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GLADMAN DEVELOPMENTS LIMITED

SWANSTREE AVENUE, SITTINGBOURNE

AIR QUALITY ASSESSMENT

JULY 2022

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DATE ISSUED:	**19th July 2022**
JOB NUMBER:	**GM12373**
REPORT NUMBER:	**001**
VERSION:	**V0.5**
STATUS:	**FINAL**

GLADMAN DEVELOPMENTS LIMITED

SWANSTREE AVENUE, SITTINGBOURNE

AIR QUALITY ASSESSMENT

JULY 2022

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APPENDICES

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EXECUTIVE SUMMARY

An air quality assessment has been undertaken to accompany a planning application for a proposed residential development off Swanstree Avenue, Sittingbourne.

The assessment has considered dust and fine particulate matter emissions 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, construction and trackout; the risk of human health effects is classed as low for earthworks, construction and trackout. Mitigation measures are proposed, based on best practice guidance, to further reduce any potential impacts.

For the operational phase assessment, annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations have been modelled at thirty-four existing sensitive receptor locations, as well as two proposed sensitive 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 concludes that the development will result in concentrations of NO_2, PM_{10} and $PM_{2.5}$ remaining below the air quality objectives/target values, both without and with the development for the proposed 2026 opening/future year. All impacts with the development in place are classed as negligible. Air quality effects are therefore considered to be 'not significant'.

The assessment demonstrates that the proposed development will not lead to an unacceptable risk from air pollution, or to any breach in national objectives, and is in accordance with all relevant national policy. 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 Limited to undertake an air quality assessment to accompany a planning application for a proposed residential development off Swanstree Avenue, Sittingbourne.

1.1.2 The proposed development site is situated within Sittingbourne, located within the administrative area of Swale Borough Council (SBC). Currently, SBC has declared six Air Quality Management Areas (AQMAs) within its administrative area. However, the proposed development is not located within any of these AQMAs, with the nearest, AQMA No.3, located approximately 850m to the north of the site. Therefore, the site is not located within an area of known poor air quality.

1.1.3 The proposals are for a development of approximately 135 residential dwellings within a 5.9ha site located to the south of Swanstree Avenue.

1.1.4 This report details the results of the air quality assessment undertaken to accompany an outline planning application for the proposed development. The assessment considers dust and fine particulate matter emissions during the construction phase and road traffic emissions during the operational phase. Consideration has also been given to the potential impact of vehicle emissions on future residents of the proposed development site.

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 (further details are included in **Appendix A)**:

- EU Ambient Air Quality Directive 2008/50/EC (i.e. the CAFE Directive);
- The Environment Act 1995;
- 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(16), April 2021;
- 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.

2.2 Assessment Criteria

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

Table 1: Air Quality Objectives and Limit Values Relevant to the Assessment*

Pollutant	Objective/Limit Value	Averaging Period	Obligation
Nitrogen Dioxide (NO_2)	200µg/m^3, not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m^3	Annual mean	All local authorities
Particulate Matter (PM_{10})	50µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	England, Wales and Northern Ireland
	40µg/m^3	Annual mean	England, Wales and Northern Ireland
	18µg/m^3	Annual mean	Scotland only
Particulate Matter ($PM_{2.5}$)	Limit Value of 25µg/m^3	Annual mean	England, Wales and Northern Ireland
	10µg/m^3	Annual mean	Scotland only

**In accordance with the Air Quality Standards Regulations 2010*

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 An initial air quality screening methodology was discussed with Ms Clare Lydon, Senior Scientific Officer at Mid Kent Environmental Health Service, via email correspondence on 8th March 2021. The Mid Kent Environmental Health Service is a shared service that covers Swale Borough Council, Maidstone Borough Council and Tunbridge Wells Borough Council.

3.1.2 Ms Lydon replied via email on 6th April 2021 to state that, given the proposed development is classed as a 'major' development in accordance with the Swale Borough Council's Air Quality and Planning Technical Guidance document, a more detailed air quality assessment would be required.

3.1.3 Since this consultation was undertaken, the number of proposed dwellings has reduced and so this assessment reflects the updated modelling associated with this reduction. In order to ensure CIL-compliance of the Damage Cost Calculation, this air quality assessment has been reworked to consider the impact of the 135 units proposed on the site resulting in a reduced contribution being required.

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)[1]. 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 residential and commercial in nature and are detailed in Table 2.

Table 2: Existing Sensitive Receptors Considered in the Construction Phase Assessment

Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing residential dwellings off Swanstree Avenue	North	Approximately 15m at closest point
Existing residential dwellings off Highsted Road	West	Approximately 25m at closest point

[1] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, June 2016

3.2.3 There are no potentially dust sensitive statutory or non-statutory designated habitat sites within 50m of the site and/or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s). Ecological effects do not therefore need to be considered within this 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**.

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[2]. Further details of the modelling and assessment methodology are provided in **Appendix C**.

3.3.2 NO_2, PM_{10} and $PM_{2.5}$ concentrations have been predicted at existing sensitive receptors, as these are the pollutants considered most likely to exceed the objectives and limit values.

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

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

3.3.4 The following committed developments have been included in scenarios 2 and 3 above:

- 14/501588/OUT: Land at Stones Farm, Bapchild
- 16/507689/OUT: Land between Frognal Lane and Orchard View, Teynham

[2] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

- 18/503697: Land at Station Road, Teynham

3.3.5 The estimates of traffic generated by the committed developments included within the air quality assessment have been provided by Ashley Helme, the appointed transport consultant for the scheme. Two of the committed developments used in the air quality assessment (14/501588/OUT and 16/507689/OUT) are also included within the Transport Assessment (TA) provided by Ashley Helme. Consideration was given to the Station Road scheme in the TA, and although it was scoped out of the assessment as it does not affect junctions in the relevant assessment area for the current Sittingbourne application, it has been included in the flows used in the air quality assessment. The committed developments included in the TA have been agreed with KCC highways officers.

3.3.6 Traffic data used in the 2019 base year scenario has been estimated using ATC count data undertaken in 2022. Ashley Helme have advised that the counts undertaken in 2022 are deemed to be representative of 2019 pre-covid conditions and that it would not be representative to apply a Tempro factor to these counts to reduce these to 2019 flows:

> *"In ordinary times, we would use the Tempro software to establish a locally derived conversion factor for 2022 to 2019. In more recent times, the covid-19 pandemic has resulted in changes to travel and as such application of a reduction factor could be misrepresentative".*

Existing Sensitive Receptors

3.3.7 A number of representative existing sensitive receptors in the vicinity of the proposed development (identified as ESR 1 to ESR 34) 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.

3.3.8 Details of these receptors considered are provided in Table 3, and their locations are shown on drawing GM11657 – 001.

Table 3: Existing Sensitive Receptors Considered in Operational Phase Assessment

Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 1	Swanstree Avenue, Sittingbourne	591429	162714	Residential
ESR 2	Highsted Road, Sittingbourne	591103	162703	Residential

Table 3: Existing Sensitive Receptors Considered in Operational Phase Assessment				
Receptor	**Address**	**Grid Reference**		**Receptor Type**
		Easting	**Northing**	
ESR 3		591088	162845	Residential
ESR 4		591021	162627	Residential
ESR 5	Rectory Road, Sittingbourne	591799	162868	Residential
ESR 6		591743	162852	Residential
ESR 7	Brenchley Road, Sittingbourne	590901	162654	School
ESR 8	Highsted Grammar School	590756	162814	Residential
ESR 9	Brenchley Road, Sittingbourne	590592	162851	School
ESR 10	Bell Road, Sittingbourne	590545	162835	Residential
ESR 11		590342	162517	Residential
ESR 12		590640	163094	Residential
ESR 13	Highsted Road, Sittingbourne	590802	163088	Residential
ESR 14	A2 Canterbury Road, Sittingbourne	592179	163278	Residential
ESR 15	Swanstree Avenue, Sittingbourne	592185	163260	Residential
ESR 16	Meadowfield School, Sittingbourne	592197	163169	School
ESR 17	Swanstree Avenue, Sittingbourne	592087	163044	Residential
ESR 18	Vincent Road, Sittingbourne	592221	163306	Residential
ESR 19		592240	163405	Residential
ESR 20	A2 Canterbury Road, Sittingbourne	592193	163309	Residential
ESR 21		592025	163346	Residential
ESR 22		591791	163403	First floor residential
ESR 23	Murston Road, Sittingbourne	591777	163419	Residential
ESR 24		591795	163510	Residential
ESR 25*	A2 Canterbury Road, Sittingbourne	591466	163460	Residential

Table 3: Existing Sensitive Receptors Considered in Operational Phase Assessment				
Receptor	Address	Grid Reference		Receptor Type
		Easting	Northing	
ESR 26	A2 Fox Child, Bapchild	592856	163146	Residential
ESR 27	School Lane, Bapchild	592837	163135	Residential
ESR 28	Bapchild and Tonge Primary School	592790	163025	School
ESR 29	Lynsted Lane, Teynham	595144	162462	Residential
ESR 30		595118	162426	Residential
ESR 31**	A2 London Road, Teynham	595213	162455	Residential
ESR 32		595318	162426	First floor residential
ESR 33	Station Road, Teynham	595322	162437	Residential
ESR 34		595370	162534	Residential
* Within AQMA No.3 ** Within AQMA No.5				

3.3.9 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

3.3.10 Two proposed sensitive receptors (referred to as PR 1 to PR 2) 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 Swanstree Avenue and the proposed site access road.

3.3.11 Pollutant concentrations at the proposed receptors have been predicted for scenario 3 (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.

3.3.12 Details of the proposed sensitive receptors are provided in Table 4, and the location is shown on drawing GM11657-001.

Table 4: Proposed Sensitive Receptors Considered in the Operational Phase Assessment			
Receptor Point	**Location**	**Grid Reference**	
		Easting	**Northing**
PR 1	Location considered to be representative of the closest proposed residential properties to Swanstree Avenue and the Site Access Road	591246	162663
PR 2	Location considered to be representative of the closest proposed residential properties to Site Access Road towards the centre of the development	591243	162547

3.3.13 The predicted concentrations at the proposed receptors have been assessed against the appropriate air quality objectives and limit values, as 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_2 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_x emissions from diesel vehicles (even though 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 latest Emission Factor Toolkit (EFT v11.0)[3], 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[4]. 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_x emissions will not reduce as quickly over time as within the EFT).

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

[3] Defra Local Air Quality Management webpages (https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html)
[4] Institute of Air Quality Management, Dealing with Uncertainty in Vehicle NO_x Emissions within Air Quality Assessments v1.1, July 2018

using monitored data from 2016 or later[5].

3.4.5 The IAQM has recently withdrawn their 2018 position statement on the consideration of uncertainties in predicting future air quality[6]. A growing body of evidence suggests that the latest COPERT vehicle emission factors used in EFT v9.0 (and later) reflect real-world NO_x 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 SBC to confirm their agreement with the methodology used within the assessment;
- Detailed traffic data has been obtained from the appointed transport consultant following extensive consultation to ensure its appropriateness and robustness;
- The latest Defra LAQM tools have been incorporated into the assessment;
- 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;
- A number of SBC diffusion tubes have been included within the assessment to allow model verification to take place. Model verification factor(s) have been applied to NO_x concentrations, which are then input into the Defra NO_x to NO_2 calculator tool to predict total NO_2 concentrations at each receptor considered in the assessment.

[5] Air Quality Consultants, Performance of Defra's Emission Factor Toolkit 2013 – 2019, February 2020
[6] 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)

4 BASELINE SITUATION

4.1 Swale Borough Council Local Air Quality Management

4.1.1 The proposed development site is located within the administrative area of SBC, which is responsible for the management of local air quality.

4.1.2 Currently, SBC has declared six Air Quality Management Areas (AQMAs) within its administrative area. However, the proposed development is not located within any of these AQMAs, and therefore, the proposed development site is not located within a known area of air quality concern.

4.1.3 The nearest AQMA, the AQMA No.3, is located approximately 850m from the proposed development and has been declared for exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2). Ashley Helme, the appointed transport consultant for the scheme, has confirmed that no additional traffic from the proposed development is likely to travel through this AQMA. However, an existing sensitive receptor within the AQMA has been included in the model.

4.1.4 The AQMA No.5, situated within Teynham, which is located approximately 3.9km east of the proposed development, has also been include within the model. Existing sensitive receptors within the AQMA have been included within the model.

4.1.5 There are currently no representative background monitoring locations in the vicinity of the proposed development site. There are, however, a number of roadside NO_2 diffusion tubes located in the vicinity of the proposed development, both within and outside of the AQMAs. Monitoring data for 2019, provided by SBC, shows annual mean NO_2 concentrations ranging between 22.4 and 37.7µg/m^3.

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_2, PM_{10} or $PM_{2.5}$ 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[7].

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

4.2.3 The background pollutant concentrations used in this assessment are detailed in Table 5.

Table 5: Background Pollutant Concentrations Used in the Air Quality Assessment				
Pollutant	**Annual Mean Concentrations (µg/m^3)**			
	NOx	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
2019 Base Year				
ESR 1–6 & PR 1 & 2 (591500, 162500)	15.01	11.25	14.88	10.15
ESR 7 – 11 (590500, 162500)	16.42	12.20	15.36	10.59
ESR 12 & 13 (590500, 163500)	20.85	15.07	16.02	11.18
ESR 14–21 & 26-28 (592500, 163500)	16.18	12.04	15.80	10.67
ESR 22 -25 (591500, 163500)	18.75	13.73	16.22	11.36
ESR 29 – 34 (595500, 162500)	13.75	10.40	15.21	9.88
2026 Opening/Future Year				
ESR 1–6 & PR 1 & 2 (591500, 162500)	11.92	9.11	13.70	9.22
ESR 7 – 11 (590500, 162500)	13.01	9.87	14.16	9.65
ESR 12 & 13 (590500, 163500)	16.44	12.19	14.78	10.21
ESR 14–21 & 26-28 (592500, 163500)	12.84	9.75	14.60	9.73
ESR 22 -25 (591500, 163500)	14.82	11.11	14.98	10.40
ESR 29 – 34 (595500, 162500)	10.78	8.31	14.02	8.96

4.3 Modelled Baseline Concentrations at Existing Sensitive Receptors

4.3.1 The baseline assessment (i.e. scenarios 1 and 2) has been carried out for the existing sensitive receptors considered, in accordance with Defra guidance (i.e. using EFT v11.0). The adjusted NO_2 and unadjusted PM_{10} and $PM_{2.5}$ concentrations are detailed in Table 6.

Table 6: Predicted Adjusted NO_2 and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2

Receptor	Calculated Annual Mean Concentrations (µg/m^3)					
	Scenario 1: 2019 Base Year			Scenario 2: 2026 Opening/Future Year, Without Development (including committed developments)		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
ESR 1	17.39	15.31	10.40	12.30	14.13	9.46
ESR 2	15.62	15.15	10.31	11.37	13.96	9.37
ESR 3	14.34	15.08	10.27	10.71	13.90	9.33
ESR 4	13.78	15.02	10.23	10.41	13.84	9.30
ESR 5	15.39	15.14	10.30	11.29	13.96	9.36
ESR 6	14.92	15.12	10.29	11.03	13.94	9.35
ESR 7	15.35	15.52	10.68	11.48	14.31	9.74
ESR 8	17.61	15.72	10.80	12.68	14.52	9.85
ESR 9	19.19	15.74	10.81	13.48	14.52	9.86
ESR 10	21.74	15.93	10.92	14.86	14.71	9.96
ESR 11	29.41	16.28	11.14	18.95	15.04	10.15
ESR 12	21.17	16.45	11.43	15.33	15.20	10.44
ESR 13	18.78	16.26	11.32	14.11	15.02	10.34
ESR 14	19.45	16.18	10.90	14.20	15.05	9.99
ESR 15	18.90	16.16	10.89	13.86	15.02	9.97
ESR 16	14.52	15.96	10.76	11.22	14.78	9.84
ESR 17	15.33	16.03	10.80	11.49	14.83	9.86
ESR 18	29.21	16.66	11.19	20.22	15.61	10.30
ESR 19	15.77	16.03	10.81	11.94	14.87	9.88
ESR 20	27.46	16.55	11.12	19.11	15.49	10.24
ESR 21	22.05	16.50	11.08	15.90	15.46	10.21
ESR 22	25.42	16.80	11.71	17.76	15.62	10.76
ESR 23	31.60	17.14	11.92	21.17	15.96	10.96

Table 6: Predicted Adjusted NO_2 and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 1 and 2						
Receptor	**Calculated Annual Mean Concentrations (µg/m³)**					
	Scenario 1: 2019 Base Year			**Scenario 2: 2026 Opening/Future Year, Without Development (including committed developments)**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**	**NO_2**	**PM_{10}**	**$PM_{2.5}$**
ESR 24	21.19	16.71	11.65	15.23	15.50	10.69
ESR 25	37.49	18.00	12.40	25.18	17.02	11.53
ESR 26	26.92	16.89	11.30	18.09	15.78	10.39
ESR 27	21.11	16.43	11.04	14.79	15.29	10.11
ESR 28	13.47	15.90	10.73	10.55	14.71	9.79
ESR 29	25.36	15.92	10.30	16.81	14.81	9.40
ESR 30	15.94	15.46	10.03	11.39	14.29	9.11
ESR 31	29.24	16.15	10.43	19.11	15.06	9.54
ESR 32	19.38	15.63	10.13	13.42	14.49	9.22
ESR 33	24.00	15.84	10.25	16.27	14.73	9.35
ESR 34	15.36	15.46	10.03	11.29	14.32	9.12
NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[8] in accordance with LAQM.TG(16)						

4.3.2 The results show that all predicted NO_2 PM_{10} and $PM_{2.5}$ are below the relevant objectives and limit values in both the 2019 and 2026 scenarios.

[8] 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 The proposed development site is currently open land and there are no demolition activities proposed within the site. Therefore, demolition is not considered further within the construction phase assessment.

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 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 resuspended 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 (as applicable).

5.1.7 For earthworks and construction, there are currently between 10 and 100 receptors (a mix of residential and commercial) within 100m 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 purpose 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 7.

Summary of Step 2

5.1.12 Table 7 details the results of Step 2 of the construction phase assessment for human receptors.

Table 7: Construction Phase Dust Assessment for Human Receptors

	Activity			
	Demolition	**Earthworks**	**Construction**	**Trackout**
Step 2A				
Dust Emission Magnitude	N/A	Large[a]	Large[b]	Medium[c]
Step 2B				
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[d]	Low[d]	Low[d]
Step 2C				
Dust Risk: Dust Soiling	N/A	Medium Risk	Medium Risk	Medium Risk
Dust Risk: Human Health	N/A	Low Risk	Low Risk	Low Risk

Table 7: Construction Phase Dust Assessment for Human Receptors				
	Activity			
	Demolition	Earthworks	Construction	Trackout
a. Total site area estimated to be over 10,000m^2 *b. Total building volume estimated to be over 100,000m^3, with potentially dusty construction materials* *c. Number of construction phase vehicles estimated to be between 10 and 50 movements per day* *d. Background annual mean PM_{10} concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid square for 2022*				

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.

5.1.16 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 to be in use continuously;
- 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.

5.1.17 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 SBC on request.

5.1.18 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

5.1.19 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.

5.1.20 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 34) using EFT v11.0.

5.2.2 Table 8 details the predicted NO_2 concentrations for the 2026 Opening/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**.

Table 8: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0

Receptor	Calculated Annual Mean NO_2 Concentrations (µg/m^3)[a]				
	Without Development, but including committed developments	With Development and committed developments		Concentration Change as Percentage of AQAL	Impact[b]
		Concentration	Percentage in Relation to AQAL		
ESR 1	12.30	12.38	<75%	<0.5%	**Negligible**
ESR 2	11.37	11.47	<75%	<0.5%	**Negligible**
ESR 3	10.71	10.76	<75%	<0.5%	**Negligible**
ESR 4	10.41	10.44	<75%	<0.5%	**Negligible**
ESR 5	11.29	11.33	<75%	<0.5%	**Negligible**
ESR 6	11.03	11.07	<75%	<0.5%	**Negligible**
ESR 7	11.48	11.54	<75%	<0.5%	**Negligible**
ESR 8	12.68	12.79	<75%	<0.5%	**Negligible**
ESR 9	13.48	13.57	<75%	<0.5%	**Negligible**
ESR 10	14.86	14.91	<75%	<0.5%	**Negligible**
ESR 11	18.95	18.99	<75%	<0.5%	**Negligible**
ESR 12	15.33	15.43	<75%	<0.5%	**Negligible**
ESR 13	14.11	14.17	<75%	<0.5%	**Negligible**
ESR 14	14.20	14.21	<75%	<0.5%	**Negligible**
ESR 15	13.86	13.89	<75%	<0.5%	**Negligible**
ESR 16	11.22	11.23	<75%	<0.5%	**Negligible**
ESR 17	11.49	11.52	<75%	<0.5%	**Negligible**

Table 8: Predicted Adjusted NO_2 Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0

Receptor	Calculated Annual Mean NO_2 Concentrations (µg/m^3)[a]				
	Without Development, but including committed developments	With Development and committed developments		Concentration Change as Percentage of AQAL	Impact[b]
		Concentration	Percentage in Relation to AQAL		
ESR 18	20.22	20.25	<75%	<0.5%	**Negligible**
ESR 19	11.94	11.95	<75%	<0.5%	**Negligible**
ESR 20	19.11	19.12	<75%	<0.5%	**Negligible**
ESR 21	15.90	15.91	<75%	<0.5%	**Negligible**
ESR 22	17.76	17.79	<75%	<0.5%	**Negligible**
ESR 23	21.17	21.23	<75%	<0.5%	**Negligible**
ESR 24	15.23	15.27	<75%	<0.5%	**Negligible**
ESR 25	25.18	25.18	<75%	<0.5%	**Negligible**
ESR 26	18.09	18.13	<75%	<0.5%	**Negligible**
ESR 27	14.79	14.81	<75%	<0.5%	**Negligible**
ESR 28	10.55	10.56	<75%	<0.5%	**Negligible**
ESR 29	16.81	16.85	<75%	<0.5%	**Negligible**
ESR 30	11.39	11.40	<75%	<0.5%	**Negligible**
ESR 31	19.11	19.16	<75%	<0.5%	**Negligible**
ESR 32	13.42	13.44	<75%	<0.5%	**Negligible**
ESR 33	16.27	16.30	<75%	<0.5%	**Negligible**
ESR 34	11.29	11.30	<75%	<0.5%	**Negligible**

a. NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator, in accordance with LAQM.TG(16)
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 9 details the PM_{10} concentrations for the 2026 Opening/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 9: Predicted Adjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean PM_{10}Concentrations (µg/m^3)**				
	Without Development, but including committed developments	**With Development and committed developments**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 1	14.13	14.14	<75%	<0.5%	**Negligible**
ESR 2	13.96	13.97	<75%	<0.5%	**Negligible**
ESR 3	13.90	13.91	<75%	<0.5%	**Negligible**
ESR 4	13.84	13.84	<75%	<0.5%	**Negligible**
ESR 5	13.96	13.96	<75%	<0.5%	**Negligible**
ESR 6	13.94	13.95	<75%	<0.5%	**Negligible**
ESR 7	14.31	14.32	<75%	<0.5%	**Negligible**
ESR 8	14.52	14.53	<75%	<0.5%	**Negligible**
ESR 9	14.52	14.53	<75%	<0.5%	**Negligible**
ESR 10	14.71	14.72	<75%	<0.5%	**Negligible**
ESR 11	15.04	15.04	<75%	<0.5%	**Negligible**
ESR 12	15.20	15.22	<75%	<0.5%	**Negligible**
ESR 13	15.02	15.03	<75%	<0.5%	**Negligible**
ESR 14	15.05	15.05	<75%	<0.5%	**Negligible**
ESR 15	15.02	15.03	<75%	<0.5%	**Negligible**
ESR 16	14.78	14.79	<75%	<0.5%	**Negligible**
ESR 17	14.83	14.83	<75%	<0.5%	**Negligible**
ESR 18	15.61	15.61	<75%	<0.5%	**Negligible**
ESR 19	14.87	14.87	<75%	<0.5%	**Negligible**
ESR 20	15.49	15.49	<75%	<0.5%	**Negligible**
ESR 21	15.46	15.46	<75%	<0.5%	**Negligible**
ESR 22	15.62	15.62	<75%	<0.5%	**Negligible**
ESR 23	15.96	15.97	<75%	<0.5%	**Negligible**
ESR 24	15.50	15.50	<75%	<0.5%	**Negligible**
ESR 25	17.02	17.02	<75%	<0.5%	**Negligible**

Table 9: Predicted Adjusted PM_{10} Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean PM_{10}Concentrations (µg/m³)**				
	Without Development, but including committed developments	**With Development and committed developments**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 26	15.78	15.79	<75%	<0.5%	**Negligible**
ESR 27	15.29	15.29	<75%	<0.5%	**Negligible**
ESR 28	14.71	14.71	<75%	<0.5%	**Negligible**
ESR 29	14.81	14.81	<75%	<0.5%	**Negligible**
ESR 30	14.29	14.29	<75%	<0.5%	**Negligible**
ESR 31	15.06	15.07	<75%	<0.5%	**Negligible**
ESR 32	14.49	14.49	<75%	<0.5%	**Negligible**
ESR 33	14.73	14.73	<75%	<0.5%	**Negligible**
ESR 34	14.32	14.32	<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 10 details the $PM_{2.5}$ concentrations for the 2026 Opening/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 10: Predicted Adjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)**				
	Without Development, but including committed developments	**With Development and committed developments**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 1	9.46	9.46	<75%	<0.5%	**Negligible**
ESR 2	9.37	9.37	<75%	<0.5%	**Negligible**
ESR 3	9.33	9.34	<75%	<0.5%	**Negligible**
ESR 4	9.30	9.30	<75%	<0.5%	**Negligible**
ESR 5	9.36	9.37	<75%	<0.5%	**Negligible**

Table 10: Predicted Adjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)				
	Without Development, but including committed developments	With Development and committed developments		Concentration Change as Percentage of AQAL	Impact[a]
		Concentration	Percentage in Relation to AQAL		
ESR 6	9.35	9.36	<75%	<0.5%	**Negligible**
ESR 7	9.74	9.74	<75%	<0.5%	**Negligible**
ESR 8	9.85	9.86	<75%	<0.5%	**Negligible**
ESR 9	9.86	9.86	<75%	<0.5%	**Negligible**
ESR 10	9.96	9.96	<75%	<0.5%	**Negligible**
ESR 11	10.15	10.15	<75%	<0.5%	**Negligible**
ESR 12	10.44	10.45	<75%	<0.5%	**Negligible**
ESR 13	10.34	10.34	<75%	<0.5%	**Negligible**
ESR 14	9.99	9.99	<75%	<0.5%	**Negligible**
ESR 15	9.97	9.97	<75%	<0.5%	**Negligible**
ESR 16	9.84	9.84	<75%	<0.5%	**Negligible**
ESR 17	9.86	9.86	<75%	<0.5%	**Negligible**
ESR 18	10.30	10.31	<75%	<0.5%	**Negligible**
ESR 19	9.88	9.88	<75%	<0.5%	**Negligible**
ESR 20	10.24	10.24	<75%	<0.5%	**Negligible**
ESR 21	10.21	10.21	<75%	<0.5%	**Negligible**
ESR 22	10.76	10.76	<75%	<0.5%	**Negligible**
ESR 23	10.96	10.96	<75%	<0.5%	**Negligible**
ESR 24	10.69	10.69	<75%	<0.5%	**Negligible**
ESR 25	11.53	11.53	<75%	<0.5%	**Negligible**
ESR 26	10.39	10.39	<75%	<0.5%	**Negligible**
ESR 27	10.11	10.11	<75%	<0.5%	**Negligible**
ESR 28	9.79	9.79	<75%	<0.5%	**Negligible**
ESR 29	9.40	9.40	<75%	<0.5%	**Negligible**
ESR 30	9.11	9.11	<75%	<0.5%	**Negligible**

Table 10: Predicted Adjusted $PM_{2.5}$ Concentrations at Existing Sensitive Receptors for Scenarios 2 and 3 – Using the Emission Factor Toolkit v11.0					
Receptor	**Calculated Annual Mean $PM_{2.5}$ Concentrations (µg/m³)**				
	Without Development, but including committed developments	**With Development and committed developments**		**Concentration Change as Percentage of AQAL**	**Impact[a]**
		Concentration	**Percentage in Relation to AQAL**		
ESR 31	9.54	9.54	<75%	<0.5%	**Negligible**
ESR 32	9.22	9.22	<75%	<0.5%	**Negligible**
ESR 33	9.35	9.36	<75%	<0.5%	**Negligible**
ESR 34	9.12	9.12	<75%	<0.5%	**Negligible**
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					

5.2.5 The results of the assessment show that all predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations, in all scenarios considered, are below the relevant objectives and limit values.

Proposed Sensitive Human Receptors

5.2.6 Pollutant concentrations have been modelled for proposed receptors for the 2026 Opening/Future Year 'With Development' scenario, in accordance with Defra guidance (i.e. using EFT v11.0), as detailed in Table 11.

Table 11: Predicted Adjusted NO_2, and Unadjusted PM_{10} and $PM_{2.5}$ Concentrations at Proposed Sensitive Receptors for Scenario 3 – Using Emission Factor Toolkit v11.0			
Proposed Receptor	**Calculated Annual Mean Concentrations (µg/m³)**		
	NO_2	**PM_{10}**	**$PM_{2.5}$**
PR 1	11.29	13.98	9.38
PR 2	9.67	13.77	9.26

Assessment of Significance for Human Receptors

5.2.7 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**.

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

- Baseline pollutant concentrations in 2019 and 2026 are below the relevant annual mean objectives and limit values at all existing receptors considered;
- The assessment predicts a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all existing sensitive receptors considered, with the development in place; and
- NO_2, PM_{10} and $PM_{2.5}$ concentrations within the proposed development site are predicted to be below the relevant objectives and limit values.

5.2.9 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**.

5.3 Emissions Mitigation Assessment

5.3.1 The Swale Borough Council's Air Quality and Planning Technical Guidance (2021) document classifies the proposed development as a 'major' development. In accordance with this document, any proposed development classed as major requires an emissions mitigation (damage cost) assessment to be 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[9] (March, 2021), which includes updated damage cost values for both NO_X and $PM_{2.5}$. The total number of trips in a 24-hour period, generated by the proposed development, is included within the damage cost assessment to determine 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

[9] Defra Air Quality Appraisal: Damage Cost Guidance, available at https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance

development. Full operation of the development is assumed in the opening year.

5.3.4 As a worst-case approach, the trip generation associated with the proposed development at **full occupation** has been used in the damage cost calculation. The total trip generation for the proposed development in a 24-hour period is 676 vehicles with 1.1% HDV.

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_x and particulate matter (PM) emissions, as these are the major pollutants associated with road traffic emissions. Appendix A of the Defra guidance gives a road transport sector estimated central cost of £81,518/tonne for $PM_{2.5}$. For NO_x, the Defra guidance gives a road transport sector central cost of £9,066/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 12.

Table 12: EFT Output (tonnes/annum)

Year	NO_x	$PM_{2.5}$
2026	0.381136	0.044132
2027	0.341348	0.043956
2028	0.306163	0.043819
2029	0.276143	0.043705
2030	0.250926	0.043604

5.3.7 The emissions from Table 12 are then multiplied by the uplifted estimated sector costs. Table 13 details the central transport sector cost for each assessed year, beginning with the estimated development opening year of 2025.

Table 13: Calculated Cost for Each Year (£)

Year	NO_x	$PM_{2.5}$
2026	4129.50	4299.42
2027	3772.37	4367.89
2028	3451.20	4441.39

Table 13: Calculated Cost for Each Year (£)		
Year	**NO_x**	**$PM_{2.5}$**
2029	3175.06	4518.45
2030	2942.82	4598.18

5.3.8 The total damage cost of both NO_x and $PM_{2.5}$ for the proposed development over a five-year period is £39,696. In accordance with the SBC Air Quality and Planning document, it is expected that this should be used to contribute to on-site mitigation measures equivalent to the value stated above.

5.3.9 The input data for the assessed year of 2026 for the damage cost calculation can be seen in Figure 1, below.

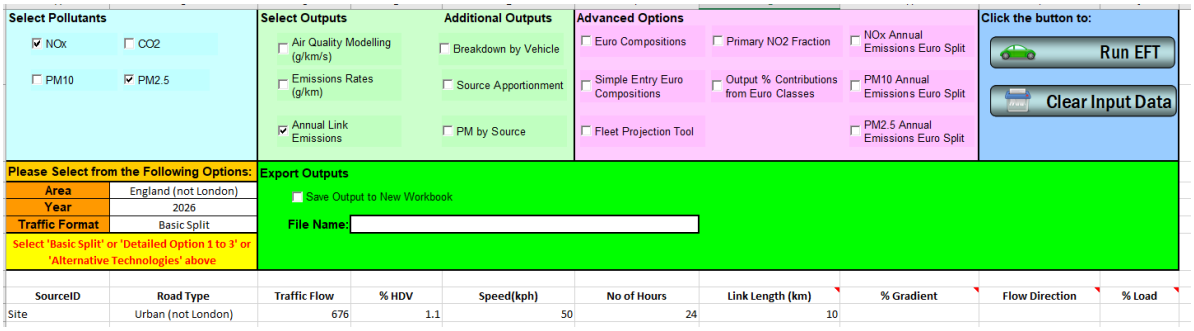


Figure 1: Damage cost Assessment inputs

5.4 Recommendations for Mitigation

5.4.1 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 and general best practice measures in relation to air quality could be implemented. SBC's Air Quality and Planning Technical Guidance stipulates these should include electric vehicle (EV) charging points and low NO_x boilers as a minimum.

5.4.2 The development will therefore include:

- All gas fired boilers to meet a minimum standard of <40mgNO_x/kWh
- 1 active Electric Vehicle charging point per dwelling with dedicated parking

5.4.3 In addition to this commitment, the result of the damage cost calculation shows the total damage cost of both NO_x and $PM_{2.5}$ emissions for the proposed development over a five-year period is £39,696, based on a projected total new vehicle trip generation of 676 vehicles (expressed as AADT). The Technical Guidance document suggests that the value determined by the damage cost calculation (£39,696) should

be utilised on additional mitigation measures equivalent to this value and should focus on mitigating elevations in NO_2 and $PM_{2.5}$ concentrations.

5.4.4 SBC is working with 'HiyaCar' to implement a private car club scheme in Faversham. The applicant proposes to provide a financial contribution secured by legal agreement to cover the cost of 3 fully serviced EVs for a similar scheme associated with this development, which will be operated by 'HiyaCar' or a similar Collaborative Mobility UK (CoMoUK) regulated operator. The cost of this has been quoted at £36,540 (see **Appendix E**) and it is proposed that the remainder of the value determined by the damage cost calculation (£3,156) will be used to contribute towards the EV car club hardstanding/parking spaces and charging infrastructure.

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 matter 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 thirty-four existing sensitive human receptors. The assessment includes receptors within the AQMAs No.3 and No.5.

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 2026, with the development in place, are below the relevant annual mean objectives and limit values at all of the receptors considered.

6.2.4 The assessment predicts that the development will have a negligible impact on concentrations of NO_2, PM_{10} and $PM_{2.5}$ at all thirty-four existing sensitive receptors considered in 2026. The effect of the proposed development on human receptors is therefore considered to be **not significant.**

Emissions Mitigation Assessment

6.2.5 The Swale Borough Council's Air Quality and Planning Technical Guidance (2021) document requires that an emissions mitigation (damage cost) assessment is undertaken for the proposed development. The damage cost calculation uses the central damage cost values for road transport which have been applied to the 2026 opening year of the proposed development onwards, for a total of five years, in accordance with Defra guidance.

Recommendations for Mitigation

6.2.6 The impact of the proposed development is predicted to be not significant. However,

mitigation measures will assist in reducing any potential impact and general best practice measures in relation to air quality could be implemented.

6.2.7 The value obtained from the emissions mitigation assessment (£39,696) will be used to mitigate elevations in NO_2 and $PM_{2.5}$ concentrations, as a result of development-generated traffic. As described in Section 5.4, mitigation measures will include a financial contribution over and above the damage cost value to cover the cost of 3 fully serviced EVs, which will be operated by 'HiyaCar' or a similar Collaborative Mobility UK (CoMoUK) regulated operator. Further mitigation measures will include the provision of one active charging point per dwelling with on plot parking and low NO_x boilers throughout the proposed development. This is in accordance with SBC's Air Quality and Planning Technical Guidance.

6.3 Summary

6.3.1 The assessment demonstrates that the proposed development will not lead to an unacceptable risk from air pollution, neither will it lead to any breach of national objectives as required by national policy. It is in accordance with all relevant national policy and 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[1].

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_2), sulphur dioxide (SO_2), carbon monoxide (CO), lead (Pb), fine particulate matter (PM_{10}), benzene (C_6H_6), 1, 3–butadiene (C_4H_6) and ozone (O_3).

A.4 Objectives for each pollutant, except O_3, were first given statutory status in the Air Quality Regulations 2000[2] and Air Quality (Amendment) Regulations 2002[3]. 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[4] (i.e. the CAFE Directive), were transposed into UK legislation on 11th 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

[1] Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007
[2] The Air Quality Regulations 2000. SI No 928
[3] The Air Quality (Amendment) Regulations 2002
[4] 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 $PM_{2.5}$ in England and Wales, a limit value of 25µg/m^3 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 $PM_{2.5}$ in Scotland since early 2016.

A.7 Examples of where these objectives and limit values apply are detailed in the Defra LAQM Technical Guidance document LAQM.TG(16)[5] and are included in Table A1.

Table A1: Examples of Where the Air Quality Objectives Should Apply

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
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[a]	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
15-minute mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer	

[5] Department for Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(16), April 2021

Table A1: Examples of Where the Air Quality Objectives Should Apply		
Averaging Period	**Objectives Should Apply at:**	**Objectives Should Generally Not Apply at:**
[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		

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(16) 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[6]. 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.

[6] 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 until July 2022, the same time the Newcastle-upon-Tyne CAZ will be introduced.

National Planning Policy Framework

A.15 The National Planning Policy Framework (NPPF)[7], 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)[8], most recently updated in November 2019, states that whether or not air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development

[7] Ministry of Housing, Communities and Local Government, National Planning Policy Framework, July 2021
[8] Department for Communities and Local Government. Planning Practice Guidance: Air Quality, November 2019

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.

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)[9].

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).

[9] Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, 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.

Table B1: Determining the Dust Emission Magnitude of Construction Phase Activities

Activity	Dust Emission Class		
	Large	**Medium**	**Small**
Demolition	Total building volume >50,000m^3; 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^3; Potentially dusty construction material; Demolition activities 10-20m above ground level	Total building volume <20,000m^3; Construction material with low potential for dust release (e.g. metal cladding or timber)
Earthworks	Total site area >10,000m^2; Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size); >10 heavy earth moving vehicles active at any one time; Formation of bunds >8m in height; Total material moved >100,000 tonnes	Total site area 2,500-10,000m^2; Moderately dusty soil type (e.g. silt); 5-10 heavy earth moving vehicles active at any one time; Formation of bunds 4-8m in height; Total material moved 20,000-100,000 tonnes	Total site area <2,500m^2; Soil type with large grain size (e.g. sand); <5 heavy earth moving vehicles active at any one time; Formation of bunds <4m in height; Total material moved <20,000 tonnes; Earthworks during wetter months
Construction	Total building volume >100,000m^3; On-site concrete batching; Sandblasting	Total building volume 25,000-100,000m^3; Potentially dusty construction material (e.g. concrete); On-site batching	Total building volume <25,000m^3; Construction material with a low potential for dust release (e.g. metal cladding or timber)
Trackout	>50 HDV (>3.5t) outward movements[a] in any one day[b]; Potentially dusty surface material (e.g. high clay content); Unpaved road length >100m	10-50 HDV (>3,5t) outward movements[a] in any one day[b]; Moderately dusty surface material (e.g. high clay content); Unpaved road length 50-100m	<10 HDV (>3.5t) outward movements[a] in any one day[b]; Surface material with low potential for dust release; Unpaved road length <50m

a. A vehicle movement is a one way journey i.e. from A to B, and excludes the return journey
b. HDV movements during a construction project may vary over its lifetime, and the number of movements is the maximum not the average

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.

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects

Sensitivity Category	Dust Soiling Effects	Health effects of PM_{10}	Ecological Effects
High	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	Locations where members of the public are exposed over a period of time relevant to the air quality objective for PM_{10}; Examples include residential properties, hospitals, schools, and residential care homes	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
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; The appearance, aesthetics or value of their property could be diminished; 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	Locations where people are exposed as workers and exposure is over a period of time relevant to the air quality objective for PM_{10}; Examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}	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

Table B2: Sensitivity Categories for Dust Soiling, Human Health and Ecological Effects			
Sensitivity Category	**Dust Soiling Effects**	**Health effects of PM_{10}**	**Ecological Effects**
Low	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; Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads	Locations where human exposure is transient; Examples include public footpaths, playing fields, parks and shopping streets	Locations with a local designation where the features may be affected by dust deposition; Examples include a Local Nature Reserve with dust sensitive features

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[ab]					
Receptor Sensitivity	**Number of Receptors**	**Distance from Source (m)[c]**			
		<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[ab]							
Receptor Sensitivity	**Annual Mean PM_{10} Concentration[c]**	**Number of Receptors[d]**	**Distance from Source (m)[e]**				
			<20m	**<50m**	**<100m**	**<200m**	**<350m**
High	>32µg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32µg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>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^3 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^3
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[ab]		
Receptor Sensitivity	**Distance from the Source (m)[c]**	
	<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
- Track-out.

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.

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

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

Table B8: Risk of Dust Impacts for Track-out			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Step 3

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[10], 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.

[11] Greater London Authority, The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance, 2006

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 obtained for this project by Ashley Helme Associates, the appointed transport consultants for the project. The study extent of the model for local roads surrounding the proposed development is shown in Figure C.1.

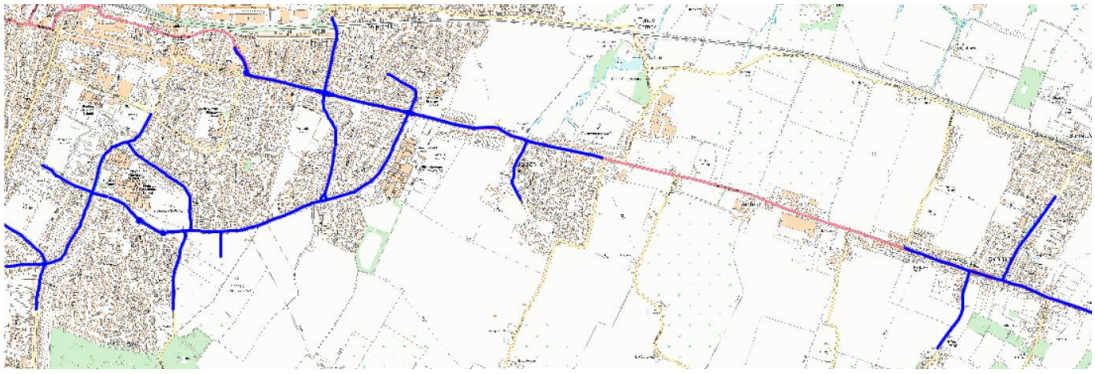


Figure C.1: Study Extent of Air Dispersion Model. The roads modelled in the assessment can be seen in blue (‘*Reproduced from Ordnance Survey Maps © Crown Copyright All Rights Reserved Licence No. 0100031673’)*

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 15kph 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 Name	Scenario 1: 2019 Verification and Base Year		Scenario 2: 2026 Opening Year, Without Development, but including Committed Developments		Scenario 3: 2026 Opening Year, With Development, including Committed Developments		Committed Development Flows	
	LGV	HGV	LGV	HGV	LGV	HGV	LGV	HGV
Swanstree Avenue (E)	7112	86	7367	89	7563	92	0	0
Site Access	0	0	0	0	668	7	0	0
Swanstree Avenue (W)	7112	86	7367	89	7839	95	0	0
Rectory Road	3671	71	3803	74	3902	76	0	0
Swanstree Avenue (E)	5170	95	5356	98	5451	100	0	0
Swanstree Avenue (W)	7096	86	7351	89	7546	92	0	0
Murston Road	8298	109	9081	120	9181	121	486	5
A2 Canterbury Road (E)	11530	620	15352	825	15352	825	3404	187
Rectory Road	5197	68	5404	71	5505	73	21	0
A2 Canterbury Road (W)	16344	752	19873	915	19873	915	2939	139
Vincent Road	2587	21	2959	24	2959	24	279	2
A2 Canterbury Road (E)	14873	668	19980	898	20073	902	4550	229
Swanstree Avenue	5128	99	6276	122	6371	123	960	23
A2 Canterbury Road (W)	11484	617	15233	819	15233	819	3329	186
Highsted Road (N)	2925	18	3030	18	3127	19	0	0
Swanstree Avenue (E)	7112	86	7367	89	7839	95	0	0
Highsted Road (S)	2860	29	2963	30	2963	30	0	0
Swanstree Avenue (W)	7293	89	7555	92	7931	96	0	0
Bell Road (N)	7867	136	8149	141	8454	146	0	0
Brenchley Road	7781	87	8061	90	8425	94	0	0
Bell Road (S)	10569	128	10948	133	11006	134	0	0
Capel Road	2026	37	2098	38	2098	38	0	0
A2 The St (Bapchild)	14521	511	16576	583	16670	587	2055	72
School Lane (Bapchild)	1138	11	1180	12	1180	12	43	0
A2 London Road (Teynham)	13511	490	15887	576	15980	580	2376	86
Lynsted Lane (Teynham)	1931	35	2042	37	2042	37	111	2
Station Road (Teynham)	3335	27	4160	34	4160	34	825	7
Gore Court Rd (N)	8956	127	9277	132	9296	132	0	0
Bell Road	9860	130	10214	135	10271	135	0	0
Woodstock Rd	8785	98	9101	101	9133	102	0	0
Park Avenue	2531	23	2622	24	2628	24	0	0

Vehicle Emission Factors

C.5 The vehicle emission factors used in this assessment are from Defra's latest Emission

Factor Toolkit (EFT v11.0)[11], 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, there are uncertainties involved with the prediction of future NO_2 concentrations. However, in accordance with the latest guidance from the IAQM, a sensitivity analysis has not been undertaken as model verification has been possible using data from later than 2016[12].

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(16) 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 included an advanced street canyon along a section of the A2 Canterbury Road, within the AQMA No.3, in order to replicate the conditions experienced at diffusion tube SW56, which is sited directly on the façade of a residential building.

Meteorological Data

C.10 The meteorological data used in the air quality modelling has been obtained from Air Pollution Services and is from the Manston recording station, covering the period

[11] Defra Local Air Quality Management webpages (https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html)

[12] 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)

between 1st January and 31st December 2019. This has complete data capture for wind and temperature.

C.11 The Manston recording station is located approximately 40km 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.

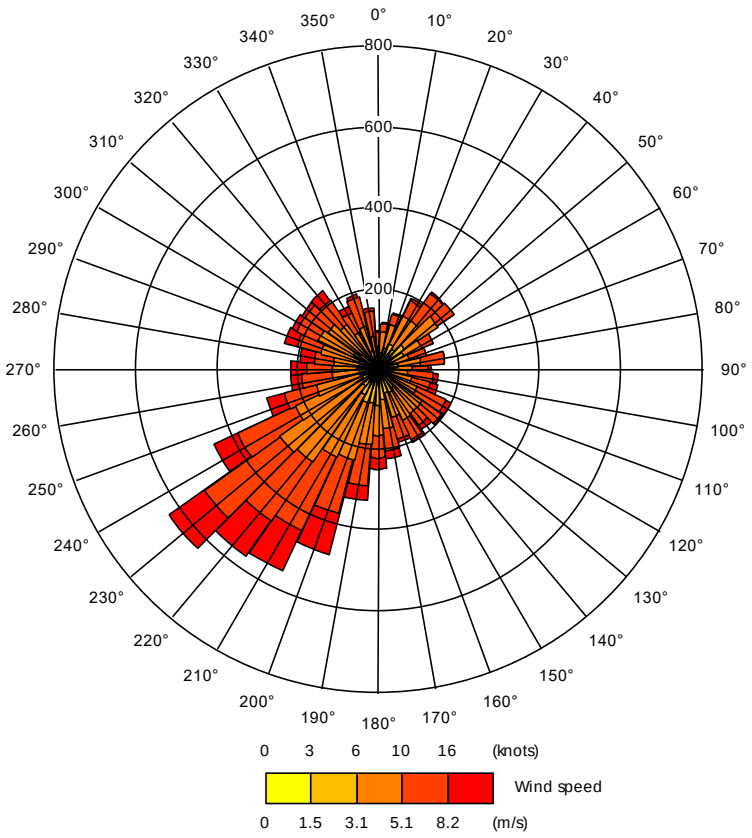


Figure C.2: 2019 Wind Rose for the Manston Meteorological Station

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	0.1m
Surface Albedo	0.23	0.23
Minimum Monin-Obukhov Length	30m	1m
Priestley-Taylor Parameter	1	1

NO_x to NO_2 Conversion

C.14 In accordance with the guidance within LAQM.TG(16), the ADMS-Roads model has been run to predict the road-contribution NO_x concentrations for each receptor location. These have then been converted to NO_2 concentrations using the Defra NO_x to NO_2 calculator[13].

Model Validation and Verification

C.15 LAQM.TG(16) 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 SBC 2021 Annual Status Report (ASR) it is understood there are several roadside air quality monitoring locations in close proximity to the proposed development site .Therefore, these diffusion tubes have been used to verify the results of the model on roads local to the proposed development.

C.18 As no PM_{10} or $PM_{2.5}$ 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_{10} or $PM_{2.5}$ concentrations.

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

C.19 The monitoring data that has been used in the model verification procedure is detailed in Table C3.

Table C3: NO_2 Monitoring Data Used for Verification Purposes

Monitoring Location Reference	Type	Approximate Grid Reference		2019 Bias Adjusted NO_2 Annual Average Concentration (µg/m³)
		Easting	Northing	
SW56	Roadside Diffusion Tube	591451	163465	37.70*
SW87	Roadside Diffusion Tube	591489	163472	30.70*
SW80	Roadside Diffusion Tube	595160	162470	32.80**
SW101	Roadside Diffusion Tube	595131	162463	22.40
* Within AQMA N0.3 ** Within AQMA No.4				

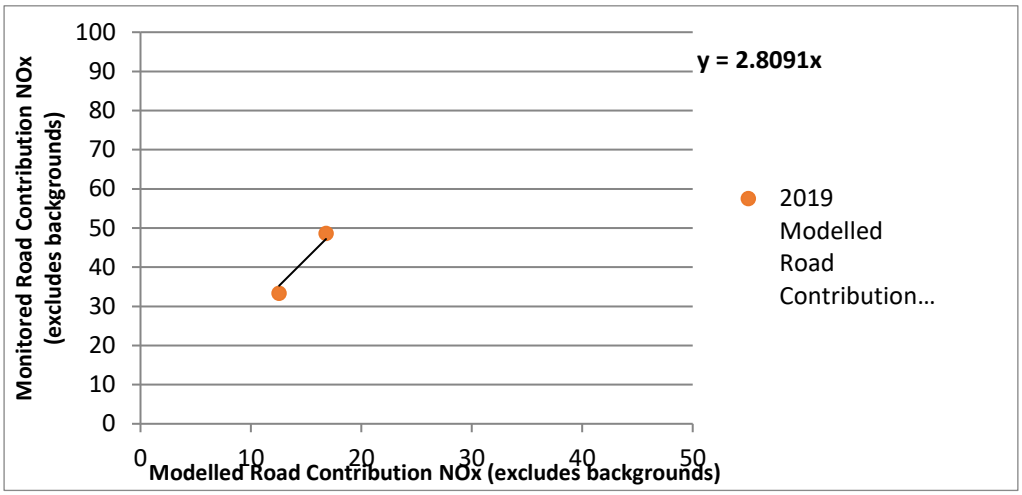
C.20 Two further diffusion tubes, SW90 and SW92, have been excluded from the air quality assessment.

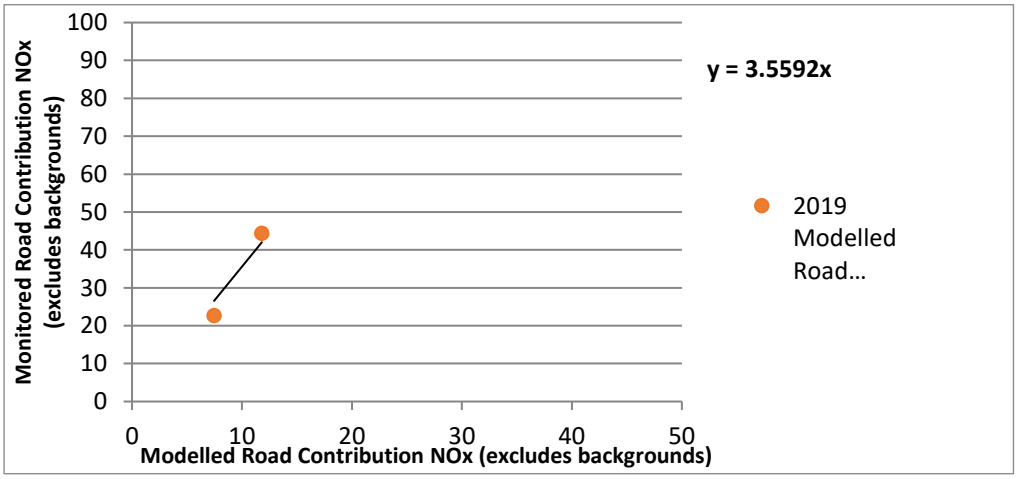
C.21 SW90 is located at a junction for which traffic data for all roads of the junction is not available. Therefore, including the diffusion tube in the model verification procedure led to the model drastically under predicting pollutant NO2 concentrations at this location. This then subsequently resulted in an overly high verification factor which artificially inflates the results of the model.

C.22 SW92 is sited directly adjacent to a bus stop and is therefore subject to elevated levels of pollution from buses using the bus stop. LAQM.TG(16) recommends that further information is required in order to effectively replicate bus stops within any modelling assessment, including the number and frequency of buses using the bus stop, and how long buses are left to idle at the bus stop. This information is difficult to obtain and was not available for consideration as part of this assessment. Given this, and the large number of other diffusion tubes available for use in the assessment, SW92 has not been used within the model verification procedure.

C.23 The modelled road-contribution NO_x concentration for the diffusion tubes have been compared against the measured road-contribution NO_x concentrations for the same locations. The measured concentrations have been derived using the Defra NO_x to NO_2 calculator, taking into account the background NO_x concentration for the local area.

C.24 The comparison is shown in the below graphs. The equation of the trend line is based on linear regression through zero, which provides an overall adjustment factor of 2.8091 for the roads within and around the AQMA No.3 and 3.5592 for roads within and around the AQMA No.5 .





C.25 This adjustment factor has been applied to the modelled road-contribution NO_x concentrations as described above. The total NO_2 concentrations have been derived by combining the adjusted road-contribution NO_x concentration and background NO_2 concentration, using the Defra NO_x to NO_2 calculator.

C.26 A final comparison has been made between the total measured NO_2 concentrations and total modelled NO_2 concentrations, as shown in Table C4. Following adjustment, modelled concentrations are within 10% of measured concentrations.

Table C4: Comparison Between Measured and Monitored NO_2 Concentrations			
Monitoring Location Reference	**Measured Total NO_2 Concentration ($\mu g/m^3$)**	**Modelled Total NO_2 Concentration ($\mu g/m^3$)**	**Difference (%)**
SW56	37.70	37.06	-1.70
SW87	30.70	31.61	2.96
SW80	32.80	31.69	-3.38
SW101	22.40	24.31	8.53

C.27 A Root Mean Square Error (RMSE) calculation has been undertaken as part of the model verification for NO_2 concentrations. This has been carried out for the monitoring location included within the model verification, in accordance with the guidance detailed in LAQM.TG(16).

C.28 The RMSE calculation following adjustment is detailed in Table C5 and C6 for both verifcation factors used within the assessment.

Table C5: RMSE Calculation for Nitrogen Dioxide Concentrations				
Diffusion Tube Location	**After Verification**			
	Observed Value	**Predicted Value**	**Difference**	**RMSE**
SW56	37.70	37.06	0.64	**0.79**
SW87	30.70	31.61	-0.91	

Table C6: RMSE Calculation for Nitrogen Dioxide Concentrations				
Diffusion Tube Location	**After Verification**			
	Observed Value	**Predicted Value**	**Difference**	**RMSE**
SW80	32.80	31.69	1.11	**1.56**
SW101	22.40	24.31	-1.91	

C.29 LAQM.TG(16) states that *"ideally an RMSE value within 10% of the objective would be derived"*, although 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$\mu g/m^3$) of the objective (i.e. 40$\mu g/m^3$). Therefore, the model is considered to be performing to an acceptable standard.

Assessment Criteria

Assessing the Impact of a Proposed Development on Human Receptors

C.30 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM[14] with relation to the assessment of the air quality impacts of proposed developments and their significance.

C.31 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.32 The impact descriptors for individual receptors are detailed in Table C5.

Table C5: Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year*	Percentage Change in Concentration Relative to Air Quality Assessment Level (AQAL)*			
	1%	2-5%	6-10%	>10
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^3) should be described as Negligible*

Determining the Significance of Effects

C.33 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.34 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:

[14] Moorcroft and Barrowcliffe et al, Land-Use Planning and Development Control: Planning for Air Quality (v1.2), January 2017

- 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: Email Quote for the Provision of a Fully Managed 3 EV Car Club Service for the Residents of Sittingbourne

Stiles, Rachael

From: Keith Stark <keith.stark@hiyacar.co.uk>
Sent: 18 July 2022 16:57
To: John MacKenzie
Cc: Steve Barker; Oliver Lloyd; Joshua Cornes
Subject: RE: Providing a EV car club scheme for development in Sittingbourne

Good Afternoon John,

Thank-you for getting in touch regarding providing car club services for your development in Sittingbourne.

As promised please find below an outline commercial proposal for providing a fully managed 3 Electric Vehicle car club service for the new residents of Sittingbourne.

Hiyacar would provide everything you need to get your car club up and running and would include:

- Installing 'Quickstart' keyless technology into the cars.
- List the cars on the state of the art Hiyacar booking platform.
- Provide free membership to all residents.
- Complete all membership security & driver verification checks.
- Provide all back office administrative & accounting functions.
- Provide industry leading car sharing insurance (charged against each booking).
- Provide the most secure vehicle access through facial recognition.
- Detailed management information on the use of the cars.
- 24/7 driver support delivered by Hiyacar customer support team.
- Cleaning the vehicles twice monthly.
- Branding the vehicles in development livery.
- Marketing the service to the residents in the development & surrounding area.

There would be no requirement for Gladman or the developer to be involved in any aspect of the day-to-day running of the car club service that would all be taken care of by the Hiyacar team.

It would be Hiyacar's intention to provide a self-supporting car club service at the end of a 3-year contract. In order to achieve this, we would request that Gladman/Developer covers 80% of the costs of the service for the first year, 50% for the second year and 10% of the cost for the third year. The table below details the total costs to provide the service:

Costs for providing Fully serviced EV car club (3 cars) for 3 years	
Component	**Total 3 year cost to Developer**
Car (EV)	£25,200.00
Cleaning	£2,520.00
Software License	£2,520.00
Branding	£1,260.00
Installation Costs	£2,520.00
Marketing	£2,520.00

1

	£36,540.00

I hope that this is of interest and please do not hesitate to contact me if you have any questions or would like any further information.

Many Thanks,

Keith

—

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Keith Stark
Business Development Lead

07498 184070
keith.stark@hiyacar.co.uk
www.hiyacar.co.uk

Appendix E: 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:

Paul Threlfall **Principal Environmental**
BSc (Hons), MSc **Scientist (Air Quality & Odour)**

Paul joined Wardell Armstrong in October 2017 as an Air Quality Scientist, after completing his MSc Water, Energy and the Environment at Liverpool John Moores University. The majority of his work is carried out in support of planning applications and, therefore, he has experience of undertaking air quality assessments for a wide range of projects including residential developments, commercial developments and mixed-use developments. Paul has a good range of skills and knowledge of air quality modelling and monitoring through his involvement in air quality projects, both as individual commissions and as part of Environmental Impact Assessments (EIAs). Paul also has extensive knowledge and experience of undertaking odour assessments, ranging from qualitative desk-based assessments to more detailed odour dispersion modelling assessments using AERMOD, as well as extensive experience of undertaking odour 'sniff test' observations.

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 also regularly acts as expert witness in planning inquiries in respect of noise, air quality and odour.

DRAWINGS

KEY

- Site Boundary
- Existing Sensitive Receptors
- Proposed Sensitive Receptors

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

GLADMAN DEVELOPMENTS LTD

PROJECT

SWANSTREE AVENUE, SITTINGBOURNE

DRAWING TITLE

EXISTING AND PROPOSED SENSITIVE RECEPTORS

DRG No.	REV
GM11657-001	A

DRG SIZE	SCALE	DATE
A3	1:20,000	28/09/2021

DRAWN BY	CHECKED BY	APPROVED BY
EF	PT	MD

wardell armstrong

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