dealing with this uncertainty should be decided on a case-by-case basis, but may include the use of a sensitivity test (i.e. where it is assumed that NO<sub>x</sub> emissions will not reduce as quickly over time as within the EFT).

<sup>3</sup> Defra Local Air Quality Management webpages (<https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>)

<sup>4</sup> Institute of Air Quality Management, Dealing with Uncertainty in Vehicle NO<sub>x</sub> Emissions within Air Quality Assessments v1.1, July 2018

- 3.4.4 A later study provided evidence that EFT v9.0 may be relied upon to predict the ‘most likely’ future emissions reductions, as long as model verification has been undertaken using monitored data from 2016 or later<sup>5</sup>.
- 3.4.5 The IAQM has recently withdrawn their 2018 position statement on the consideration of uncertainties in predicting future air quality<sup>6</sup>. A growing body of evidence suggests that the latest COPERT vehicle emission factors used in EFT v9.0 (and later) reflect real-world NO<sub>x</sub> emissions more accurately. As a result, the IAQM judge that “an exclusively vehicle emissions-based sensitivity test is no longer necessary”. This is provided that the assessment has been verified using monitoring data from 2016 or later.
- 3.4.6 In accordance with Defra guidance, the air quality assessment has been carried out using EFT v11.0. As model verification has been undertaken, following the latest guidance from the IAQM, it is not considered necessary to carry out a sensitivity analysis. Further information on the vehicle emission factors used in the assessment are provided in **Appendix C**.
- 3.4.7 Several steps have been taken to ensure the model is as accurate and representative as possible. These comprise:
- Consultation has been undertaken with CCC to confirm their agreement with the methodology used within the assessment;
  - Detailed traffic data has been obtained from the appointed transport consultant;
  - The latest Defra LAQM tools have been incorporated into the assessment following their release in November 2021;
  - Meteorological data, obtained from a representative meteorological recording station, has been incorporated into the assessment;
  - Road widths and the location of ESRs in relation to each road have been measured in detail to ensure greater accuracy within the model; and
  - Four nearby Council-operated diffusion tube monitoring locations (REF: DT1, DT22, DT35 and DT44) have been considered within the assessment to allow model verification to take place. Model verification factor(s) have been applied to NO<sub>x</sub> concentrations, which are then input into the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator tool to predict total NO<sub>2</sub> concentrations at each receptor considered in the assessment.

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<sup>5</sup> Air Quality Consultants, Performance of Defra’s Emission Factor Toolkit 2013 – 2019, February 2020

<sup>6</sup> Available on the Institute of Air Quality Management website ([https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm\\_uncertainty\\_vehicle\\_NOx\\_emission\\_withdrawn-02.pdf](https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm_uncertainty_vehicle_NOx_emission_withdrawn-02.pdf))

## **4 BASELINE SITUATION**

### **4.1 Canterbury City Council Local Air Quality Management**

4.1.1 The proposed development site is located within the administrative area of Canterbury City Council (CCC), which is responsible for the management of local air quality.

4.1.2 There are currently two Air Quality Management Areas (AQMA) within CCC's boundary, which are all declared for exceedances of the annual mean objective for NO<sub>2</sub>.

- AQMA Canterbury No. 3: The AQMA is a linear area of exceedance along major roads. This reflects the narrow band of impact created by emissions from road traffic in respect of compliance against the national air quality objective for NO<sub>2</sub>; and
- Canterbury AQMA Herne No. 1: Small part of Herne Street from the Church to just before Ridley Close and Part of School Lane to St Martins View.

4.1.3 The two AQMAs are both located approximately 6km to the west of the proposed development within the confines of Canterbury. Therefore, the proposed development does not lie within, or in proximity to, an existing AQMA or area of air quality concern.

4.1.4 There are currently no representative background or roadside monitoring locations in the vicinity of the proposed development.

### **4.2 Background Air Pollutant Concentrations**

4.2.1 The air quality assessment needs to take into account background concentrations upon which the local, traffic derived pollution is superimposed.

4.2.2 As there are currently no representative NO<sub>2</sub>, PM<sub>10</sub> or PM<sub>2.5</sub> background monitoring locations in the vicinity of the proposed development site, background concentrations have been obtained from the 2018-based Defra default concentration maps, for the appropriate grid squares<sup>7</sup>.

4.2.3 The background pollutant concentrations used in this assessment are detailed in Table 6.

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<sup>7</sup> Accessed through the Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html>)

<b>Table 6: Background Pollutant Concentrations Used in the Air Quality Assessment</b>				
<b>Pollutant</b>	<b>Annual Mean Concentrations (<math>\mu\text{g}/\text{m}^3</math>)</b>			
	<b>NO<sub>x</sub> *</b>	<b>NO<sub>2</sub> *</b>	<b>PM<sub>10</sub> *</b>	<b>PM<sub>2.5</sub> *</b>
<b>2019 Base Year</b>				
ESR 1 – 2, 4; PSR 1 – 3 (620500, 157500)	11.59	8.89	14.18	9.11
ESR 3 (620500, 156500)	10.87	8.38	14.78	9.03
ESR 5 (617500, 157500)	12.42	9.48	14.41	9.17
ESR 6 (616500, 157500)	14.42	10.88	14.55	9.72
ESR 7 – 11 (617500, 157500)	19.22	14.09	15.35	10.34
<b>2026 Opening Year</b>				
ESR 1 – 2, 4; PSR 1 – 3 (620500, 157500)	9.21	7.18	13.06	8.22
ESR 3 (620500, 156500)	8.70	6.80	13.68	8.15
ESR 5 (617500, 157500)	9.78	7.59	13.29	8.27
ESR 6 (616500, 157500)	11.30	8.69	13.40	8.81
ESR 7 – 11 (617500, 157500)	14.89	11.18	14.14	9.41
<b>2032 Future Year</b>				
ESR 1 – 2, 4; PSR 1 – 3 (620500, 157500)	8.64	6.76	13.12	8.27
ESR 3 (620500, 156500)	8.20	6.43	13.73	8.20
ESR 5 (617500, 157500)	9.13	7.12	13.35	8.33
ESR 6 (616500, 157500)	10.54	8.14	13.45	8.87
ESR 7 – 11 (617500, 157500)	13.83	10.43	14.20	9.46
<i>*Obtained from the Defra 2018-based background maps</i>				

### 4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.3.1 The baseline assessment (i.e. scenarios 1, 2 and 4) has been carried out for the existing sensitive receptors considered, in accordance with Defra guidance (i.e. using EFT v11.0). The adjusted NO<sub>2</sub> and unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are detailed in Table 7.

**Table 7: Predicted Adjusted NO<sub>2</sub>, unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 1, 2 and 4.**

Receptor	Calculated Annual Mean Concentrations (µg/m <sup>3</sup> )								
	Scenario 1: 2019 Base Year			Scenario 2: 2026 Opening Year, Without Development			Scenario 4: 2032 Future Year, Without Development		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
ESR 1	27.99	15.07	9.63	18.64	14.09	8.79	14.72	14.18	8.86
ESR 2	14.14	14.42	9.25	10.09	13.32	8.37	8.76	13.39	8.42
ESR 3	11.36	14.92	9.11	8.45	13.83	8.23	7.56	13.90	8.29
ESR 4	22.74	14.84	9.49	16.09	13.88	8.67	12.92	13.97	8.74
ESR 5	20.90	14.99	9.50	14.91	14.00	8.66	12.11	14.08	8.73
ESR 6	20.38	15.01	9.98	14.57	13.94	9.11	12.19	14.02	9.18
ESR 7	37.84	16.56	11.04	25.51	15.52	10.17	20.46	15.64	10.25
ESR 8	37.68	16.35	10.93	25.44	15.29	10.04	20.48	15.39	10.12
ESR 9	31.89	16.06	10.76	22.69	15.04	9.91	18.54	15.13	9.98
ESR 10	<u>50.28</u>	16.59	11.07	33.64	15.64	10.24	26.49	15.76	10.32
ESR 11	<u>47.65</u>	16.68	11.11	34.22	15.91	10.38	26.77	16.04	10.47

*NO<sub>2</sub> concentrations obtained by inputting predicted NO<sub>x</sub> concentrations into the NO<sub>x</sub> to NO<sub>2</sub> calculator<sup>8</sup> in accordance with LAQM.TG(22)*  
*Underlined concentrations represent an exceedance of the AQO.*

4.3.2 The results show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the relevant objectives and limit values, with the exceptions of ESRs 10 and 11 in the 2019 base year, which exceed the annual mean NO<sub>2</sub> objective.

<sup>8</sup> Defra Local Air Quality Management webpages (<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>)

## 5 IMPACT ASSESSMENT

### 5.1 Construction Phase Assessment

#### *Step 2 – Impact Assessment*

5.1.1 In accordance with the IAQM guidance, the main activities to be considered during the construction phase of the proposed development are demolition, earthworks, construction and trackout.

5.1.2 There are no demolition activities proposed, and so no further consideration is required.

5.1.3 Earthworks covers the processes of soil-stripping, ground-levelling, excavation and landscaping. Construction activities will focus on the proposed buildings, access roads and car parking areas. Trackout is defined as the transport of dust and dirt by vehicles travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

#### *Step 2A*

5.1.4 Step 2A of the assessment defines the potential dust emission magnitude from earthworks, construction and trackout in the absence of site specific mitigation.

5.1.5 Examples of the criteria for the dust emission classes are detailed in **Appendix B**. The results of this step are detailed in Table 8.

#### *Step 2B*

5.1.6 Step 2B of the construction phase dust assessment defines the sensitivity of the area, taking into account the significance criteria detailed in **Appendix B**, for earthworks, construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling, human health effects and ecological effects.

5.1.7 For earthworks and construction, there are currently between 10 and 100 receptors (mainly residential) within 50m of where these activities may take place, which is assumed to be the site boundary for the purposes of this assessment.

5.1.8 The routing of construction vehicles is unknown at this stage. Therefore, for the purposes of this assessment, worst case routing scenarios have been assumed for assessment of potential trackout impacts at nearby receptors.

5.1.9 As a result, for trackout, there are between 10 and 100 receptors (mainly residential) within 20m of where trackout may occur for a distance of up to 500m from the site entrance.

**Step 2C**

5.1.10 Step 2C of the construction phase dust assessment defines the risk of impacts from each activity, by combining the dust emission magnitude with the sensitivity of the surrounding area.

5.1.11 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in **Appendix B**. The results of this step are detailed in Table 8.

**Summary of Step 2**

5.1.12 Table 8 details the results of Step 2 of the construction phase assessment for human receptors.

<b>Table 8: Construction Phase Dust Assessment for Human Receptors</b>				
	<b>Activity</b>			
	<b>Demolition</b>	<b>Earthworks</b>	<b>Construction</b>	<b>Trackout</b>
<b>Step 2A</b>				
Dust Emission Magnitude	N/A	Large <sup>a</sup>	Large <sup>b</sup>	Large <sup>c</sup>
<b>Step 2B</b>				
Sensitivity of Closest Receptors	N/A	High	High	High
Sensitivity of Area to Dust Soiling Effects	N/A	Medium	Medium	High
Sensitivity of Area to Human Health Effects	N/A	Low <sup>d</sup>	Low <sup>d</sup>	Low <sup>d</sup>
<b>Step 2C</b>				
Dust Risk: Dust Soiling	N/A	Medium Risk	Medium Risk	High Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk
<p><i>a. Total site area estimated to be more than 10,000m<sup>2</sup></i></p> <p><i>b. Total building volume estimated to more than 100,000m<sup>3</sup>, with potentially dusty construction materials</i></p> <p><i>c. Number of construction phase vehicles estimated to be over 50 movements per day (peak movements – robust assumption)</i></p> <p><i>d. Background annual mean PM<sub>10</sub> concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2023</i></p>				

### ***Step 3 – Mitigation***

5.1.13 During the construction phase, the implementation of effective mitigation measures will substantially reduce the potential for nuisance dust and particulate matter to be generated.

5.1.14 Step 2C of the assessment has identified that the risk of dust soiling and human health effects is not negligible for all the activities and therefore site-specific mitigation will need to be implemented to ensure dust effects from these activities will be not significant.

### ***Recommendations for Site-Specific Mitigation***

5.1.15 Specific mitigation relating to dust control may be in the form of construction best practices or could include a dust management plan. Recommendations for mitigation within the IAQM guidance include:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- Protection of surfaces and exposed material from winds until disturbed areas are sealed and stable;
- Dampening down of exposed stored materials, which will be stored as far from sensitive receptors as 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;
- Avoidance of activities that generate large amounts of dust during windy conditions;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- Avoid dry sweeping of large areas;
- 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;
- Ensure vehicles entering and leaving the site are covered to prevent escape of materials during transport;
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable);

- Minimisation of vehicle movements and limitation of vehicle speeds – the slower the vehicle speeds, the lower the dust generation;
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever the site size and layout permits; and
- Access gates to be located at least 10m from receptors, where possible.

5.1.16 All dust and air quality complaints should be recorded and appropriate measures be taken to identify causes and reduce emissions in a timely manner. Exceptional incidents which cause dust and/or emissions, and the action taken to resolve the situation, should be recorded in a log book and made available to CCC on request.

5.1.17 It is recognised that the final design solutions will be developed with the input of the Contractor to maximise construction efficiencies, to use modern construction techniques and sustainable materials and to incorporate the particular skills and experience offered by the appointed contractor.

#### ***Step 4 – Residual Effects***

5.1.18 Step 4 of the construction phase dust assessment has been undertaken to determine the significance of the dust effects arising from earthworks, construction and trackout associated with the proposed development.

5.1.19 The implementation of effective mitigation measures during the construction phase, such as those detailed in Step 3, will substantially reduce the potential for nuisance dust and particulate matter to be generated and any residual impact should be **not significant**.

## **5.2 Operational Phase Assessment**

### ***Existing Sensitive Human Receptors***

5.2.1 The impact assessment has been carried out for the representative existing sensitive receptors considered (i.e. ESR 1 to ESR 11) using EFT v11.0.

5.2.2 Table 9 details the predicted NO<sub>2</sub> concentrations for the 2026 Opening Year, for both the 'Without Development' and 'With Development' scenarios, in accordance with Defra guidance (i.e. using EFT v11.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

<b>Table 9: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup>				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>b</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	18.64	17.55	<75%	-2 to -5%	Negligible
ESR 2	10.09	9.23	<75%	-2 to -5%	Negligible
ESR 3	8.45	8.48	<75%	<0.5%	Negligible
ESR 4	16.09	16.32	<75%	1%	Negligible
ESR 5	14.91	15.37	<75%	1%	Negligible
ESR 6	14.57	14.91	<75%	1%	Negligible
ESR 7	25.51	26.25	<75%	2 to 5%	Negligible
ESR 8	25.44	26.13	<75%	2 to 5%	Negligible
ESR 9	22.69	22.85	<75%	<0.5%	Negligible
ESR 10	33.64	33.87	76 to 94%	1%	Negligible
ESR 11	34.22	34.44	76 to 94%	1%	Negligible

*a. NO<sub>2</sub> concentrations obtained by inputting predicted NO<sub>x</sub> concentrations into the NO<sub>x</sub> to NO<sub>2</sub> calculator, in accordance with LAQM.TG(22)*  
*b. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible*

5.2.3 Table 10 details the PM<sub>10</sub> concentrations for the 2026 Opening Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

<b>Table 10: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	14.09	14.00	<75%	<0.5%	Negligible
ESR 2	13.32	13.25	<75%	<0.5%	Negligible
ESR 3	13.83	13.84	<75%	<0.5%	Negligible
ESR 4	13.88	13.90	<75%	<0.5%	Negligible
ESR 5	14.00	14.04	<75%	<0.5%	Negligible
ESR 6	13.94	13.97	<75%	<0.5%	Negligible

<b>Table 10: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 7	15.52	15.59	<75%	<0.5%	Negligible
ESR 8	15.29	15.34	<75%	<0.5%	Negligible
ESR 9	15.04	15.05	<75%	<0.5%	Negligible
ESR 10	15.64	15.66	<75%	<0.5%	Negligible
ESR 11	15.91	15.93	<75%	<0.5%	Negligible

*a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible*

5.2.4 Table 11 details the PM<sub>2.5</sub> concentrations for the 2026 Opening Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

<b>Table 11: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean PM <sub>2.5</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	8.79	8.74	<75%	<0.5%	Negligible
ESR 2	8.37	8.32	<75%	<0.5%	Negligible
ESR 3	8.23	8.23	<75%	<0.5%	Negligible
ESR 4	8.67	8.68	<75%	<0.5%	Negligible
ESR 5	8.66	8.69	<75%	<0.5%	Negligible
ESR 6	9.11	9.13	<75%	<0.5%	Negligible
ESR 7	10.17	10.21	<75%	<0.5%	Negligible
ESR 8	10.04	10.08	<75%	<0.5%	Negligible
ESR 9	9.91	9.91	<75%	<0.5%	Negligible
ESR 10	10.24	10.25	<75%	<0.5%	Negligible
ESR 11	10.38	10.39	<75%	<0.5%	Negligible

*a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible*

5.2.5 Table 12 details the predicted NO<sub>2</sub> concentrations for the 2032 Future Year, for both the ‘Without Development’ and ‘With Development’ scenarios, in accordance with Defra guidance (i.e. using EFT v11.0). The impact has been assessed in accordance with the descriptors included in **Appendix C**.

<b>Table 12: Predicted Adjusted NO<sub>2</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean NO <sub>2</sub> Concentrations (µg/m <sup>3</sup> ) <sup>a</sup>				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>b</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	14.72	13.96	<75%	-2 to -5%	Negligible
ESR 2	8.76	8.18	<75%	-1%	Negligible
ESR 3	7.56	7.58	<75%	<0.5%	Negligible
ESR 4	12.92	13.06	<75%	<0.5%	Negligible
ESR 5	12.11	12.41	<75%	1%	Negligible
ESR 6	12.19	12.41	<75%	1%	Negligible
ESR 7	20.46	20.96	<75%	1%	Negligible
ESR 8	20.48	20.94	<75%	1%	Negligible
ESR 9	18.54	18.64	<75%	<0.5%	Negligible
ESR 10	26.49	26.64	<75%	<0.5%	Negligible
ESR 11	26.77	26.93	<75%	<0.5%	Negligible
<p><i>a. NO<sub>2</sub> concentrations obtained by inputting predicted NO<sub>x</sub> concentrations into the NO<sub>x</sub> to NO<sub>2</sub> calculator, in accordance with LAQM.TG(22)</i></p> <p><i>b. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible</i></p>					

5.2.6 Table 13 details the PM<sub>10</sub> concentrations for the 2032 Future Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

<b>Table 13: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	14.18	14.09	<75%	<0.5%	Negligible
ESR 2	13.39	13.31	<75%	<0.5%	Negligible

**Table 13: Predicted Unadjusted PM<sub>10</sub> Concentrations at Existing Sensitive Receptors for Scenarios 4 and 5 – Using the Emission Factor Toolkit v11.0**

Receptor	Calculated Annual Mean PM <sub>10</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 3	13.90	13.90	<75%	<0.5%	Negligible
ESR 4	13.97	13.99	<75%	<0.5%	Negligible
ESR 5	14.08	14.13	<75%	<0.5%	Negligible
ESR 6	14.02	14.05	<75%	<0.5%	Negligible
ESR 7	15.64	15.71	<75%	<0.5%	Negligible
ESR 8	15.39	15.45	<75%	<0.5%	Negligible
ESR 9	15.13	15.14	<75%	<0.5%	Negligible
ESR 10	15.76	15.78	<75%	<0.5%	Negligible
ESR 11	16.04	16.06	<75%	<0.5%	Negligible

*a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible*

5.2.7 Table 14 details the PM<sub>2.5</sub> concentrations for the 2032 Future Year, for both the ‘Without Development’ and ‘With Development’ scenarios. The impact has been assessed in accordance with the descriptors included in **Appendix C**.

**Table 14: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0**

Receptor	Calculated Annual Mean PM <sub>2.5</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 1	8.86	8.81	<75%	<0.5%	Negligible
ESR 2	8.42	8.38	<75%	<0.5%	Negligible
ESR 3	8.29	8.29	<75%	<0.5%	Negligible
ESR 4	8.74	8.75	<75%	<0.5%	Negligible
ESR 5	8.73	8.76	<75%	<0.5%	Negligible
ESR 6	9.18	9.20	<75%	<0.5%	Negligible
ESR 7	10.25	10.29	<75%	<0.5%	Negligible
ESR 8	10.12	10.15	<75%	<0.5%	Negligible
ESR 9	9.98	9.99	<75%	<0.5%	Negligible

<b>Table 14: Predicted Unadjusted PM<sub>2.5</sub> Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0</b>					
Receptor	Calculated Annual Mean PM <sub>2.5</sub> Concentrations (µg/m <sup>3</sup> )				
	Without Development	With Development		Concentration Change as Percentage of AQAL	Impact <sup>a</sup>
		Concentration	Percentage in Relation to AQAL		
ESR 10	10.32	10.33	<75%	<0.5%	Negligible
ESR 11	10.47	10.48	<75%	<0.5%	Negligible
<i>a. Assessed using the Impact Descriptors from the EPUK/IAQM guidance, included in Appendix C. Changes of less than 0.5% should be described as negligible</i>					

5.2.8 It is noted that there is a reduction in concentrations at ESRs 1 and 2 in the “with development” scenarios. This is caused by the site road having the effect of diverting some of the traffic which currently travels between the A257 and Bekesbourne Lane within Littlebourne through the site between the A257 and Bekesbourne Lane accesses.

5.2.9 The results of the assessment show that all predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations, in all scenarios considered, are below the relevant objectives and limit values.

#### ***Proposed Sensitive Human Receptors***

5.2.10 Pollutant concentrations have been modelled for proposed receptors for the 2026 Opening Year and 2032 Future Year ‘With Development’ scenarios, in accordance with Defra guidance (i.e. using EFT v11.0), as detailed in Table 15.

<b>Table 15: Predicted adjusted NO<sub>2</sub>, unadjusted PM<sub>10</sub> and PM<sub>2.5</sub> Concentrations at Proposed Sensitive Receptors for Scenarios 3 and 5 – Using Emission Factor Toolkit v11.0</b>						
Proposed Receptor	Calculated Annual Mean Concentrations (µg/m <sup>3</sup> )					
	2026 Opening Year			2032 Future Year		
	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
PSR 1	10.22	13.33	8.37	8.83	13.39	8.43
PSR 2	10.58	13.33	8.37	9.09	13.40	8.43
PSR 3	7.79	13.12	8.25	7.17	13.18	8.31

#### ***Assessment of Significance for Human Receptors***

5.2.11 The significance of the overall effects of the proposed development has been assessed in accordance with the EPUK/IAQM guidance. This assessment is based on professional judgement and details of the assessor’s experience is included in

#### **Appendix D.**

5.2.12 The assessment of significance has taken into account a number of factors, including:

- Baseline pollutant concentrations in 2019 are expected to be below the relevant annual mean objectives and limit values at all existing receptors considered, except for NO<sub>2</sub> concentrations at ESR 10 and 11 inside the AQMA;
- Baseline pollutant concentrations in the opening and future year are predicted to be below the relevant annual mean objectives and limit values at all existing receptors considered;
- The assessment predicts a negligible impact on concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at all existing sensitive receptors considered, with the development in place; and
- NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations within the proposed development site are predicted to be below the relevant objectives and limit values.

5.2.13 Based on the above factors, in accordance with the EPUK/IAQM guidance, the air quality effect of the proposed development is considered to be **not significant**.

#### ***Recommendations for Mitigation***

5.2.14 The impact of the proposed development is predicted to be not significant for human receptors. However, mitigation measures will assist in reducing any potential impact; further details may be found in section 5.3 below.

### **5.3 Emissions Mitigation Assessment**

5.3.1 As requested by the local authority and specified in the Kent and Medway Air Quality Partnership Air Quality Planning Mitigation Guidance (Option A)<sup>9</sup> an emissions mitigation (damage cost) assessment has been undertaken as part of the air quality assessment.

5.3.2 A damage cost assessment provides a basis for quantifying a financial commitment required to offset potential development-generated traffic emissions. An air pollution damage cost assessment utilises the current Defra emission factor toolkit (version 11.0), available on the Defra website, to estimate the annual link emissions associated with the additional development generated vehicle trips over a 5-year period.

5.3.3 The damage cost calculation has been undertaken using the most recent guidance available from Defra (January 2023), which includes updated damage cost values for both NO<sub>x</sub> and PM<sub>2.5</sub>. The total number of trips in a 24-hour period, generated by the proposed development, is included within the damage cost assessment to determine

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<sup>9</sup> Kent and Medway Air Quality Partnership Air Quality Planning Mitigation Guidance (Option A), December 2015

the transport related emissions. The damage cost calculation uses central damage cost values provided by Defra and applies these to the opening year of the proposed development. Full operation of the development is assumed in the opening year.

- 5.3.4 Consultation undertaken with i-Transport, the appointed transport consultants for the scheme, confirmed the total new vehicle trip generation for the proposed development (i.e., new trips generated by the proposed development, as annual average daily traffic - AADT) in a 24-hour period is 1667 vehicles (HGVs 0%).
- 5.3.5 The average trip length is assumed to be 10km and the average speed is 50kph. The calculation has been undertaken for both NO<sub>x</sub> and particulate matter (PM) emissions, as these are the major pollutants associated with road traffic emissions. The Defra guidance gives a road transport sector estimated central cost of £84,548/tonne for PM<sub>2.5</sub>. For NO<sub>x</sub>, the Defra guidance gives a road transport sector central cost of £11,682/tonne.
- 5.3.6 In accordance with guidance, an uplift factor of 2% per year is applied to these costs. The EFT output (tonnes/annum) for each of the five assessed years is detailed in Table 16.

<b>Table 16: EFT Output (tonnes/annum)</b>		
<b>Year</b>	<b>NO<sub>x</sub></b>	<b>PM<sub>2.5</sub></b>
2026	0.924457	0.105628
2027	0.828058	0.105224
2028	0.742346	0.104902
2029	0.668947	0.104632
2030	0.607035	0.104391

- 5.3.7 The emissions from Table 16 are then multiplied by the uplifted estimated sector costs. Table 17 details the central transport sector cost for each assessed year, beginning with the estimated development opening year of 2026.

<b>Table 17: Calculated Cost for Each Year (£)</b>		
<b>Year</b>	<b>NO<sub>x</sub></b>	<b>PM<sub>2.5</sub></b>
2026	11689.73	9666.79
2027	10680.19	9822.44
2028	9766.18	9988.24
2029	8976.57	10161.80
2030	8308.69	10341.12

- 5.3.8 The total damage cost of both NO<sub>x</sub> and PM<sub>2.5</sub> for the proposed development over a five-year period is £99,402.
- 5.3.9 During consultation, the Environmental Health Officer advised that the following standard air quality mitigation measures are required for developments:
- Electric Vehicle charging - 1 active charging point per dwelling with dedicated parking and 10% active charging points for unallocated parking. Charging points should be Mode 3 (providing up to 7kw) and SMART (enabling Wifi connection). Passive charging points should be provided to all remaining parking spaces to allow for future installation of charging points.
  - Low NO<sub>x</sub> boilers conforming to the ultra-low emission standard of below 40mg/kWh NO<sub>x</sub>.
- 5.3.10 In addition to the above, the applicant proposes to provide a financial contribution secured by legal agreement to cover the cost of 6 fully serviced EVs for a car club scheme associated with this development, which will be operated by 'HiyaCar' or a similar Collaborative Mobility UK (CoMoUK) regulated operator. This funding secures residents access to 6 cars during the contract period of 3 years after which it is expected to be financially self-supporting. The cost of this has been quoted at £77,220 and it is proposed that the remainder of the value determined by the damage cost calculation will be used to contribute towards the on-site EV car club hardstanding/parking spaces and charging infrastructure, the provision of cycle storage within the site as part of a small transport hub and a comprehensive monitored Travel Plan to encourage sustainable travel choices for people living at the development.
- 5.3.11 Section 4 of the Air Quality Planning Mitigation Guidance (Option A), states that in cases where the magnitude of change in air quality is "low", minimum mitigation should be implemented. As the predicted impacts of the proposed development are mainly "negligible" under IAQM guidance, with "slight" impacts predicted at ESRs 10 and 11, it is considered that the above proposed mitigation would be appropriate for the proposed development.
- 5.3.12 The input data for the assessed year of 2026 for the damage cost calculation can be seen in Figure 1, below.

<b>Select Pollutants</b> <input checked="" type="checkbox"/> NOx <input type="checkbox"/> CO2 <input type="checkbox"/> PM10 <input checked="" type="checkbox"/> PM2.5		<b>Select Outputs</b> <input type="checkbox"/> Air Quality Modelling (g/km/s) <input type="checkbox"/> Emissions Rates (g/km) <input checked="" type="checkbox"/> Annual Link Emissions		<b>Additional Outputs</b> <input type="checkbox"/> Breakdown by Vehicle <input type="checkbox"/> Source Apportionment <input type="checkbox"/> PM by Source		<b>Advanced Options</b> <input type="checkbox"/> Euro Compositions <input type="checkbox"/> Primary NO2 Fraction <input type="checkbox"/> NOx Annual Emissions Euro Split <input type="checkbox"/> Simple Entry Euro Compositions <input type="checkbox"/> Output % Contributions from Euro Classes <input type="checkbox"/> PM10 Annual Emissions Euro Split <input type="checkbox"/> Fleet Projection Tool <input type="checkbox"/> PM2.5 Annual Emissions Euro Split			<b>Click the button to:</b> <input type="button" value="Run EFT"/> <input type="button" value="Clear Input Data"/>	
<b>Please Select from the Following Options:</b> Area: England (not London) Year: 2026 Traffic Format: Basic Split Select 'Basic Split' or 'Detailed Option 1 to 3' or 'Alternative Technologies' above		<b>Export Outputs</b> <input type="checkbox"/> Save Output to New Workbook File Name: <input type="text"/>								
SourceID	Road Type	Traffic Flow	% HDV	Speed(kph)	No of Hours	Link Length (km)	% Gradient	Flow Direction	% Load	
Site Access	Urban (not London)	1667	0	50	24	10				

Figure 1: Damage cost Assessment inputs

## 6 CONCLUSIONS

### 6.1 Construction Phase

6.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust and fine particulate matter effects from earthworks, construction and trackout associated with the proposed development, in accordance with guidance published by the IAQM.

6.1.2 With site specific mitigation measures in place, the significance of dust and fine particulate effects from earthworks, construction and trackout is considered to be **not significant**.

### 6.2 Operational Phase

#### *Existing Sensitive Receptors*

6.2.1 An air quality assessment has been undertaken to consider the potential impact of development generated vehicles on air quality at eleven existing sensitive human receptors.

6.2.2 The assessment has been undertaken in accordance with Defra guidance, by using the latest vehicle emission factors from EFT v11.0.

6.2.3 Pollutant concentrations in the 2026 opening year and 2032 future year, with the development in place, are below the relevant annual mean objectives and limit values at the receptors considered.

6.2.4 The assessment predicts that impacts on concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> will be negligible at sensitive receptors considered, with the development in place; therefore, the effect of the proposed development on human receptors is considered to be **not significant**.

#### *Proposed Sensitive Receptors*

6.2.5 The assessment has also predicted pollutant concentrations at three proposed receptors within the development site.

6.2.6 Predicted NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are below the annual mean air quality objective and limit value concentrations, for 2026 and 2032, at the proposed sensitive receptors considered. Air quality effects within the site are, therefore, considered to be **not significant**.

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***Recommendations for Mitigation***

6.2.7 The impact of the proposed development is predicted to be not significant. However, mitigation measures will assist in reducing any potential impact and best practice measures in relation to air quality should be implemented in line with the Kent and Medway Air Quality guidance, and the requests of the EHO, as detailed in section 5.3.9 – 5.3.11.

**6.3 Summary**

6.3.1 The assessment has demonstrated that the proposed development will not lead to an unacceptable risk from air pollution, nor will it lead to any breach of national objectives as required by national policy. There are no material reasons in relation to air quality why the proposed scheme should not proceed.

## APPENDICES

## Appendix A: Air Quality Legislation and Guidance

### National Air Quality Strategy

- A.1 The Environment Act 1995 requires the UK government to prepare a national Air Quality Strategy. The first UK strategy was published in March 1997, setting out policies for the management of ambient air quality. This was subsequently updated in 2007<sup>1</sup>.
- A.2 The 2007 strategy establishes the framework for air quality management in England, Scotland, Wales and Northern Ireland. Air quality standards and objectives are set out for eight pollutants which may potentially occur at levels that give cause for concern. The strategy also provides details of the role that local authorities are required to take in working towards improvements in air quality, known as the Local Air Quality Management (LAQM) regime.

### Air Quality Standards and Objectives

- A.3 Air quality standards and objectives are set out in the strategy for the following pollutants: nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), lead (Pb), fine particulate matter (PM<sub>10</sub>), benzene (C<sub>6</sub>H<sub>6</sub>), 1, 3-butadiene (C<sub>4</sub>H<sub>6</sub>) and ozone (O<sub>3</sub>).
- A.4 Objectives for each pollutant, except O<sub>3</sub>, were first given statutory status in the Air Quality Regulations 2000<sup>2</sup> and Air Quality (Amendment) Regulations 2002<sup>3</sup>. These objectives are defined in the strategy as:
- “the maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, within a specified timescale.”*
- A.5 EU limit values, set out within the Ambient Air Quality Directive 2008/50/EC<sup>4</sup> (i.e. the CAFE Directive), were transposed into UK legislation on 11<sup>th</sup> June 2011 as The Air Quality Standards Regulations 2010. These are mostly the same as the air quality objectives in terms of concentrations; however, there are differences in determining how compliance is achieved. Although the UK is no longer part of the EU, no changes

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<sup>1</sup> Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007

<sup>2</sup> The Air Quality Regulations 2000. SI No 928

<sup>3</sup> The Air Quality (Amendment) Regulations 2002

<sup>4</sup> Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

have yet been made to the objectives and limit values used in the management and assessment of air quality.

A.6 Whilst there is no specific objective for PM<sub>2.5</sub> in England and Wales, a limit value of 20µg/m<sup>3</sup> is referred to in the regulations, which has been adopted for use in this assessment (as recommended by the LAQM Helpdesk). An objective has been set for PM<sub>2.5</sub> in Scotland since early 2016. The Environment Act 2021 sets out a requirement to establish a target objective for PM<sub>2.5</sub>, however it is not known what this objective will be or when it will come into force.

A.7 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(22)<sup>5</sup> and are included in Table A1.

<b>Table A1: Examples of Where the Air Quality Objectives Should Apply</b>		
<b>Averaging Period</b>	<b>Objectives Should Apply at:</b>	<b>Objectives Should Generally Not Apply at:</b>
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes, etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels. Gardens of residential properties <sup>a</sup>	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
1-hour mean	All locations where the annual mean and 24 and 8-hour objectives apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend one hour or longer	Kerbside sites where public would not be expected to have regular access

<sup>5</sup> Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(22), August 2022

Table A1: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	
<i>a. Such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure to pollutants would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied</i>		

### Local Air Quality Management

- A.8 LAQM legislation in the Environment Act 1995 requires local authorities to conduct the periodic review and assessments of air quality. These aim to identify all those areas where the objectives are being, or are likely to be, exceeded. Where exceedances are likely to occur, local authorities are required to declare an Air Quality Management Area (AQMA).
- A.9 LAQM.TG(22) presents a streamlined approach for LAQM in England and Scotland; however, Northern Ireland is still considering changes to LAQM and therefore works according to the previous regime.
- A.10 The Welsh Government amended the LAQM regime in Wales in 2017 by issuing new statutory policy guidance in order to bring the system into line with the Well-being of Future Generations (Wales) Act 2015<sup>6</sup>. This aims to achieve compliance with the national air quality objectives in specific hotspots and to reduce exposure to pollution more widely, so as to achieve the greatest public health benefit.
- A.11 Local authorities in England are required to produce Annual Status Reports (ASRs), and in Scotland and Wales, Annual Progress Reports (APRs). These replace all other reports which previously had to be submitted including Updating and Screening Assessments, Progress Reports and Detailed Assessments (which would be produced to assist with an AQMA declaration).
- A.12 Local authorities now have the option of a fast track AQMA declaration option. This allows more expert judgement to be used and removes the need for a Detailed Assessment where a local authority is confident of the outcome. Detailed Assessments should however still be used if there is any doubt.

<sup>6</sup> Well-being of Future Generations (Wales) Act 2015 (anaw 2)

- A.13 As part of the UK Government's requirement to improve air quality, selected local authorities in England are also currently investigating the feasibility of setting up Clean Air Zones (CAZs). These are areas where targeted action and co-ordinated resources aim to improve air quality within an urban setting, in order to achieve compliance with the EU limit values within the shortest possible time.
- A.14 The first CAZs were implemented in Bath in March 2021, and in Birmingham in June 2021. In addition, the London Ultra Low Emission Zone (ULEZ) was expanded to incorporate the North and South Circular roads in October 2021. Charges apply to certain types of vehicles travelling within these areas, including buses, coaches, taxis, private hire vehicles and heavy-duty vehicles (HDVs). The Greater Manchester CAZ, due to be introduced from 30 May 2022, has been delayed and is currently under review. The Newcastle-upon-Tyne and Gateshead CAZ is planned to be introduced on 30<sup>th</sup> January 2023.

#### **National Planning Policy Framework**

- A.15 The National Planning Policy Framework (NPPF)<sup>7</sup>, introduced in March 2012 and most recently updated in July 2021, requires 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 AQMAs and CAZs, 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 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 AQMAs and CAZs is consistent with the local air quality action plan.”*

#### **Planning Practice Guidance**

- A.16 The Planning Practice Guidance (PPG)<sup>8</sup>, updated in November 2019, states that whether or not air quality is relevant to a planning decision will depend on the

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<sup>7</sup> Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021

<sup>8</sup> Department for Communities and Local Government. Planning Practice Guidance: Air Quality, November 2019

proposed development and its location. Concerns could arise if the development is likely to generate air quality impacts in an area where air quality is known to be poor. They could also arise where the development is likely to adversely impact upon the implementation of air quality strategies and action plans and/or, in particular, lead to a breach of EU legislation (including that applicable to wildlife).

- A.17 Where a proposed development is anticipated to give rise to concerns about air quality, an appropriate assessment needs to be carried out. Where the assessment concludes that the proposed development (including mitigation) will not lead to an unacceptable risk from air pollution, prevent sustained compliance with national objectives or fail to comply with the requirements of the Habitats Regulations, then the local authority should proceed to decision with appropriate planning conditions and/or obligations.

#### **Local Planning Guidance**

- A.18 The *Kent and Medway Air Quality Partnership Air Quality Planning Guidance* provides requirements for air quality assessment and mitigation measures.

## Appendix B: Methodology for Construction Phase Assessment

### Institute of Air Quality Management Guidance

B.1 The methodology for the construction phase dust assessment is set out in guidance from the Institute of Air Quality Management (IAQM)<sup>9</sup>.

#### Step 1

B.2 Step 1 is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing sensitive human receptors within 350m of the site boundary and/or within 100m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

B.3 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing receptors within 50m of the site boundary and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

B.4 Where any of these criteria are met, it is necessary to proceed to Step 2.

#### Step 2

B.5 Step 2 determines the potential risk of dust arising in sufficient quantities to cause annoyance and/or health or ecological impacts. The risk is related to:

- The activities being undertaken (demolition, number of vehicles and plant etc);
- The duration of these activities;
- The size of the site;
- The meteorological conditions (wind speed, direction and rainfall);
- The proximity of receptors to the activity;
- The adequacy of the mitigation measures applied to reduce or eliminate dust; and
- The sensitivity of receptors to dust.

B.6 The risk of dust impacts is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon the following two factors (known as Step 2A and Step 2B).

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<sup>9</sup> Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction (v1.1), June 2016

B.7 **Step 2A** assesses the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large. Examples of how the magnitude may be defined are included in Table B1.

<b>Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities</b>			
<b>Activity</b>	<b>Dust Emission Class</b>		
	<b>Large</b>	<b>Medium</b>	<b>Small</b>
<b>Demolition</b>	Total building volume >50,000m <sup>3</sup> ; Potentially dusty construction material (e.g. concrete); On-site crushing and screening; Demolition activities >20m above ground level	Total building volume 20,000-50,000m <sup>3</sup> ; Potentially dusty construction material; Demolition activities 10-20m above ground level	Total building volume <20,000m <sup>3</sup> ; Construction material with low potential for dust release (e.g. metal cladding or timber)
<b>Earthworks</b>	Total site area >10,000m <sup>2</sup> ; Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); >10 heavy earth moving vehicles active at any one time; Formation of bunds >8m in height; Total material moved >100,000 tonnes	Total site area 2,500-10,000m <sup>2</sup> ; 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	Total site area <2,500m <sup>2</sup> ; 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 <20,000 tonnes; Earthworks during wetter months
<b>Construction</b>	Total building volume >100,000m <sup>3</sup> ; On-site concrete batching; Sandblasting	Total building volume 25,000-100,000m <sup>3</sup> ; Potentially dusty construction material (e.g. concrete); On-site batching	Total building volume <25,000m <sup>3</sup> ; Construction material with a low potential for dust release (e.g. metal cladding or timber)
<b>Trackout</b>	>50 HDV (>3.5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ; Potentially dusty surface material (e.g. high clay content); Unpaved road length >100m	10-50 HDV (>3,5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ; Moderately dusty surface material (e.g. high clay content); Unpaved road length 50-100m	<10 HDV (>3.5t) outward movements <sup>a</sup> in any one day <sup>b</sup> ; Surface material with low potential for dust release; Unpaved road length <50m
<p><i>a. A vehicle movement is a one way journey i.e. from A to B, and excludes the return journey</i>  <i>b. HDV movements during a construction project may vary over its lifetime, and the number of movements is the maximum not the average</i></p>			

B.8 **Step 2B** considers the sensitivity of the area to dust impacts which is defined as low, medium or high. The sensitivity categories for different types of receptors are described in Table B2.

<b>Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects</b>			
<b>Sensitivity Category</b>	<b>Dust Soiling Effects</b>	<b>Health effects of PM<sub>10</sub></b>	<b>Ecological Effects</b>
<b>High</b>	<p>Users can reasonably expect to enjoy a high level of amenity;                      Appearance, aesthetics or value of a property would be diminished;                      Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car show rooms</p>	<p>Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM<sub>10</sub>;                      Examples include residential properties, hospitals, schools, and residential care homes</p>	<p>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;                      Examples include a Special Area of Conservation with dust sensitive features</p>
<b>Medium</b>	<p>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;                      People or property wouldn't reasonably be expected to be continuously present or regularly for extended periods of time;                      Examples include parks and places of work</p>	<p>Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM<sub>10</sub>;                      Examples include office and shop workers but will generally not include workers occupationally exposed to PM<sub>10</sub></p>	<p>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;                      Examples include a Site of Special Scientific Interest with dust sensitive features</p>
<b>Low</b>	<p>Enjoyment of amenity would not reasonably be expected;                      Property would not be diminished in appearance, aesthetics or value;                      People or property would be expected to be present only for limited periods of time;</p>	<p>Locations where human exposure is transient;                      Examples include public footpaths, playing fields, parks and shopping streets</p>	<p>Locations with a local designation where the features may be affected by dust deposition;                      Examples include a Local Nature Reserve with dust sensitive features</p>

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects			
Sensitivity Category	Dust Soiling Effects	Health effects of PM <sub>10</sub>	Ecological Effects
	Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads		

B.9 Based on the sensitivity of individual receptors, the overall sensitivity of the area to dust soiling, human health and ecological effects is then determined using the criteria detailed in Tables B3 to B5, respectively.

Table B3: Sensitivity of the Area to Dust Soiling Effects on People and Property <sup>ab</sup>					
Receptor Sensitivity	Number of Receptors	Distance from Source (m) <sup>c</sup>			
		<20m	<50m	<100m	<350m
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

a. The sensitivity to the area should be derived for each of the four activities  
b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered  
c. For trackout, distances should be measured from the side of the roads used by construction traffic. Without site specific mitigation, trackout may occur for up to 500m from large sites, 200m from medium sites and 50m from small sites, measured from the site exit. The impact declines with distance from the site and it is only necessary to consider trackout impacts up to 50m from the edge of the road

Table B4: Sensitivity of the Area to Human Health Impacts <sup>ab</sup>							
Receptor Sensitivity	Annual Mean PM <sub>10</sub> Concentration <sup>c</sup>	Number of Receptors <sup>d</sup>	Distance from Source (m) <sup>e</sup>				
			<20m	<50m	<100m	<200m	<350m
High	>32µg/m <sup>3</sup>	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low

Table B4: Sensitivity of the Area to Human Health Impacts <sup>ab</sup>							
Receptor Sensitivity	Annual Mean PM <sub>10</sub> Concentration <sup>c</sup>	Number of Receptors <sup>d</sup>	Distance from Source (m) <sup>e</sup>				
			<20m	<50m	<100m	<200m	<350m
	28-32µg/m <sup>3</sup>	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m <sup>3</sup>	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m <sup>3</sup>	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
<b>Medium</b>	>32µg/m <sup>3</sup>	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m <sup>3</sup>	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m <sup>3</sup>	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24µg/m <sup>3</sup>	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
<b>Low</b>	-	>1	Low	Low	Low	Low	Low

a. The sensitivity to the area should be derived for each of the four activities  
 b. Estimate the total number of receptors within the stated distance. Only the highest level of sensitivity from the table needs to be considered  
 c. Most straightforwardly taken from the national background maps, but should also take account of local sources. The values are based on 32µg/m<sup>3</sup> being the annual mean concentration at which an exceedance of the 24-hour mean objective is likely in England, Wales and Northern Ireland. In Scotland, there is an annual mean objective of 18µg/m<sup>3</sup>  
 d. In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties  
 e. For trackout, distances should be measured from the side of the roads used by construction traffic

Table B5: Sensitivity of the Area to Ecological Impacts <sup>ab</sup>		
Receptor Sensitivity	Distance from the Source (m) <sup>c</sup>	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

a. The sensitivity to the area should be derived for each of the four activities  
 b. Only the highest level of sensitivity from the table needs to be considered  
 c. For trackout, distances should be measured from the side of the roads used by construction traffic

B.10 These two factors are combined in **Step 2C** to determine the risk of dust impacts with no mitigation applied.

B.11 The risk of dust effects is determined for four types of construction phase activities, with each activity being considered separately. If a construction phase activity is not taking place on the site, then it does not need to be assessed. The four types of activities to be considered are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

B.12 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table B6.

Table B6: Risk of Dust Impacts for 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

B.13 The risk of dust being generated by earthworks and construction at the site is determined using the criteria in Table B7.

<b>Table B7: Risk of Dust Impacts for Earthworks and Construction</b>			
<b>Sensitivity of Area</b>	<b>Dust Emission Magnitude</b>		
	<b>Large</b>	<b>Medium</b>	<b>Small</b>
<b>High</b>	High Risk	Medium Risk	Low Risk
<b>Medium</b>	Medium Risk	Medium Risk	Low Risk
<b>Low</b>	Low Risk	Low Risk	Negligible

B.14 The risk of dust being generated by trackout at the site is determined using the criteria in Table B8.

<b>Table B8: Risk of Dust Impacts for Trackout</b>			
<b>Sensitivity of Area</b>	<b>Dust Emission Magnitude</b>		
	<b>Large</b>	<b>Medium</b>	<b>Small</b>
<b>High</b>	High Risk	Medium Risk	Low Risk
<b>Medium</b>	Medium Risk	Low Risk	Negligible
<b>Low</b>	Low Risk	Low Risk	Negligible

### Step 3

B.15 Step 3 of the assessment determines the site-specific mitigation required for each of the activities, based on the risk determined in Step 2. Mitigation measures are detailed in guidance published by the Greater London Authority<sup>10</sup>, recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. Professional judgement should be used to determine the type and scale of mitigation measures required.

B.16 If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

### Step 4

B.17 Step 4 assesses the residual effect, with mitigation measures in place, to determine whether or not these are significant.

<sup>10</sup> Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Supplementary Planning Guidance, 2014

### **Professional Judgement**

- B.18 The IAQM guidance makes reference to the use of professional judgement when assessing the risks of dust and fine particulate matter from demolition and construction sites. Details of the experience of the personnel involved with the project are provided in **Appendix D**.

## Appendix C: Methodology for Operational Phase Assessment

### Air Dispersion Modelling Inputs

C.1 The air dispersion model ADMS-Roads (CERC, Version 5.0.1) has been used to assess the potential air quality impacts associated with development-generated road traffic emissions. This dispersion model is widely used and accepted for the purpose of undertaking assessments to support both planning and Environmental Permit applications.

### Traffic Flow Data

C.2 The ADMS-Roads model requires the input of detailed road traffic flow data for those routes which may be affected by the proposed development. Traffic flow data has been provided for this project by i-Transport, the appointed transport consultants for the project. The study extent of the model is shown in Figure C.1.



**Figure C.1:** Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue (*Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673*)

C.3 Data has been provided as 24-hour Annual Average Daily Traffic (AADT) flows, with HGV percentages. No average speed information was available and therefore speed limits have been used, with a reduction to 20kph in locations where congestion or the slowing down of vehicles would be expected.

C.4 The traffic flow data used in the assessment is included in Table C1.



Table C1: 24-hour AADT traffic data used in the assessment												
Link	Link Name	Speed Info (kph)	Scenario 1: 2019 Verification and Base Year		Scenario 2: 2026 Without Development		Scenario 3: 2026 With Development		Scenario 4: 2032 Without Development		Scenario 5: 2032 With Development	
			AADT	HGV%	AADT	HGV%	AADT	HGV%	AADT	HGV%	AADT	HGV%
1	Bekesbourne Lane (South of Site Access)	64	4,301	1.6%	4,770	1.6%	4,853	1.6%	5,043	1.6%	5,127	1.6%
2	Bekesbourne Lane (North of Site Access)	48	4,301	1.6%	4,770	1.6%	2,919	1.6%	5,043	1.6%	3,112	1.6%
3	A257 Wingham Road (East of Bekesbourne Lane)	48	8,756	2.9%	10,939	2.9%	11,107	2.5%	11,496	2.9%	11,664	2.5%
4	A257 High Street (West of Nargate Street)	48	8,369	2.9%	10,678	2.9%	9,185	2.6%	11,211	2.9%	9,637	2.6%
5	A257 The Hill (West of Jubilee Road)	48	7,202	1.9%	9,456	1.9%	8,147	1.6%	9,914	1.9%	8,525	1.6%
6	A257 The Hill (East of Newing Close)	48	7,141	2.1%	9,340	2.1%	9,954	1.7%	9,795	2.1%	10,408	1.8%
7	A257 Littlebourne Road (East of Smith Way)	48	10,032	3.1%	12,487	3.1%	13,448	2.6%	13,125	3.1%	14,086	2.6%
8	Wemyss Way	48	498	7.7%	2,717	7.7%	2,794	1.5%	2,748	7.7%	2,825	1.6%
9	A257 St Martin's Hill (East of St. Augustine's Rdbt)	48	12,162	2.7%	14,663	2.7%	15,547	2.4%	15,437	2.7%	16,321	2.4%
10	Longport (West of St. Augustine's Rdbt)	48	5,309	0.9%	5,773	0.9%	5,773	0.9%	6,110	0.9%	6,110	0.9%
11	A2050 New Dover Road (East of A257)	48	12,400	4.4%	19,348	4.4%	19,390	3.1%	20,137	4.4%	20,179	3.1%



Table C1: 24-hour AADT traffic data used in the assessment												
Link	Link Name	Speed Info (kph)	Scenario 1: 2019 Verification and Base Year		Scenario 2: 2026 Without Development		Scenario 3: 2026 With Development		Scenario 4: 2032 Without Development		Scenario 5: 2032 With Development	
			AADT	HGV%	AADT	HGV%	AADT	HGV%	AADT	HGV%	AADT	HGV%
12	Upper Chantry Lane (South of A257)	48	4,961	0.7%	5,472	0.7%	5,472	0.7%	5,787	0.7%	5,787	0.7%
13	A257 St. Georges Place (West of Upper Chantry Lane)	48	16,565	5.4%	24,866	5.4%	25,708	3.9%	25,920	5.4%	26,762	3.9%
14	A257 Lower Chantry Lane (North of A2050 New Dover Road)	48	11,097	2.6%	13,578	2.6%	14,462	2.2%	14,284	2.6%	15,168	2.2%
15	A28 Upper Bridge Street (South of A257)	48	16,963	8.4%	21,668	8.4%	22,121	7.0%	22,748	8.4%	23,201	7.1%
16	A28 Lower Bridge Street (North of A257)	48	19,282	6.0%	25,470	6.0%	25,771	4.9%	26,697	6.0%	26,998	4.9%
17	St George's Street (West of A28)	32	2,339	36.2%	2,595	36.2%	2,595	35.5%	2,743	36.2%	2,743	35.5%
18	Access Road (South of A257)	48					3,434	1.4%			3,515	1.4%
19	Access Road (West of Bekesbourne Lane)	48					1,934	1.6%			2,015	1.6%

### **Vehicle Emission Factors**

- C.5 The air quality assessment has used vehicle emission factors calculated using the Emissions Factor Toolkit (EFT) version 11.0, released in November 2021. This is the most up-to-date version of the EFT currently available.
- C.6 As discussed in the section 3.4 of the report, in accordance with the latest guidance from the IAQM, a sensitivity analysis has not been undertaken as model verification has been undertaken using data from later than 2016<sup>11</sup>.
- C.7 As a result, vehicle emission factors from EFT v11.0 have been used for the assessment, with the appropriate year factors applied to the modelling scenarios.

### **Street Canyons**

- C.8 LAQM.TG(22) states that '*street canyons can generally be defined as narrow streets where the height of buildings on both sides of the road is greater than the road width*'. The principal effects of a street canyon on the dispersion of pollution from a road source are:
- Pollution being channelled along the canyon;
  - Pollution being dispersed across the canyon by circulating flow at road height;
  - Pollutants being trapped in recirculation regions;
  - Pollutants leaving the canyon between gaps in the buildings;
  - Pollutants leaving the canyon from the canyon top; and
  - Pollutants leaving the canyon from the downstream end of the canyon.
- C.9 The model has not included any street canyons as there are none along the roads included in the study network.

### **Meteorological Data**

- C.10 The meteorological data used in the air quality modelling has been obtained from ADM Limited and is from the Manston recording station, covering the period between 1<sup>st</sup> January and 31<sup>st</sup> December 2019. This has complete data capture for wind and temperature.

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<sup>11</sup> Available on the Institute of Air Quality Management website ([https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm\\_uncertainty\\_vehicle\\_NOx\\_emission\\_withdrawn-02.pdf](https://iaqm.co.uk/wp-content/uploads/2013/02/iaqm_uncertainty_vehicle_NOx_emission_withdrawn-02.pdf))

C.11 The Manston recording station is located approximately 14.6km from the proposed development and is considered to be the most representative of the conditions at the proposed development, due to its relative location and similar altitude.

C.12 The 2019 wind rose for the Manston Meteorological Recording Station is shown in Figure C2.

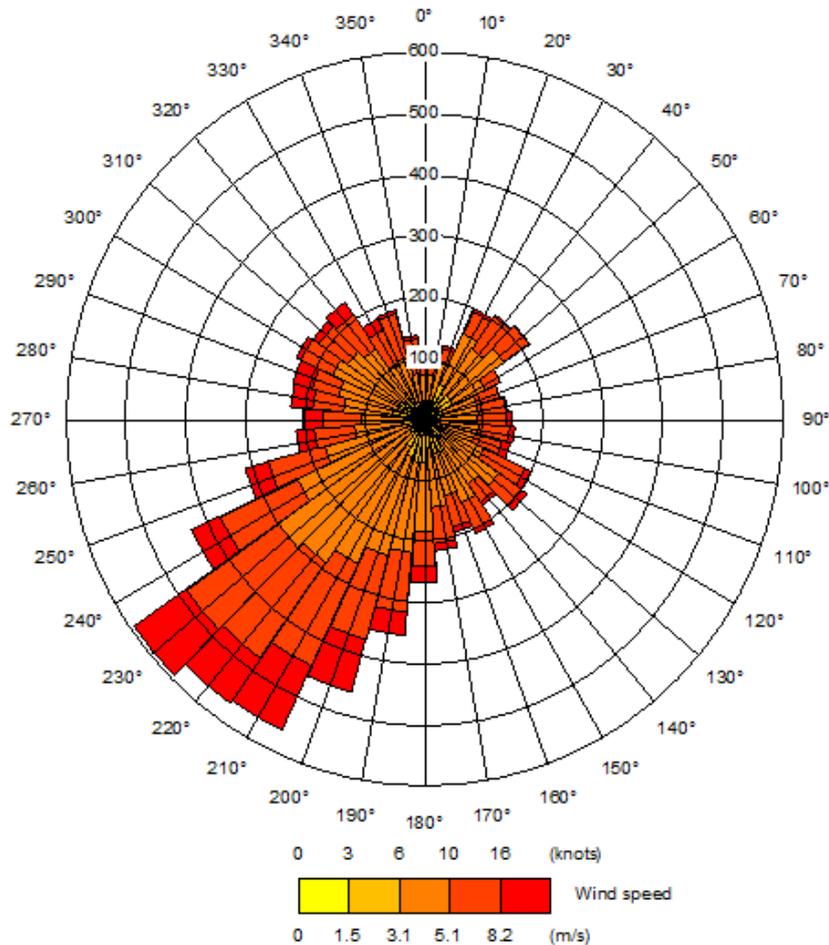


Figure C.2: 2019 Wind Rose for the Manston Meteorological Station

**Dispersion and Meteorological Site Characteristics**

C.13 The characteristics for the dispersion site and meteorological sites, included in the ADMS-Roads model, are detailed in Table C2.

Table C2: Dispersion and Meteorological Site Characteristics		
Setting	Dispersion Site	Meteorological Site
Surface Roughness	0.5m	0.005m
Surface Albedo	0.23	0.23

<b>Table C2: Dispersion and Meteorological Site Characteristics</b>		
<b>Setting</b>	<b>Dispersion Site</b>	<b>Meteorological Site</b>
Minimum Monin-Obukhov Length	30m	1m
Priestley-Taylor Parameter	1	1

***NO<sub>x</sub> to NO<sub>2</sub> Conversion***

C.14 In accordance with the guidance within LAQM.TG(22), the ADMS-Roads model has been run to predict the road-contribution NO<sub>x</sub> concentrations for each receptor location. These have then been converted to NO<sub>2</sub> concentrations using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator<sup>12</sup>.

***Model Validation and Verification***

C.15 LAQM.TG(22) refers to model validation as “*the general comparison of modelled results against monitoring data carried out by model developers*”. ADMS-Roads is widely accepted by regulatory authorities for use in this type of assessment.

C.16 Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads air dispersion model is achieved by modelling concentration(s) at existing monitoring location(s) in the vicinity of the proposed development, and comparing the modelled concentration(s) with the measured concentration(s).

C.17 Following review of the 2022 Annual Status Report (ASR) for Canterbury City Council, it is understood there are four roadside air quality monitoring locations for NO<sub>2</sub> situated along roads where traffic flow data is available.

C.18 As no PM<sub>10</sub> or PM<sub>2.5</sub> monitoring locations are situated along roads where traffic flow data is available, it has not been possible to carry out model verification for modelled PM<sub>10</sub> or PM<sub>2.5</sub> concentrations.

C.19 A review of the 2021 Annual Status Report (ASR) for CCC, identified four roadside NO<sub>2</sub> diffusion tubes (DT1, DT22, DT35 and DT44) located within the study area.

C.20 As no monitoring locations for PM<sub>10</sub> or PM<sub>2.5</sub> are situated along roads where traffic flow data is available, it has not been possible to carry out model verification for modelled PM<sub>10</sub> or PM<sub>2.5</sub> concentrations.

<sup>12</sup> Defra Local Air Quality Management web pages [<http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html>]

C.21 The monitoring data that has been used in the model verification procedure is detailed in Table C3.

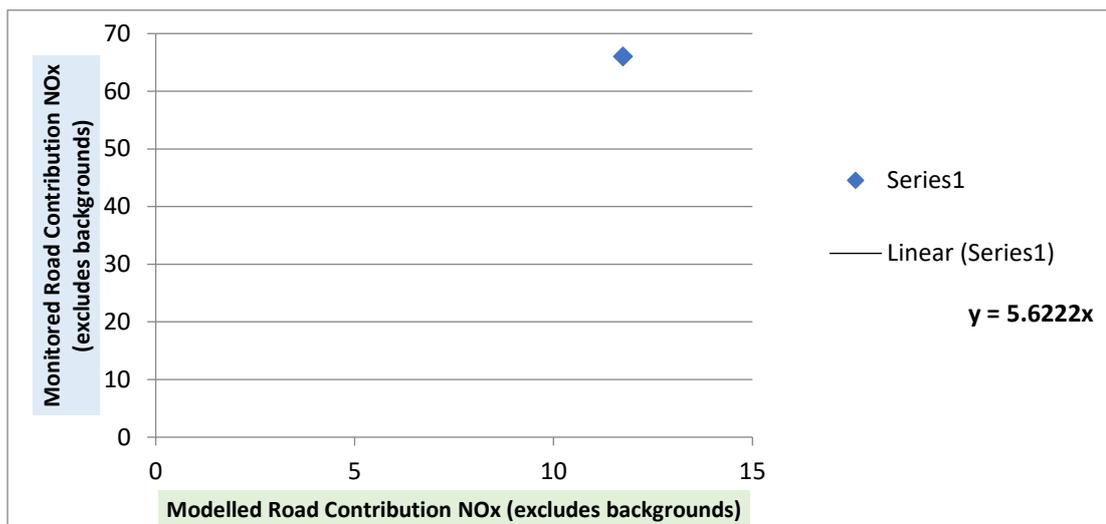
<b>Table C3: NO<sub>2</sub> Monitoring Data Used for Verification Purposes</b>				
<b>Monitoring Location Reference</b>	<b>Type</b>	<b>Approximate Grid Reference</b>		<b>2019 Bias Adjusted NO<sub>2</sub> Annual Average Concentration (µg/m<sup>3</sup>)</b>
		<b>Easting</b>	<b>Northing</b>	
DT1	Diffusion Tube	615295	158001	45.10
DT22	Diffusion Tube	615851	157672	31.20
DT35	Diffusion Tube	615645	157192	31.90
DT44	Diffusion Tube	615445	157408	35.20

C.22 The modelled road-contribution NO<sub>x</sub> concentration for the diffusion tubes has been compared against the measured road-contribution NO<sub>x</sub> concentration for the same location. The measured concentrations have been derived using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator, taking into account the background NO<sub>x</sub> concentration for the local area.

C.23 It is considered that a separate adjustment factor ought to be calculated for AQMA no. 3, due to congestion and traffic slowing. The adjustment factor calculated for diffusion tube DT1 has been applied only to ESRs 10 and 11 which are also located in AQMA No. 3. The adjustment factor for tubes DT22, DT35 and DT44 has been used for all locations outside AQMA No. 3.

*AQMA No. 3.*

C.24 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 5.6222.



C.25 This adjustment factor has been applied to the modelled road-contribution NO<sub>x</sub> concentrations. The total NO<sub>2</sub> concentrations have been derived by combining the adjusted road-contribution NO<sub>x</sub> concentration and background NO<sub>2</sub> concentration, using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator.

C.26 A final comparison has been made between the total measured NO<sub>2</sub> concentrations and total modelled NO<sub>2</sub> concentrations, as shown in Table C4. Following adjustment, modelled concentrations are within 10% of measured concentrations.

Monitoring Location Reference	Measured Total NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	Modelled Total NO <sub>2</sub> Concentration (µg/m <sup>3</sup> )	Difference (%)
DT1	45.10	45.10	0.00

C.27 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO<sub>2</sub> concentrations. This has been carried out for the monitoring location included within the model verification, in accordance with the guidance detailed in LAQM.TG(22).

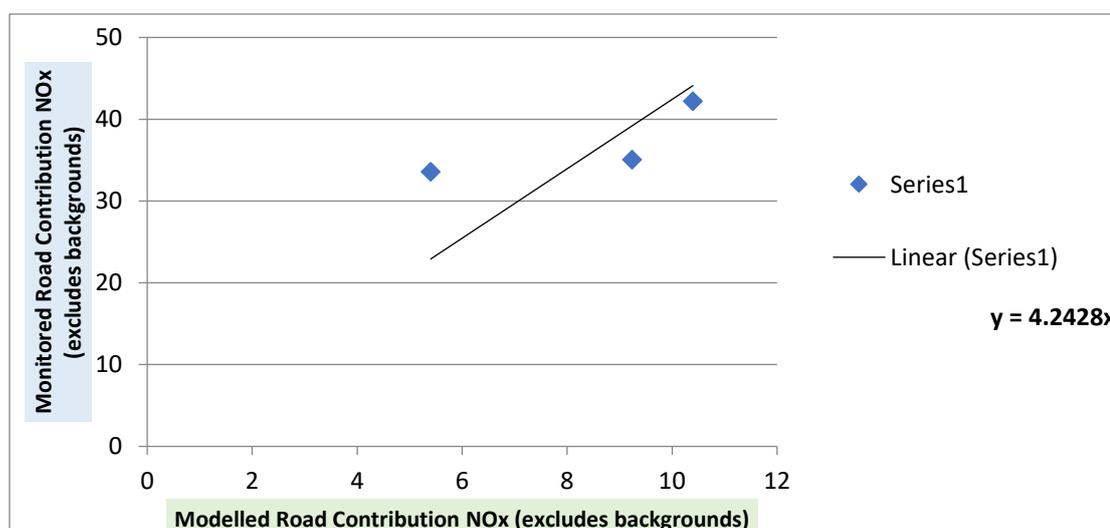
C.28 The RMSE calculation following adjustment is detailed in Table C5.

Diffusion Tube Location	After Verification			
	Observed Value	Predicted Value	Difference	RMSE
DT1	45.10	45.10	0.00	0.00

C.29 LAQM.TG(22) states that “ideally an RMSE value within 10% of the objective would be derived”, a value of within 25% is considered acceptable. The results of the calculation show that following model verification, the RMSE value is within 10% (i.e.  $4\mu\text{g}/\text{m}^3$ ) of the objective (i.e.  $40\mu\text{g}/\text{m}^3$ ). Therefore, the model is considered to be performing to an acceptable standard at this location.

*Non-AQMA*

C.30 The comparison is shown in the below graph. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 4.2428.



C.31 This adjustment factor has been applied to the modelled road-contribution NO<sub>x</sub> concentrations. The total NO<sub>2</sub> concentrations have been derived by combining the adjusted road-contribution NO<sub>x</sub> concentration and background NO<sub>2</sub> concentration, using the Defra NO<sub>x</sub> to NO<sub>2</sub> calculator.

C.32 A final comparison has been made between the total measured NO<sub>2</sub> concentrations and total modelled NO<sub>2</sub> concentrations, as shown in Table C4.

Monitoring Location Reference	Measured Total NO <sub>2</sub> Concentration ( $\mu\text{g}/\text{m}^3$ )	Modelled Total NO <sub>2</sub> Concentration ( $\mu\text{g}/\text{m}^3$ )	Difference (%)
DT22	31.20	26.03	-16.57
DT35	31.90	33.81	5.99
DT44	35.20	36.06	2.44

- C.33 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO<sub>2</sub> concentrations. This has been carried out for the monitoring location included within the model verification, in accordance with the guidance detailed in LAQM.TG(22).
- C.34 The RMSE calculation following adjustment is detailed in Table C5.

<b>Table C5: RMSE Calculation for Nitrogen Dioxide Concentrations</b>				
<b>Diffusion Tube Location</b>	<b>After Verification</b>			
	<b>Observed Value</b>	<b>Predicted Value</b>	<b>Difference</b>	<b>RMSE</b>
DT22	31.20	26.03	5.17	<b>3.22</b>
DT35	31.90	33.81	-1.91	
DT44	35.20	36.06	-0.86	

- C.35 LAQM.TG(22) states that “ideally an RMSE value within 10% of the objective would be derived”, a value of within 25% is considered acceptable. The results of the calculation show that following model verification, the RMSE value is within 10% (i.e. 4µg/m<sup>3</sup>) of the objective (i.e. 40µg/m<sup>3</sup>). Therefore, the model is considered to be performing to an acceptable standard at this location.

### **Assessment Criteria**

#### ***Assessing the Impact of a Proposed Development on Human Receptors***

- C.36 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM<sup>13</sup> with relation to the assessment of the air quality impacts of proposed developments and their significance.
- C.37 The impact of a development is usually assessed at specific receptors, and takes into account both the long-term background concentrations, in relation to the relevant Air Quality Assessment Level (AQAL) at these receptors, and the change with the development in place.
- C.38 The impact descriptors for individual receptors are detailed in Table C6.

<sup>13</sup> Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

<b>Table C6: Impact Descriptors for Individual Receptors</b>				
<b>Long Term Average Concentration at Receptor in Assessment Year*</b>	<b>Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)*</b>			
	<b>1%</b>	<b>2-5%</b>	<b>6-10%</b>	<b>&gt;10</b>
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

*\*Percentage pollutant concentrations have been rounded to whole numbers, to make it easier to assess the impact. Changes of 0% (i.e. less than 0.5% or 0.2µg/m<sup>3</sup>) should be described as Negligible*

***Determining the Significance of Effects***

- C.39 Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as either ‘significant’ or ‘not significant’.
- C.40 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:
- The existing and future air quality in the absence of the development;
  - The extent of the current and future population exposure to the impacts; and
  - The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

## Appendix D: Professional Experience of Assessors

D.1 The assessment of air quality impacts, and the significance of the associated effects, takes into account the professional judgement of the assessor. Details of the experience of the personnel involved with the project are provided below:

**Dr. Paul Sanderson**

**BSc (Hons) MSc DPhil MEnvSc MIAQM**

Paul is a PhD qualified Air Quality Specialist and Member of The Institution of Environmental Sciences and Institute of Air Quality Management who has completed a number of projects examining the air quality impact of various schemes including residential and commercial developments. He has good experience in the use of ADMS Roads advanced dispersion model for undertaking detailed air quality modelling as well as using the Design Manual for Roads and Bridges (DMRB).

**Senior Environmental  
Scientist (Air Quality)**

Paul has been involved in large complex EIA schemes as well as smaller individual commissions as part of planning applications and also has experience in air quality monitoring using nitrogen dioxide diffusion tubes as well as undertaking numerous dust assessments.

Paul also has experience in liaising with transport consultants on traffic data requirements for input and taking responsibility for of undertaking the technical aspects relating to the dispersion modelling as well as preparation of technical reports and chapters.

**Mariam Weatherley**

**BSc (Hons) MSc CEnv MEnvSc MIAQM**

Mariam is a Chartered Environmental Scientist, with wide experience in the environmental profession predominantly in relation to air quality, gained from 14 years employment in this sector. Mariam's background in environmental consultancy has provided her with a good range of skills and knowledge through the involvement in air quality projects both as individual commissions and as part of EIAs for public and private sector clients. Mariam has an advanced knowledge of modelling techniques and monitoring (including monitoring strategies, passive

**Associate Director (Air  
Quality)**

monitoring techniques and automatic stations) and has led teams of air quality specialists on technical assessments.

Mariam frequently carries out the role of Project Manager for air quality projects, offering specialist air quality analysis, interpretation and advice ensuring that the air quality aspects of the services are appropriately addressed.

**Malcolm Walton**

**Technical Director**

**BSc (Env Health) Dip (Acoustics & Noise Control)**

**MCIEH AMIOA**

Malcolm holds a Bachelor of Science degree in Environmental Health and the Diploma in Acoustics and Noise Control. Malcolm is a Member of the Chartered Institute of Environmental Health and an Associate Member of the Institute of Acoustics. Malcolm joined Wardell Armstrong in September 2001 following 12 years working as an Environmental Health Officer in several local authorities, responsible for the enforcement of environmental legislation and in particular air pollution and noise nuisance.

Malcolm has experience in the technical co-ordination of environmental appraisal of large schemes to UK and international standards. Malcolm regularly carries out and co-ordinates noise and air quality assessment work associated with planning applications including EIA work and PPC permit application/compliance. He regularly acts as expert witness in planning inquiries in respect of noise, air quality and odour.

**DRAWING**



**KEY**

- Site Boundary
- Canterbury AQMA
- Existing Sensitive Receptors
- Proposed Sensitive Receptors

**Notes:**

Boundaries are indicative. Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD

CLIENT  
**GLADMAN DEVELOPMENTS LTD**

PROJECT  
**THE HILL LITTLEBOURNE**

DRAWING TITLE  
**AIR QUALITY RECEPTOR LOCATION PLAN**

DRG No.	GM11368-001	REV	A
DRG SIZE	A3	SCALE	1:30,178
DRAWN BY	HF	DATE	27/02/2023
CHECKED BY	PS	APPROVED BY	--

**STOKE-ON-TRENT**

Sir Henry Doulton House  
Forge Lane  
Etruria  
Stoke-on-Trent  
ST1 5BD  
Tel: +44 (0)1782 276 700

**BIRMINGHAM**

Two Devon Way  
Longbridge Technology Park  
Longbridge  
Birmingham  
B31 2TS  
Tel: +44 (0)121 580 0909

**BOLTON**

41-50 Futura Park  
Aspinall Way  
Middlebrook  
Bolton  
BL6 6SU  
Tel: +44 (0)1204 227 227

**BRISTOL**

Temple Studios  
Temple Gate  
Redcliffe  
Bristol  
BS1 6QA  
Tel: +44 (0)117 203 4477

**BURY ST EDMUNDS**

Armstrong House  
Lamdin Road  
Bury St Edmunds  
Suffolk  
IP32 6NU  
Tel: +44 (0)1284 765 210

**CARDIFF**

Tudor House  
16 Cathedral Road  
Cardiff  
CF11 9LJ  
Tel: +44 (0)292 072 9191

**CARLISLE**

Marconi Road  
Burgh Road Industrial Estate  
Carlisle  
Cumbria  
CA2 7NA  
Tel: +44 (0)1228 550 575

**EDINBURGH**

Great Michael House  
14 Links Place  
Edinburgh  
EH6 7EZ  
Tel: +44 (0)131 555 3311

**GLASGOW**

24 St Vincent Place  
Glasgow  
G1 2EU  
Tel: +44 (0)141 428 4499

**LEEDS**

36 Park Row  
Leeds  
LS1 5JL  
Tel: +44 (0)113 831 5533

**LONDON**

Third Floor  
46 Chancery Lane  
London  
WC2A 1JE  
Tel: +44 (0)207 242 3243

**NEWCASTLE UPON TYNE**

City Quadrant  
11 Waterloo Square  
Newcastle upon Tyne  
NE1 4DP  
Tel: +44 (0)191 232 0943

**TRURO**

Baldhu House  
Wheal Jane Earth Science Park  
Baldhu  
Truro  
TR3 6EH  
Tel: +44 (0)187 256 0738

**International office:**

**ALMATY**

29/6 Satpaev Avenue  
Hyatt Regency Hotel  
Office Tower  
Almaty  
Kazakhstan  
050040  
Tel: +7(727) 334 1310