Blackthorn Farm, Culverstone Green

Air Quality Assessment

Esquire Developments Ltd

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Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Esquire Developments Ltd to undertake an air quality assessment to support an "*outline application for up to 100 dwellings with all matters reserved except for access from South Street*" (the 'Proposed Development') at Blackthorn Farm, Culverstone Green, Gravesham (the 'Site').

The Site is located at the approximate National Grid Reference (NGR): x563760, y163420 within Gravesham Borough Council's (GBC – the 'Council') administrative area, and is bounded by:

- A collection of residential dwellings and commercial properties to the north, with Heron Hill Lane and agricultural land beyond;
- Round Wood Ancient Woodland (AW) and Wilson's Way to the east with residential dwellings beyond;
- A mixture of residential dwellings and woodland to the south; and
- The A227 South Street to the west, with residential dwellings beyond.

Vehicular access to the Site will be via a new entrance off the A227 South Street to the west.

1.1 Scope of Assessment

Pre-assessment consultation with the Environmental Health Officer at GBC[1] was undertaken to agree upon the extent and methodology of the air quality assessment. The following agreed scope of works has been undertaken:

- Baseline Evaluation;
- Construction Phase Assessment;
- Operational Phase Assessment; and
- Mitigation Measures.

[1] Email Correspondence between SLR Consulting and Julie Oates, Gravesham Borough Council Senior Environmental Health Officer, sent 26/03/35 and response received 27/03/2025.

2.0 Background Context

2.1 Legislation

A dual set of regulations, separately applicable to National and Local Government, are currently operable within the UK.

2.1.1 National Obligations

The Air Quality Standards Regulations 2010[2] (AQSR) transpose both the EU Ambient Air Quality Directive (2008/50/EC), and the Fourth Daughter Directive (2004/107/EC) within UK legislation. The AQSR includes Limit Values which are legally binding ambient concentration thresholds which, however, are only applicable at specific locations (Schedule 1: AQSR)[3].

Following the UK's withdrawal from the EU, the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[4] was introduced to mirror revisions to supporting EU legislation. As a result, the fine particulate matter ($PM_{2.5}$) Limit Value was reduced to 20µg/m^3 (to be met by 2020).

The responsibility of achieving the AQSR is a National obligation for Central Government who undertake assessments on an annual basis. Local Authorities have no statutory obligation to achieve the AQSR or the European equivalent Directives, unless otherwise instructed to assist Central Government under Ministerial Direction.

2.1.1.1 Environmental Targets (Fine Particulate Matter) Regulations

The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023[5] introduced an annual mean concentration target of 10µg/m^3 to be met across England by 2040. Central Government is responsible for meeting this future target, whereas Local Authorities have no statutory obligation to achieve this target.

2.1.2 Local Obligations

Part IV of the Environment Act 1995 (as amended by the Environment Act 2021) requires the Secretary of State to review the national Air Quality Strategy (AQS) every five years and modify this if necessary. It also established the system of Local Air Quality Management (LAQM) for Local Authorities to regularly review and assess air quality within their respective administrative areas.

The Air Quality (England) Regulations 2000 (as amended) provide the statutory basis for the Air Quality Objectives Local Authorities must adhere to under LAQM in England. $PM_{2.5}$ is not currently part of the LAQM framework; however, as per the national AQS, Local Authorities are required to work towards reducing $PM_{2.5}$.

The Air Quality Objectives apply at locations where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period (referred to as 'relevant exposure'). Table 2-2 provides an indication of those locations. Where any of the prescribed Air Quality Objectives are not likely to be achieved, the authority must designate an Air Quality Management Area

[2] The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.
[3] Schedule 1 of the 2010 AQSR provides the locations of the sampling points where the AQSR Limits Values can be assessed.
[4] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020, Statutory Instrument No. 1313, The Stationary Office Limited.
[5] The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023. UK Statutory Instruments 2023 No. 96.

(AQMA). For each AQMA, the local authority is required to prepare an Air Quality Action Plan (AQAP), which details measures the authority intends to introduce to deliver improvements in local air quality and achieve compliance.

The latest AQS for England was published in 2023[6]. The AQS provides the delivery framework for air quality management across England for local authorities and summarises the air quality standards and objectives operable within England for the protection of public health and the environment.

The ambient air quality standards of relevance to this assessment (collectively termed Air Quality Assessment Levels (AQALs) throughout this report) are provided in Table 2-1. These are primarily based upon the Air Quality Objectives Local Authorities are responsible for achieving. The $PM_{2.5}$ AQSR AQAL has also been included for completeness.

Table 2-1: Relevant Ambient AQALs (England)

Pollutant	AQAL (µg/m^3)	Averaging Period
Nitrogen dioxide (NO_2)	40	Annual mean
	200	1-hour mean (not to be exceeded on more than 18 occasions per annum)
Particles (as PM_{10})	40	Annual mean
	50	24-hour mean (not to be exceeded on more than 35 occasions per annum)
Particles (as $PM_{2.5}$)	20	Annual mean

Table 2-2: Human Health Relevant Exposure

AQAL Averaging Period	AQALs Should Apply At	AQALs Should Not Apply At
Annual mean	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

2.1.3 Environmental Protection Act 1990

The Environmental Protection Act 1990[7] sets out provisions for the regulation of statutory nuisances. Section 79 sets out this statutory nuisance as, ‘any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance’.

Section 79 requires that, where a complaint of a statutory nuisance is made to it by a person living within its area, a Local Authority must take steps as are reasonably practicable to investigate the complaint.

[6] Defra, Air Quality Strategy: Framework for Local Authority Delivery, April 2023.
[7] The Environmental Protection Act 1990. Available at http://www.legislation.gov.uk/ukpga/1990/43/contents.

Fractions of dust greater than 10µm (i.e. greater than PM_{10}) in diameter typically relate to nuisance effects as opposed to potential health effects and therefore are not covered within the UK AQS. In legislation there are currently no numerical limits in terms of what level of dust deposition constitutes a nuisance.

2.2 Ecological Habitats

Ecological habitats vary in terms of their sensitivity, perceived ecological value, geographic importance, and level of protection. Within the UK, there are three types of nature conservation designations: international/European, national and local designations, which are all provided environmental protection from developments, including from atmospheric emissions, with a greater level of protection afforded to the former, relative to the latter.

The Conservation of Habitats and Species Regulations 2017 (the 'Habitats Regulations')[8] introduces the precautionary principle for protected European sites, i.e. that projects can only be permitted to proceed; having ascertained that there will be no adverse effect on the integrity of the designated site. It requires an assessment to determine if significant effects (alone or in-combination) are likely, followed by an 'appropriate assessment' by the competent authority, if necessary. European sites include Special Areas of Conservation (SAC) and Special Protection Areas (SPA). These regulations were subsequently amended in 2019 to make them operable from 1 January 2021 despite the UK's withdrawal from the EU[9].

Other sites of international significance are Ramsar sites, which are wetlands protected under the 1971 Ramsar Convention[10]. Many of these sites in the UK were initially selected on the basis of their importance to waterbirds and are therefore also classified as SPAs.

The Wildlife and Country Act 1981 (as amended, primarily by The Countryside and Rights of Way (CRoW) Act 2000) provides protection to Sites of Special Scientific Interest (SSSI) to ensure that developments are not likely to cause damage.

In addition to the above, other designations (e.g. Ancient Woodland) and locally designated sites (e.g. Local Wildlife Sites) are afforded protection under national and local planning policy; including the National Planning Policy Framework (NPPF) and Local Plans respectively.

2.3 Policy

2.3.1 National Policy

2.3.1.1 Clean Air Strategy

The 2019 Clean Air Strategy[11] sets out the Government's proposals aimed at delivering cleaner air in England and indicates how devolved administrations intend to make emissions reductions. It sets out the comprehensive action that is required from across all parts of government and society to deliver clean air.

2.3.1.2 Environmental Improvement Plan 2023

The 2023 Environmental Improvement Plan[12] is the first revision of the UK Government's 25 Year Environment Plan (25YEP) – planned on a five-year rolling cycle. This document sets

[8] The Conservation of Habitats and Species Regulations 2017 Statutory Instrument 490.
[9] The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.
[10] Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat.
[11] Defra, The Clean Air Strategy, January 2019.
[12] Defra, Environmental Improvement Plan 2023, 2023.

out the 5-year delivery plan to improve the natural environment. The 2023 Environmental Improvement Plan builds on the 2019 Clean Air Strategy by setting environmental targets and commitments to reduce air pollution. Goal 2 of the 25YEP is Clean Air – which relates to improving air quality.

2.3.1.3 National Planning Policy Framework

The December 2024 update to the NPPF[13] sets out planning policy for England. The NPPF states that the planning system should contribute to and enhance the natural and local environment, by preventing new development from contributing to or being adversely affected by unacceptable concentrations of air pollution and development should, wherever possible, help to improve local environmental conditions such as air quality.

In specific relation to air quality policy, the document states:

Chapter 15 – Conserving and Enhancing the Natural Environment

> "*Para 199. Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan.*"

The NPPF is accompanied by web based supporting Planning Practice Guidance (PPG)[14] which includes guiding principles on how planning can take account of the impacts of new development on air quality. The November 2019 update details several factors that may need to be considered within an air quality assessment. Assessments and mitigation options need to be proportionate to the nature and scale of development proposed and potential impacts (taking into account existing conditions).

2.3.2 Local Policy

The Gravesham Local Plan Core Strategy[15] was adopted by GBC in September 2014. The strategy is part of the Development Plan for Gravesham and sets out the spatial vision for the Borough up to 2028. It contains the following policy of relevance to this air quality assessment:

Policy CS19 – Development and Design Principles

> "*5.15.14 New development will be visually attractive, fit for purpose and locally distinctive. It will conserve and enhance the character of the local built, historic and natural environment, integrate well with the surrounding local area and meet anti-crime standards. The design and construction of new development will incorporate sustainable construction standards and techniques, be adaptable to reflect hanging lifestyles, and be resilient to the effects of climate change. This will be achieved through the criteria set out below: […]*

[13] National Planning Policy Framework, Ministry of Housing, Communities & Local Government. December 2024.

[14] Planning Practice Guidance Air Quality, Ministry of Housing, Communities and Local Government. November 2019.

[15] Gravesham Borough Council, Gravesham Local Plan Core Strategy, adopted September 2014.

- *New development will be located, designed and constructed to:*

[…]

  - *avoid adverse environmental impacts from pollution, including noise, air, odour and light pollution, and land contamination; […]"*

2.4 Guidance

This assessment has been informed by the principles contained within the guidance documents below.

- Department for Environment, Food and Rural Affairs (Defra): Local Air Quality Management Technical Guidance (TG22) (LAQM.TG22)[16];
- Defra: COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021[17];
- Defra: Air Quality Appraisal: Damage Cost Guidance[18];
- Environmental Policy Implementation Community (EPIC) (formerly EPUK) and the Institute of Air Quality Management (IAQM): Land-Use Planning and Development Control: Planning for Air Quality[19];
- IAQM: A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites[20];
- IAQM: Guidance on the Assessment of Dust from Demolition and Construction[21];
- IAQM: Position Statement: Use of 2020 and 2021 Monitoring Datasets[22]; and
- Kent & Medway Air Quality Partnership: Air Quality Planning Guidance (AQPG)[23].

[16] Local Air Quality Management Technical Guidance (TG22), Published by Defra in partnership with the Scottish Government, Welsh Government and Department of Agriculture, Environment and Rural Affairs Northern Ireland. August 2022.
[17] Defra and the Greater London Authority, COVID-19: Supplementary Guidance. Local Air Quality Management Reporting in 2021. April 2021.
[18] Defra, Air Quality Appraisal: Damage Cost Guidance, updated 2 March 2023, available: https://www.gov.uk/government/publications/assess-the-impact-of-air-quality/air-quality-appraisal-damage-cost-guidance.
[19] EPIC (formerly EPUK) and IAQM, Land-Use Planning and Development Control: Planning for Air Quality, v1.2 2017.
[20] IAQM, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites, v1.1, 2020.
[21] IAQM, Guidance on the Assessment of Dust from Demolition and Construction, v2.2 2024.
[22] IAQM, Position Statement: Use of 2020 and 2021 Monitoring Datasets, Version 1.1, December 2023.
[23] Kent & Medway Air Quality Partnership, Air Quality Planning Guidance, December 2015.

3.0 Assessment Methodology

3.1 Development Classification

The Kent and Medway AQPG requires classification of whether the Proposed Development is 'major'.

In recognition of the scale of the Proposed Development, it is classified as a 'major' development. An air quality and emissions mitigation assessment have therefore been undertaken.

3.2 Construction Phase

The assessment has been undertaken in accordance with IAQM demolition and construction dust guidance. The assessment of risk is determined by considering the risk of dust effects arising from four activities in the absence of mitigation. The assessment will consider the potential dust impacts associated with the following activities:

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

The assessment methodology considers three separate dust impacts with account being taken of the sensitivity of the area that may experience these effects:

- Annoyance due to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

The first stage of the assessment involves a screening to determine if there are sensitive receptors within threshold distances of the Site and activities associated with the construction phase of the scheme. A detailed assessment is required where a:

- Human receptor is located within 250m of the Site boundary, and/or within 50m of routes used by construction vehicles, up to 250m from the Site entrance(s); and/or
- Ecological receptor is located within 50m of the Site boundary, and/or within 50m of routes used by construction vehicles, up to 250m from the Site entrance(s).

The dust emission class (or magnitude) for each activity is determined based on the guidance, indicative thresholds and professional judgement. The risk of dust effects arising is based upon the relationship between the dust emission magnitude and the sensitivity of the area. The risk of impact is then used to determine the appropriate mitigation requirements, whereby through effective application, residual effects are considered to be 'not significant'.

Given the short-term nature of the construction phase and the low volume of vehicle movements that will likely arise, there is not considered to be any potential for significant air quality effects from construction-generated road traffic emissions. Such potential effects have therefore been scoped out from requiring assessment based their assumed insignificant impacts.

3.3 Operational Phase

3.3.1 Road Traffic Screening Assessment

3.3.1.1 Human Receptors

The assessment of air quality effects in relation to the development's operational phase has been undertaken in accordance with EPIC & IAQM guidance.

The EPIC & IAQM guidance provides a series of indicative screening criteria where, if exceeded, further assessment is required. If the Proposed Development is found not to exceed any of the relevant indicative criteria presented, then a detailed impact assessment is consequently not required, and effects are concluded to be 'insignificant'.

The indicative screening criteria relevant for this assessment are as follows (for locations outside of an AQMA):

- A change of Light-Duty Vehicle (LDV) flows of more than 500 Annual Average Daily Traffic (AADT); and/or
- A change of Heavy-Duty Vehicle (HDV) flows of more than 100 AADT.

Traffic data used for the purposes of the screening assessment has been provided by DHA Transport – the appointed transport consultant.

3.3.1.2 Ecological Receptors

The assessment of potential air quality effects in relation to the operation of the Proposed Development on ecological receptors has been undertaken in accordance with the IAQM ecological guidance.

This initially comprises a screening assessment irrespective of current baseline rates to indicate whether:

- Any sensitive qualifying features are located within 200m of a road link projected to experience development-generated vehicle movements; and
- The Proposed Development (alone and/or in-combination with other projects and plans) is likely to generate:
  - >1,000 AADT; or
  - >200 HDV.

If the above criteria are not met, the ecological designations screen out of the assessment, and impacts are likely to be imperceptible, whereby resultant effects can be classed as insignificant.

Whilst assessing impacts on internationally designated ecological sites (e.g. SAC, SPA, Ramsar), screening has been undertaken in-combination with other projects and plans, following relevant legislation (Section 2.4). However, whilst assessing impacts on national and/or local ecological designations, it is appropriate to assess developmental trips in isolation (i.e. project alone). This is reflective of the differing level of protection afforded to international sites in comparison to national / local sites.

3.3.2 Site Suitability

A site suitability assessment is required to assess the likely exposure future occupants of the Proposed Development may experience in respect of the considered AQALs, to ensure the Site is suitable for its residential use. The scope of the site suitability assessment has been informed by the EPIC & IAQM guidance requirements, and in

relation to the Site locale considers:

- The background and future baseline air quality and whether this will be likely to approach or exceed an AQAL;
- The presence and location of any AQMAs as an indicator of local hotspots where the AQALs may be exceeded; and
- The presence of a heavily trafficked road, with emissions that could give rise to sufficiently high concentrations of pollutants (in particular NO_2), that would cause unacceptably high exposure for users of the new development.

To determine the overall significance with respect to the suitability of the Site for future occupants and likely exposure to pollutant concentrations, the EPIC & IAQM guidance states:

> "*Where the air quality is such that an air quality objective at the building façade is not met, the effect on residents or occupants will be judged as significant, unless provision is made to reduce their exposure by some means.*"

In line with this, a qualitative site suitability assessment has been undertaken, with reference to air quality data relative to the AQALs (detailed in Table 2-1), to determine whether further consideration is required or whether effects can be considered 'not significant'.

4.0 Baseline Environment

4.1 Baseline Air Quality

Pollutant concentrations monitored during 2020 and 2021 (i.e. affected by the COVID-19 pandemic) are expected to be atypical and not representative of the local environment. These have therefore not been considered for the determination of baseline conditions as per Defra guidance and an IAQM position statement, however, have been presented for completeness.

4.1.1 LAQM Review and Assessment

GBC, in fulfilment of statutory requirements, has conducted an on-going exercise to review and assess air quality within their administrative area. The most recently published 2024 Air Quality Annual Status Report (ASR)[24] has been reviewed.

GBC presently has three AQMAs – two AQMAs declared for exceedances of the annual mean NO_2 AQAL and one AQMA declared for exceedances of the annual mean NO_2 and PM_{10} AQALs at locations of relevant public exposure. The nearest AQMA – the Gravesham A2 AQMA is located approximately 7.1km north of the Site and is therefore sufficiently distant.

4.1.2 Review of Air Quality Monitoring

4.1.2.1 Automatic Air Quality Monitoring

From review of the 2024 ASR, GBC undertook automatic air quality monitoring at two locations during 2023. The nearest automatic monitor is located approximately 8.6km to the north of the Site. Due to the separation distance, this has not been considered further in this assessment.

4.1.2.2 Passive Diffusion Tube Monitoring

Passive NO_2 diffusion tube monitoring was undertaken by GBC at several locations within their administrative area during 2023 in fulfilment of their statutory LAQM obligations.

The details and results of monitoring locations of relevance to the Site (i.e. those within proximity to road links predicted to witness an increase in traffic flows as a result of the Proposed Development) are presented in Table 4-1 and Table 4-2 respectively, whilst their locations are illustrated in Figure 4-1. All monitoring data presented has been ratified by GBC.

Table 4-1: Diffusion Tube Monitoring Sites: Details

Site ID	Site Type	NGR (m)		Approximate Distance to Site (m)
		X	Y	
GR94	Roadside	564392	166012	2,525

[24] Gravesham Borough Council, 2024 Air Quality Annual Status Report (ASR), June 2024.

Table 4-2: Diffusion Tube Monitoring Sites: Results

Site ID	2023 Data Capture %	Annual Mean NO_2 Concentration (µg/m^3)				
		2019	2020	2021	2022	2023
GR94	100	36.1	27.2	25.5	26.6	23.3

As shown in Table 4-2, annual mean NO_2 concentrations were 'well below' (<75%) the AQAL (40µg/m^3) at monitor 'GR94' in 2022 and 2023. Additionally, monitor 'GR94' has shown an overall downward trend in concentrations during the period presented (2019 – 2023), as well as concentrations being consistently below the AQAL.

The empirical relationship given in LAQM.TG22 states that exceedances of the 1-hour mean AQAL for NO_2 is unlikely to occur where annual mean concentrations are <60µg/m^3. This indicates that an exceedance of the 1-hour mean AQAL was unlikely to have occurred at the above locations for the period assessed.

4.1.3 Defra Mapped Background Concentrations

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution which is routinely used to support LAQM requirements and air quality assessments. The data sets include annual average concentration estimates for NO_2, PM_{10} and $PM_{2.5}$ using a reference year of 2021 (the year in which comparisons between modelled and monitored concentrations are made).

The Defra mapped annual mean background concentrations for the base year (2023) and the predicted opening year of the development (2027) for the grid square containing the Site are presented in Table 4-3.

All of the mapped background concentrations presented are well below the respective annual mean AQALs.

Table 4-3: Defra Mapped Background Pollutant Concentrations

Grid Square (X, Y) (m)	Year	Annual Mean Concentration (µg/m^3)		
		NO_2	PM_{10}	$PM_{2.5}$
563500, 163500	2023	9.6	10.1	6.2
	2027	8.4	9.8	5.9
AQAL		***40***	***40***	***20***

4.2 Ecological Receptors

The Halling to Trottiscliffe Escarpment SSSI is located approximately 2km south of the Site. Additionally, there are several AW sites located near to the Site, as presented in Figure 4-1.

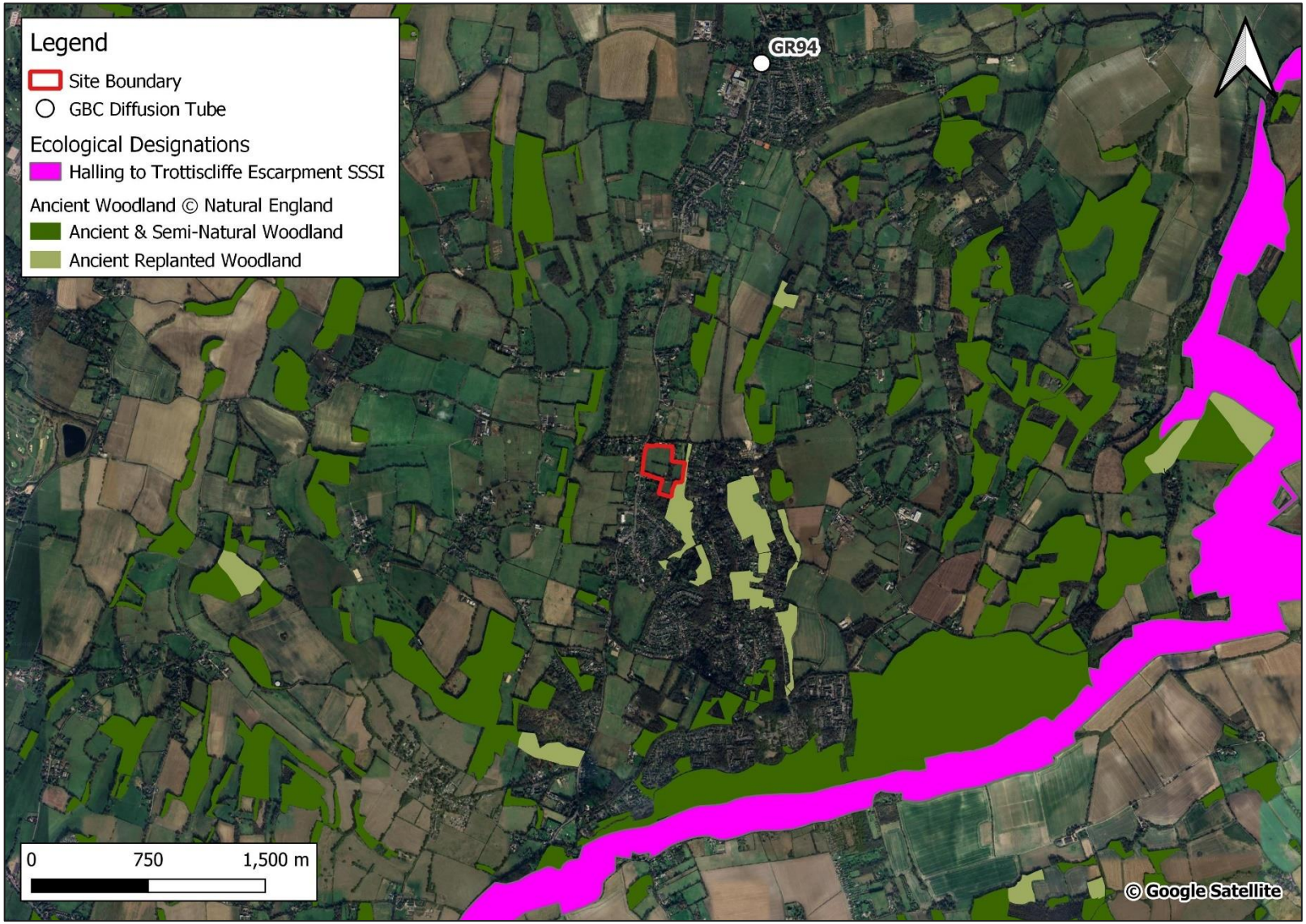


Figure 4-1: Local Monitoring Locations and Ecological Designations Relative to Site

5.0 Construction Phase Assessment

This section presents the potential air quality impacts and effects associated with the construction of the Proposed Development.

5.1 Construction Dust Assessment

Where figures relating to area of the site, volume of the site, approximate number of construction vehicles or distances to receptors are given, these relate to thresholds as defined in the IAQM guidance to guide the assessor to define the dust emissions magnitude and sensitivity of the area.

5.1.1 Assessment Screening

As shown in Figure 5-1, there are human receptors within 250m of the Site and designated ecological sites within 50m of the Site. Therefore, an assessment of construction dust on human and ecological receptors is required.

5.1.2 Potential Dust Emission Magnitude

5.1.2.1 Demolition

The Site currently comprises of open green space with a singular existing dwelling towards the south of the Site that requires demolition. The total building volume is significantly less than 12,000m^3, and the majority is <6m above ground.

The dust magnitude for demolition is therefore considered to be ‘small’.

5.1.2.2 Earthworks

The total Site area is 18,000m^2 – 110,000m^2 with earthworks required over a lesser area than this. Given the size of the Site, it is considered that 5 – 10 heavy earth moving vehicles may be active at any one time.

The dust emission magnitude for earthworks is therefore considered to be ‘medium’.

5.1.2.3 Construction

The total building volume requiring construction is estimated to be 12,000m^3 – 75,000m^3, with potentially dusty construction materials used (e.g. concrete).

The dust emission magnitude for construction is therefore considered to be ‘medium’.

5.1.2.4 Trackout

It is assumed construction vehicles will access the Site via the proposed entrance off the A227 South Street. No details are available at the time of assessment regarding the number of HDV movements associated with the construction works. However, the number of outward HDV movements in any one day is unlikely to be >20 at any one point during construction. Furthermore, given the likely phased development of the Site and the developable area, it is considered unlikely that the unpaved road length will exceed 50m at any given time.

The dust emission magnitude for trackout is therefore considered to be ‘small’.

5.1.2.5 Summary

A summary of the dust emission magnitude for the activities is detailed in Table 5-1.

Table 5-1: Potential Dust Emission Magnitude

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Medium
Construction	Medium
Trackout	Small

5.1.3 Sensitivity of the Area

5.1.3.1 Dust Soiling Impacts

There are estimated to be 10 – 100 high sensitivity receptors (residential receptors) within 20m of the Site.

Furthermore, assuming construction vehicles may travel in both directions along the A227 South Street when leaving the Site, there are 10 – 100 high sensitivity receptors within 20m of the access routes up to 250m from the Site exit.

The sensitivity of the area with respect to dust soiling effects on people and property in relation to demolition, earthworks, construction and trackout is therefore considered to be 'high'.

5.1.3.2 Human Health Impacts

The 2023 mapped background PM_{10} concentration for the $1km^2$ grid square centred on the Site is estimated to be $10.1\mu g/m^3$ (i.e. falls into the $<24\mu g/m^3$ class). As discussed in Section 4.1.2, no representative local background PM_{10} monitoring exists in the development locale.

Given the above information regarding the number of receptors within 20m of the Site boundary and identified trackout routes, the sensitivity of the area with respect to human health impacts in relation to demolition, earthworks, construction and trackout is therefore considered to be 'low'.

5.1.3.3 Ecological Impacts

The Round Wood AW runs along the eastern boundary of the Site and is within 20m.

The AW is classified as 'low' sensitivity in line with IAQM guidance. The sensitivity of the area with respect to ecological impacts in relation to demolition, earthworks and construction is therefore considered to be 'low'.

There are no ecological designations located within 50m of the roads anticipated to witness construction traffic movements, and impacts in relation to trackout have therefore not been considered.

5.1.3.4 Summary

A summary of the sensitivity of the surrounding area is detailed in Table 5-2, whilst the spatial density of nearby receptors is provided in Figure 5-1.

Table 5-2: Sensitivity of the Area

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

5.1.4 Risk of Impacts (Unmitigated)

The outcome of the assessment of the potential 'magnitude of dust emissions', and the 'sensitivity of the area' are combined in Table 5-3 below to determine the risk of impact (unmitigated) which is used to inform the selection of appropriate mitigation.

Table 5-3: Risk of Dust Impacts (Unmitigated)

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

Following the construction dust assessment, the Site is found to be at worst 'Medium Risk' in relation to dust soiling effects on people and property, and 'Low Risk' in relation to human health and ecological impacts (Table 5-3). However, potential dust effects during the construction phase are considered temporary in nature and may only arise at particular times (i.e. certain activities and/or meteorological conditions).

Nonetheless, commensurate with the above designation of dust risk, mitigation measures, as identified by IAQM guidance are required to ensure that any potential impacts arising from the construction phase of the Proposed Development are reduced and, where possible, completely removed. In accordance with IAQM guidance, providing effective mitigation measures are implemented, such as those outlined in Section 7.1, construction dust effects are considered to be not significant.

Figure 5-1: Construction Dust Assessment Buffers

6.0 Operational Phase Assessment

This section presents the potential air quality impacts and effects associated with the operation of the Proposed Development.

6.1 Road Traffic Screening Assessment

6.1.1 Human Receptors

Table 6-1 details the road traffic flows generated by the Proposed Development upon the local road network. There are no additional HDV movements associated with the operational phase of the Proposed Development and therefore flows are all as LDVs. The traffic flows have been compared to the relevant EPIC & IAQM indicative screening criteria.

Table 6-1: Road Traffic Flows Generated on the Local Road Network

Description	AADT (LDVs)
Maximum for Proposed Site Use (100 dwellings)	464
A227 north of the Site access	148
A227 south of the Site access	315
EPIC & IAQM Screening Criteria	***500***

As presented in Table 6-1, the road traffic flows generated by the Proposed Development on the local road network are below the relevant EPIC & IAQM screening criteria.

Given the above, the operational effects on local air quality arising from road traffic emissions associated with the Proposed Development can be considered ‘insignificant’ and further detailed assessment is not required.

6.1.2 Ecological Receptors

The screening criteria presented in the IAQM guidance document has been utilised to assess potential impacts of road traffic emissions on ecological receptors.

The Halling to Trottiscliffe Escarpment SSSI and several AW sites are located in proximity to the Site, and within 200m of road links predicted to witness development-generated traffic flows.

Table 6-1 details the development-generated road traffic flows on the road links within 200m of the identified ecological designations.

The Proposed Development alone generates road traffic flows <1,000 AADT on all road links considered. Given this, the operational effects on ecological receptors arising from road traffic emissions associated with the Proposed Development alone can be considered ‘insignificant’.

6.2 Site Suitability Assessment

With reference to EPIC & IAQM guidance and the information already discussed in Section 4.1, the following has been used to inform the suitability of the Site for its proposed residential use:

- The Site is sufficiently distant from any AQMAs, Gravesham A2 AQMA is located approximately 7.1km north of the Site;

- The Defra mapped background concentrations of NO_2, PM_{10} and $PM_{2.5}$ predicted at the Site in the base year (2023) and anticipated development opening year (2027) are 'well below' the respective AQALs;
- The Proposed Development is expected to generate road traffic volumes below the EPIC & IAQM screening criteria; and
- As presented in Table 4-2, monitored NO_2 concentrations at diffusion tube GR94 (located approximately 2.5km north of the Site) have been below the AQAL across the period 2019-2023. Further, the 2022 and 2023 concentrations were well-below the annual mean NO_2 AQAL, suggesting that this is characteristic of the baseline air quality environment in proximity to the Site.

Given the above information, in line with the EPIC & IAQM guidance, the Site is found to be suitable for its proposed residential use. A detailed site suitability assessment is not considered to be required, and pollutant concentrations are predicted to be below the respective AQALs across the Site. Effects associated with likely exposure of future residents of the Proposed Development are considered to be 'not significant'.

7.0 Mitigation Measures

This section presents any proportionate mitigation measures required during the construction and operational phases of the Proposed Development.

7.1 Construction Phase

IAQM guidance outlines a number of site-specific mitigation measures based on the assessed site risk. The measures are grouped into those which are highly recommended and those which are desirable.

With the effective application of the dust mitigation measures, as detailed in Table 7-1, it is considered that the overall effect at all receptors will be 'not significant'.

Table 7-1: Construction Dust Mitigation Measures

Site Application	Mitigation Measures
Highly Recommended	
Communications	Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
	Display the head or regional office contact information.
	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.
Construction	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
Demolition	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
	Avoid explosive blasting, using appropriate manual or mechanical alternatives.
	Bag and remove any biological debris or damp down such material before demolition.
Monitoring	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
	Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.

Site Application	Mitigation Measures
Operating Vehicle/Machinery and Sustainable Travel	Ensure all vehicles switch off engines when stationary - no idling vehicles.
	Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
	Use enclosed chutes and conveyors and covered skips.
	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
Preparing and Maintaining the Site	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.
	Avoid site runoff of water or mud.
	Keep site fencing, barriers and scaffolding clean using wet methods.
	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
	Cover, seed or fence stockpiles to prevent wind whipping.
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
	Make the complaints log available to the local authority when asked.
	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
Waste Management	Avoid bonfires and burning of waste materials.
Desirable	
Construction	Avoid scabbling (roughening of concrete surfaces) if possible.
	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
	For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.
Demolition	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).

Site Application	Mitigation Measures
Earthworks	Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.
	Use Hessian, mulches or tackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.
	Only remove the cover in small areas during work and not all at once.
Monitoring	Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
Operating Vehicle/Machinery and Sustainable Travel	Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
Trackout	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
	Avoid dry sweeping of large areas.
	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
	Record all inspections of haul routes and any subsequent action in a site logbook.
	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

7.2 Operational Phase

7.2.1 Standard Mitigation

The Kent and Medway AQPG lists the following as standard mitigation for all major developments:

- **Residential:**
  - All gas-fired boilers to meet a minimum standard of <40mgNOx/kWh; and
  - 1 Electric Vehicle (EV) charging point per dwelling with dedicated parking or 1 charging point per 10 spaces (unallocated parking).

In relation to the above measures the Proposed Development does not propose the installation of any combustion emission sources, and the energy/heat sources will be electric, using Air Source Heat Pumps (ASHP). All plots will have an EV charging point, in line with Approved Document S to The Building Regulations[25].

[25] HM Government, The Building Regulations 2010, Approved Document S - Infrastructure for the charging of electric vehicles, 2021 edition – for use in England. [online version]

7.2.2 Emission Mitigation Statement

In line with the Kent and Medway AQPG (adopted by GBC), an estimation of the pollutant emission costs (i.e. Damage Cost) associated with the Proposed Development has been undertaken.

Pollutant emissions costs associated with development-generated operational trips over a 5-year period (from the first year of operation – i.e. 2027 to 2031) have been calculated to indicate potential mitigation requirements. The latest version of the EFT (presently v13) has been used to determine vehicle emission factors as input into the Damage Cost Calculation.

Reference should be made to Table 7-2 and Table 7-3 for a presentation of the calculation inputs and outputs, respectively.

Table 7-2: Damage Cost Calculation – Inputs

Input Parameter	Inputs
Total Trips (AADT)	464
Average trip length (km)	10
Speed (kph)	50
2022 Base Damage cost NOx (£ per tonne)	£11,682
2022 Base Damage cost $PM_{2.5}$ (£ per tonne)	£84,548

Table 7-3: Damage Cost Calculation – Outputs

Output Parameter	Year					5-year Total
	2027	2028	2029	2030	2031	
Annual NO_x Emissions (tonnes/year)	0.25	0.21	0.18	0.16	0.13	0.93
Annual PM_{10} Emissions (tonnes/year)	0.06	0.05	0.05	0.05	0.05	0.27
Annual $PM_{2.5}$ Emissions (tonnes/year) (A)	0.03	0.03	0.03	0.03	0.03	0.17
NO_x contribution (£) (rounded up) (B)	£3,065	£2,620	£2,212	£1,850	£1,537	£11,284
$PM_{2.5}$ contribution (£) (rounded up) (B)	£3,104	£3,007	£2,916	£2,830	£2,752	£14,610
Total contribution (£) (rounded up)						**£25,893**

Table notes:

(A) Converted utilising the Road Transport PM_{10} to $PM_{2.5}$ factor of 0.622 as provided in the Defra damage costs guidance.

(B) Discounted benefits across the period of appraisal.

In summary, over a 5-year period (commencing from 2027 – the assumed opening year of development), an emission cost has been calculated at **£25,893**.

The above damage cost provides an indicator of the financial commitment required to offset emissions and is used to determine the level of appropriate mitigation required.

7.2.3 Mitigation Measures

In accordance with EPIC & IAQM guidance, road traffic impacts associated with the operation of the Site can be considered as having an insignificant effect on local air quality. Furthermore, the Site is found to be suitable for residential purposes.

Long-term scheme-specific mitigation measures are therefore not considered to be required to mitigate effects, however, will be considered as part of the detailed design in line with good practice and the calculated damage cost.

8.0 Conclusion

SLR has undertaken an air quality assessment to support an "*outline application for up to 100 dwellings with all matters reserved except for access from South Street"* at Blackthorn Farm, Culverstone Green, Gravesham.

8.1 Construction Phase

A qualitative assessment of the potential dust impacts during the construction of the development has been undertaken following the IAQM guidance. Providing mitigation measures are implemented, such as those outlined in Section 7.1 of this report, residual effects from dust emissions arising during the construction phase are considered to be 'not significant'.

Given the short-term nature of the construction phase, there is predicted to be an insignificant effect on air quality from construction-generated vehicle emissions.

8.2 Operational Phase

8.2.1 Human Receptors

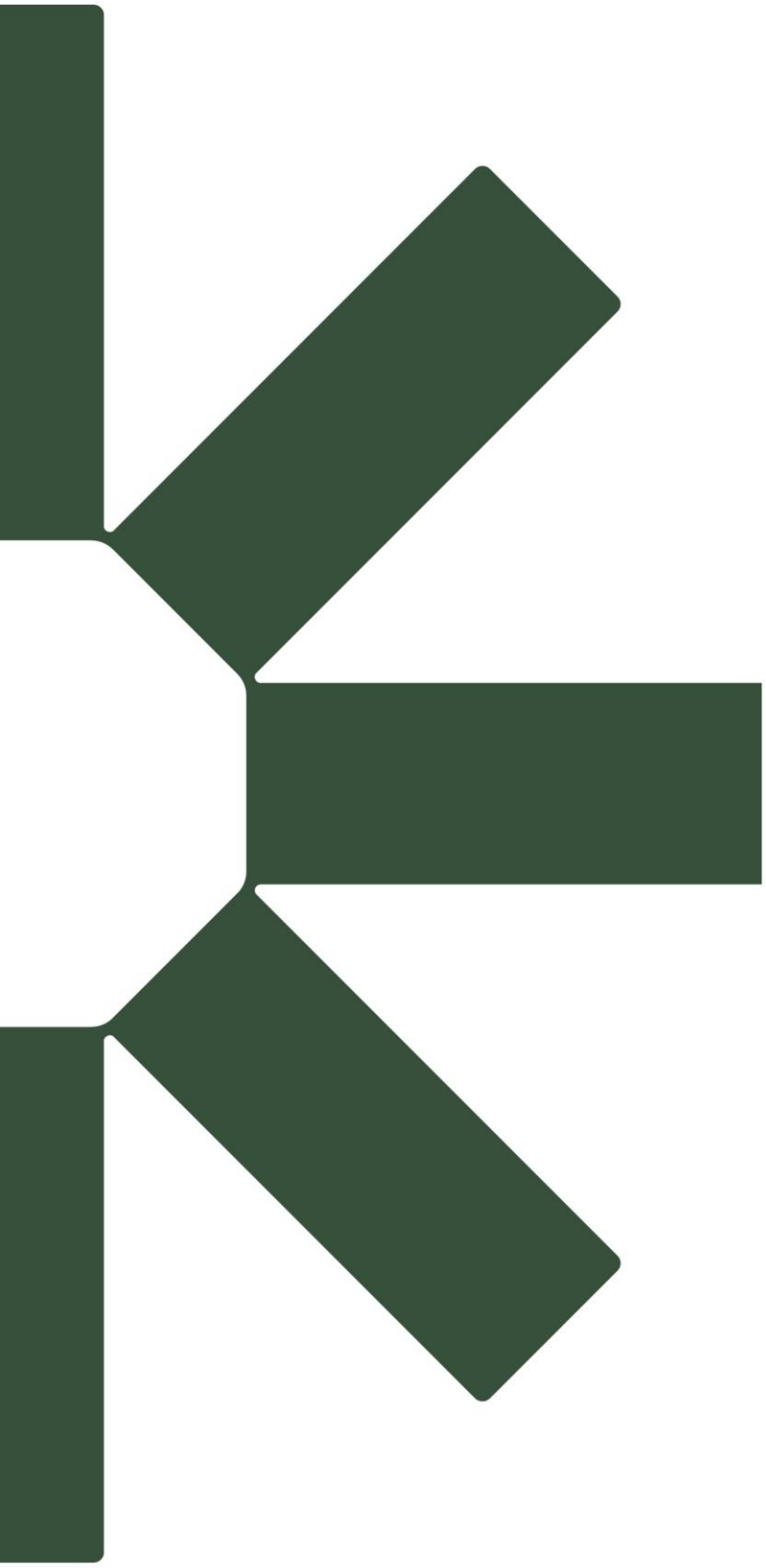
The Proposed Development is expected to generate road traffic volumes below the relevant indicative EPIC & IAQM screening criteria. As such, the operational effects on local air quality arising from road traffic emissions associated with the Proposed Development can be considered 'insignificant'.

A qualitative site suitability assessment has been undertaken following EPIC & IAQM guidance, with reference to publicly available datasets. Effects associated with likely exposure of future users of the Proposed Development are considered to be 'not significant'.

A damage cost calculation has been undertaken in accordance with the Kent and Medway AQPG and Defra guidance. The 5-year calculated damage cost is **£25,893**.

8.2.2 Ecological Receptors

The Proposed Development alone generates road traffic volumes below the relevant IAQM screening criteria on all road links considered. As such, the operational effects on ecological receptors arising from road traffic emissions associated with the Proposed Development can be considered 'insignificant'.



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