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GLADMAN DEVELOPMENTS LIMITED

DUKE'S PARK, WOODBRIDGE

AIR QUALITY ASSESSMENT

OCTOBER 2015

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GLADMAN DEVELOPMENTS LIMITED

DUKE'S PARK, WOODBRIDGE

AIR QUALITY ASSESSMENT

OCTOBER 2015

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1 INTRODUCTION

1.1.1 By email instruction dated 24th March 2014, from Ms Emma Tutton of Gladman Developments Limited, Wardell Armstrong LLP was commissioned to undertake an air quality assessment for a proposed residential development at land off Duke's Park, Woodbridge.

1.1.2 The proposed development site is located approximately 2km to the south west of the centre of Woodbridge. The site is bordered to the north and north east by the B1438 Ipswich Road and a small number of existing residential properties on Duke's Park. To the east, the site is bordered by Sandy Lane; beyond which lies a small industrial estate. To the south, the site is bordered by the Norwich to Ipswich railway line; with open land and a small Sewage Treatment Works beyond. To the west, the site is bordered by Bridge Farm Business Park, a small number of existing residential properties and Top Street; with the A12 located further away to the north west. The location of the site is shown on drawing LE12277-001.

1.1.3 The site is approximately 12.67 hectares in area and the development proposals comprise approximately 215 residential dwellings, a small retail unit, open space and associated infrastructure. Access to the site will be via Top Street and Ipswich Road.

1.1.4 This report details the results of the air quality assessment, undertaken in support of an outline planning application, for the proposed residential development. The report discusses an assessment of the potential air quality impacts of the additional road traffic generated by the proposed development. Air pollutant concentrations are considered at representative existing sensitive receptor locations, including within the Woodbridge Air Quality Management Area, and also at proposed receptor locations within the residential development itself.

1.1.5 In addition, the potential air quality impacts from emissions associated with the Norwich to Ipswich railway line, and potential odour impacts from the Sewage Treatment Works, have been considered within the development site.

2 PLANNING POLICY CONTEXT

2.1 Air Quality

Air Quality Legislation

2.1.1 The UK National Air Quality Strategy (NAQS) was published in March 1997 fulfilling the requirement under the Environment Act 1995 for a national air quality strategy setting out policies for the management of ambient air quality. The Strategy sets objectives for eight pollutants, which may potentially occur in the UK at levels that give cause for concern. These pollutants are: nitrogen dioxide (NO_2), sulphur dioxide, carbon monoxide, lead, fine particulate matter (PM_{10}), benzene, 1, 3–butadiene and ozone.

2.1.2 The Strategy was reviewed and a Review Report[1] and Consultation Document[2] were published by the Department of the Environment, Transport and the Regions in 1999. A revised version (The Air Quality Strategy (AQS) 2000), which supersedes the 1997 Strategy, was published in January 2000. The AQS 2000 strengthens the objectives for a number of pollutants with the exception of that for particulates, which was replaced with the less stringent EU limit value.

2.1.3 The objectives for the eight pollutants in the Strategy provide the basis of the implementation of Part IV of the Environment Act 1995. The Air Quality Strategy objectives for each pollutant, except ozone, were given statutory status in the Air Quality (England) Regulations, 2000[3] and Air Quality (England) (Amendment) Regulations 2002[4] ('the Regulations').

2.1.4 In 2007 the Air Quality Strategy was revised. This latest strategy[5] does not remove any of the objectives set out in the previous strategy or its addendum, apart from replacing the provisional 2010 objective for PM_{10} in England, Wales and Northern Ireland with the exposure reduction approach for $PM_{2.5}$. The UK Government and the Devolved Administrations have now therefore set new national air quality objectives for particulate matter smaller than 2.5µm diameter ($PM_{2.5}$).

2.1.5 EU Directive 2008/50/EC[6] came into force in June 2008 and was transposed into legislation in England on 11th June 2010 as 'The Air Quality Standards Regulations

[1] Department of the Environment, Transport and the Regions, January 1999. Report on the Review of the National Air Quality Strategy, Proposals to amend the Strategy
[2] Department of the Environment, Transport and the Regions 1999, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. A consultation document
[3] The Air Quality (England) Regulations 2000. SI No 928
[4] The Air Quality (Amendment) Regulations 2002
[5] Department of Environment, Food and Rural Affairs, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. July 2007
[6] 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

2010'[7]. This EU Directive consolidates existing air quality legislation and provides a new regulatory framework for $PM_{2.5}$.

2.1.6 The current Air Quality Standards and Objectives, as set out in the Air Quality Standards Regulations 2010, are detailed in Table 1.

Table 1: Air Quality (England) Regulations 2010. Summary of Current Air Quality Standards and Objectives

Pollutant	**Averaging Period**	**Limit Value**
Sulphur Dioxide	1 hour	350µg/m^3 not to be exceeded more than 24 times a calendar year
	24 hour mean	125µg/m^3 not to be exceeded more than 3 times a calendar year
Nitrogen Dioxide	1 hour	200µg/m^3 not to be exceeded more than 18 times a calendar year
	Calendar year	40µg/m^3
Benzene	Calendar year	5µg/m^3
Lead	Calendar year	0.5µg/m^3
PM_{10}	24 hour mean	50µg/m^3 not to be exceeded more than 35 times a calendar year
	Calendar year	40µg/m^3
$PM_{2.5}$	Calendar year	25µg/m^3 to be met by 1st January 2015
Carbon Monoxide	Maximum 8 hour daily mean	10mg/m^3
Pollutant	**Target Value for the total content in the PM_{10} fraction averaged over a calendar year**	**Date by which target value should be met**
Arsenic	6ng/m^3	31st December 2012
Cadmium	5ng/m^3	31st December 2012
Nickel	20ng/m^3	31st December 2012
Benzo(a)pyrene	1ng/m^3	31st December 2012

[7] Statutory Instruments 2010 No. 1001 The Air Quality Standards Regulations 2010

2.1.7 Examples of where the Air Quality Objectives should/should not apply are included in Table 2. This table is taken from Local Air Quality Management Technical Guidance document LAQM.TG (09)[8].

Table 2: Examples of Where the Air Quality Objectives Should/Should Not Apply

Averaging Period	Objectives Should Apply at:	Objectives Should Generally Not Apply at:
Annual Mean	All background locations where members of the public might be regularly exposed. Building facades of residential properties, schools, hospitals, libraries, 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 or any other location where public exposure is expected to be short term.
24 hour (daily) mean 8 hour mean	All locations where the annual mean objectives would apply together with Hotels. Gardens of residential properties[1]	Kerbside sites, 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 min mean	All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

[1]: 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 would occur at the extremities of the garden boundary, or in front gardens although local judgement should always be applied.

[8] Part IV of the Environment Act 1995: Local Air Quality Management Technical Guidance 2009

Local Air Quality Management Guidance

2.1.8 The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007, establishes the framework for air quality improvements based on measures agreed at a national and international level. However, despite these measures, it is recognised that areas of poor air quality will remain and these should be dealt with through the Local Air Quality Management (LAQM) process using locally implemented measures.

2.1.9 LAQM legislation in the Environment Act 1995 requires local authorities to conduct periodic review and assessments of air quality. These aim to identify all those areas where the air quality objectives are being, or are likely to be, exceeded.

2.1.10 All authorities were required to undertake the first stage of review and assessment which concluded in September 2001. In those areas identified as having the potential to experience elevated levels of pollutants the authority was required to undertake a more detailed second stage review comprising two steps; Updating and Screening Assessments and Detailed Assessments. Where it was predicted that one or more of the air quality objectives would be unlikely to be met by the end of 2005, local authorities were required to proceed to a third stage and, if necessary, declare Air Quality Management Areas (AQMAs) and make action plans for improvements in air quality, in pursuit of the national air quality objectives.

2.1.11 In 2007 an Evaluation Report was commissioned by the UK Government and Devolved Administrations. Following this review revised LAQM Technical Guidance was published in February 2009 comprising LAQM.TG(09). This revised guidance draws together previous guidance and the recommendations of the 2007 Evaluation Report. LAQM.TG(09) maintains the phased approach to review and assessment established in previous technical guidance. The intention is that local authorities should only undertake a level of assessment that is commensurate with the risk of an air quality objective being exceeded.

2.1.12 Where a Detailed Assessment indicates that any of the air quality objectives are likely to be exceeded, an AQMA must be designated, or the geographical boundaries of an existing AQMA must be modified. An AQMA should only be declared if a Detailed Assessment has been undertaken.

2.1.13 Once an AQMA has been declared the local authority is required to undertake a Further Assessment within 12 months of the declaration.

2.1.14 A rolling programme of Review and Assessment based on a three-year cycle has been laid down by Defra in its LAQM.TG(09) policy guidance. This is supplemented by Progress Reports which are intended to maintain continuity in the LAQM process between the three-yearly cycle of Review and Assessment. Progress Reports are required in the years when the authority is not completing an Updating and Screening Assessment.

National Planning Policy and Air Quality

2.1.15 The National Planning Policy Framework[9], introduced in March 2012 requires that planning policies should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of AQMAs and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in AQMAs is consistent with the local air quality action plan.

2.1.16 The Planning Practice Guidance[10] 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 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).

2.1.17 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.

[9] Department for Communities and Local Government, March 2012, National Planning Policy Framework
[10] Department for Communities and Local Government, March 2014, Planning Practice Guidance: Air Quality

Suffolk Coastal District Council Local Air Quality Management Review and Assessment

2.1.18 Suffolk Coastal District Council (SCDC) began the review and assessment procedure in 2001 and since then has undertaken five detailed Progress Reports and four USAs to identify exceedances of the annual mean NO_2 and/or PM_{10} objective.

2.1.19 From the most recent report available, the 2013 Progress Report, it is understood that there are currently two AQMAs declared within the district. These are located at the junction of St John's Street/Lime Kiln Quay Road/Thoroughfare, in the centre of Woodbridge; and at the Dooley Inn Public House on Ferry Lane, near to the Port of Felixstowe.

2.1.20 The site is located approximately 2.1km south east of the Woodbridge AQMA; and approximately 13.8km north east of the Felixstowe AQMA.

2.1.21 SCDC maintains a network of NO_2 diffusion tubes to monitor the air quality across the area. There are currently approximately 42 diffusion tubes in operation, with twelve of these being located within the Woodbridge AQMA. In addition, a kerbside automatic monitoring site is also in operation within the AQMA. The 2012 bias-adjusted data, the most recent available at the time of the assessment, shows that the monitoring locations within the AQMA ranged between 22 and 44µg/m^3, with five exceedances of the annual mean objective for NO_2 recorded.

2.1.22 None of these monitoring locations are considered to be representative of the proposed development site.

2.2 Odour

Legislation and Planning Policy

2.2.1 The Environmental Protection Act 1990[11] is the legal framework dealing with odour from industrial, trade or business premises. If odour is present in sufficient quantity, this may constitute a statutory nuisance. The Local Authority is placed under a duty to inspect, detect any nuisance and to serve abatement notices where necessary.

2.2.2 NPPF sets out planning policy for England. Paragraph 120 advises planning policies and decisions should ensure that "*development is appropriate for its location"* and that "*the effects… of pollution on health, the natural environment or general amenity and*

[11] Environmental Protection Act, 1990

the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account".

2.2.3 Pollution is defined within NPPF as "*anything that affects the quality of land, air, water or soils, which might lead to an adverse impact on human health, the natural environment or general amenity. Pollution can arise from a range of emissions, including… odour"*.

2.2.4 In addition, Section 11 of the NPPF advises that "*The planning system should contribute to and enhance the natural and local environment by… preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability"*.

3 ASSESSMENT METHODOLOGY

3.1 Consultation and Scope of Assessment

3.1.1 Consultation was undertaken, in a series of communications, between 26th March and 22nd April 2014, with Ms Denise Lavender of the Environmental Protection Department at SCDC. The following points were discussed and agreed:

- A construction phase dust assessment will be undertaken in accordance with the most up-to-date guidance from the Institute of Air Quality Management (IAQM);
- A screening assessment, using the guidance within the Design Manual for (DMRB), is acceptable for receptors outside of the Woodbridge AQMA, including within the proposed development itself;
- Concerns were raised by SCDC about the suitability of the DMRB screening tool for the assessment of the impact of the proposed development within the Woodbridge AQMA. However, given the complexity of the air quality situation within the AQMA, it was acknowledged by SCDC that even a more detailed assessment (using ADMS-Roads) may not provide sufficient information. As a result, it was agreed with SCDC that the DMRB screening tool will be used to predict the impact of the proposed development within the AQMA. As monitoring data has shown that there are already existing exceedances of the annual mean objective for NO_2, it was requested by SCDC that rather than focusing upon absolute pollutant concentrations, the assessment should focus just upon the road component of pollutant concentration at receptor(s) within the AQMA. In particular, the change between 'without development' and 'with development' scenarios should be presented. As a result, the road contribution NO_x and NO_2 concentrations will be included within the report for selected receptor(s) within the AQMA. Further details are included in section 6.2 of this report;
- Representative background monitoring data is not available for the proposed development. NO_2 and PM_{10} background concentrations will therefore be obtained from the Defra default concentration maps for the appropriate grid square(s). The current year (i.e. 2014) backgrounds from the latest Defra default concentration maps will be used for both the base year and opening/future year scenarios;

- There are no roadside monitoring locations considered to be representative of receptors within the vicinity of the proposed development, and the proposed development itself. In addition, given the complexity of the air quality situation within the Woodbridge AQMA, it is not possible to accurately verify modelled results at receptor(s) within the AQMA boundary. As a result, it has been agreed with SCDC that verification of the screening model will not be undertaken. Further details are included in section 3.3 of this report;
- A qualitative assessment will be undertaken to consider emissions associated with the Norwich to Ipswich railway line, which borders the proposed development to the south. Further details are included in section 6.3 of this report; and
- A qualitative assessment will also be undertaken to consider odour associated with the small STW, which is located to the south east of the proposed development. Further details are included in section 6.4 of this report.

3.1.2 Further consultation was undertaken with SCDC following the addition of the access road along Top Lane and the proposed retail unit, to confirm that the air quality methodology was still acceptable. Correspondence with Ms. Lavender between the 23rd July and 31st July 2014 confirmed that the original air quality methodology was still regarded as appropriate for the site.

3.2 Construction Phase Assessment – Dust and Fine Particulate Emissions

3.2.1 To assess the impacts associated with dust and PM_{10} releases, during the construction phase of the development, an assessment has been undertaken in accordance with the Institute of Air Quality Management (IAQM) guidance[12].

Step 1

3.2.2 Step 1 of the assessment is to screen the requirement for a more detailed assessment. The guidance states that an assessment will normally be required where there are existing human sensitive receptors within 350m 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).

3.2.3 With regards to ecological receptors, the guidance states that an assessment will normally be required where there are existing ecological receptors within 50m of the

[12] Guidance on the Assessment of Dust from Demolition and Construction (February 2014)

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).

3.2.4 Where there are existing sensitive receptors locations within 350m of the site boundary, it is necessary to proceed to Step 2 of the assessment.

Step 2

3.2.5 Step 2 of the assessment determines the potential risk of dust arising in sufficient quantities to cause dust soiling, human health and/or ecological effects. 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.

3.2.6 The risk of effects is determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based upon two factors:

- **Step 2A** – the scale and nature of the works which determines the potential dust emission magnitude as small, medium or large; and
- **Step 2B** – the sensitivity of the area to dust impacts which is defined as low, medium or high sensitivity.

3.2.7 These two factors are combined in **Step 2C** to determine the risk of effects with no mitigation applied.

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

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

Step 3

3.2.9 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[13], recommended for use outside the capital by LAQM guidance, and the IAQM guidance document itself. If the risk is classed as negligible, no mitigation measures beyond those required by legislation will be necessary.

Step 4

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

Existing Dust Sensitive Receptors – Human Receptors

3.2.11 The closest sensitive human receptor locations to the proposed development are residential in nature, and are detailed in Table 3.

Table 3: Existing Dust Sensitive Receptors

Receptor	Direction from the Site	Approximate Distance from the Site Boundary (m)
Existing properties along Crane Close	North	16 at closest point (12 Crane Close)
Existing properties along Duke's Park	East	18 at closest point (11 Duke's Park)
Existing properties along Sandy Lane	South	60 at closest point (The Roost)
Existing properties along Top Street	West	25 at closest point (4 Top Street)

Existing Dust Sensitive Receptors – Ecological Receptors

3.2.12 There are no potentially sensitive statutory habitat sites located 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). It is not therefore necessary to consider ecological receptors within this assessment.

3.3 Operational Phase Assessment – Road Traffic Emissions

Modelling of Road Traffic Emissions

3.3.1 The air quality assessment has been undertaken in accordance with the air quality

[13] Greater London Authority (2006) The Control of Dust and Emissions from Construction and Demolition: Best Practice Guidance

guidance document LAQM.TG(09). The road traffic emissions associated with changing vehicle movements, as a result of the proposed development, are quantified using the methodology detailed in Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 1, HA207/07, May 2007).

3.3.2 DMRB contains a spreadsheet identified as 'The Local Impacts Screening Method'. This has been used to predict the concentrations of NO_2 and PM_{10} at existing sensitive receptor locations; as these pollutants are considered to be the most likely to exceed the air quality objectives. In addition, pollutant concentrations have also been predicted at proposed sensitive receptor locations, considered to be representative of residential areas within the site.

3.3.3 The DMRB screening assessment has been undertaken to consider the potential air quality impacts associated with the operational phase of the proposed development. The predicted impacts have been assessed against the air quality objectives and standards set out in the Air Quality Standards Regulations (2010). Changes in pollutant concentrations between 'without development' and 'with development' scenarios have also been assessed against a set of significance criteria, detailed in Section 4 of this report.

3.3.4 NO_2 and PM_{10} concentrations have been predicted for the Base Year (2015) and an Opening/Future Year (2025) for both 'without development' and 'with development' scenarios. Predictions have been made for a total of three scenarios:

- Scenario 1: 2015 Base Year;
- Scenario 2: 2025 Opening/Future Year 'Without Development'; and
- Scenario 3: 2025 Opening/Future Year 'With Development'.

Road Traffic Data

3.3.5 The DMRB screening assessment requires the input of detailed road traffic flow information for those routes which may be affected by the proposed development. The traffic flow information used in the assessment is included in Appendix A.

3.3.6 24 hour Annual Average Daily Traffic (AADT) flows and HGV percentages, for use in the DMRB screening assessment, have been obtained from Hydrock Group Limited, who has undertaken the transport assessment for the project.

3.3.7 The traffic flow information takes into account committed developments in the local area and has been provided for the following roads:

- A12 South West;
- A12 North East;
- Ipswich Road;
- Cumberland Street;
- California;
- Old Barrack Road;
- Station Road;
- St John's Street;
- Lime Kiln Quay Road;
- Thoroughfare North;
- Thoroughfare South;
- Top Street;
- Sandy Lane;
- Cherry Tree Road;
- The Medical Centre; and
- The proposed site accesses (off Ipswich Road and Top Street).

Existing Sensitive Receptor Locations

3.3.8 Eight representative existing sensitive receptor locations (identified as ESR 1 to ESR 8) have been considered in the air quality assessment. ESR 8 (93a Thoroughfare) is located within Woodbridge AQMA and has been considered at the request of SCDC.

3.3.9 Details of the existing sensitive receptor locations are provided in Table 4 and their locations are shown on drawing LE12277-001.

Table 4: Existing Sensitive Receptor Locations

Receptor	Address	Grid Reference		Roads Considered	Distance from Receptor to Road Centre (m)
		Easting	Northing		
ESR 1	12 Crane Close	625731	248091	Ipswich Road	12
				Site Access (Ipswich Road)	30
ESR 2	46 California	625943	248233	California	10
				Ipswich Road	18

Table 4: Existing Sensitive Receptor Locations					
Receptor	**Address**	**Grid Reference**		**Roads Considered**	**Distance from Receptor to Road Centre (m)**
		Easting	**Northing**		
ESR 3	2 Sandy Lane	626285	248319	Sandy Lane	10
				Ipswich Road	39
ESR 4	13 Ipswich Road	626794	248623	Ipswich Road	15
				Cherry Tree Road	11
ESR 5	66 Cumberland Street	626936	248766	Cumberland Street	9
				Cumberland Street (North of Station Road)	31
ESR 6	44 Station Road	627031	248744	Station Road	7
				Cumberland Street (North of Station Road)	48
ESR 7	3 Top Street	625353	247732	Top Street	9
				Site Access (Top Street)	30
ESR 8	93a Thoroughfare	627588	249260	Thoroughfare (North)	5
				St John's Street	30

Proposed Sensitive Receptor Location

3.3.10 Three proposed sensitive receptor locations (i.e. PR 1 to PR 3) have been selected along the site boundary to represent the proposed residential areas closest to Top Street, Ipswich Road and the Proposed Site Access roads for the site.

3.3.11 Pollutant concentrations at the proposed receptor location has been predicted for scenario 3 (as detailed in paragraph 3.3.4). It is only necessary to consider the 'with development' scenario for the proposed receptor locations as they will not experience

any 'without development' conditions. It is not therefore necessary to consider the changes in pollutant concentrations at the proposed receptor location.

3.3.12 Details of the proposed sensitive receptor locations are provided in Table 5 and their locations are shown on drawing LE12277-001.

Table 5: Proposed Sensitive Receptor Locations

Receptor	Location	Grid Reference		Roads Considered	Distance from Receptor to Road Centre (m)
		Easting	Northing		
PR 1	Location considered representative of proposed residential properties closest to both the proposed site access road and Ipswich Road.	625704	247999	Site Access (Ipswich Road)	10
				Ipswich Road	19
PR 2	Location considered representative of proposed residential properties closest to Ipswich Road and the A12.	625488	247832	Top Street	10
				Ipswich Road	105
				A12 South West	148
PR 3	Location considered representative of proposed residential properties closest to both the proposed site access road and Top Street.	625413	247698	Site Access (Top Street)	10
				Top Street	73

Model Verification

3.3.13 Defra Local Air Quality Management Technical Guidance, 2009 (LAQM.TG(09)) recognises that model validation generally refers to detailed studies that have been carried out by the model supplier or a regulatory agency.

3.3.14 Model verification is used to check the performance of the model at a local level. The verification of the DMRB model is achieved by modelling concentrations at existing monitoring locations in the vicinity of the proposed development and comparing the modelled concentration with the measured concentration.

3.3.15 There are currently twelve roadside/kerbside diffusion tubes in operation within Woodbridge. These are all located within the boundary of the Woodbridge AQMA and are not therefore considered to be representative of receptors in the vicinity of the proposed development, or the proposed development itself.

3.3.16 In addition, due to the complexities in the air quality situation within the Woodbridge AQMA, it is not considered possible to accurately verify modelled results at receptor(s) within the AQMA boundary. This has been discussed and agreed with SCDC. For receptor(s) within the AQMA, the uncorrected road contribution NO_x and NO_2 concentrations are presented in the report, as requested by SCDC.

3.3.17 As a result, it is not possible to verify the predicted NO_2 concentrations at any of the receptor locations considered. In addition, there is no representative PM_{10} monitoring data available, and therefore predicted PM_{10} concentrations cannot be verified. Full uncorrected predicted pollutant concentrations are included in Appendix B.

3.4 Operational Phase Assessment – Odour Emissions

Assessment of Odour Effects

3.4.1 To consider the potential for odour from the existing STW to give rise to an adverse effect on the proposed residential development, a qualitative odour risk assessment has been undertaken which takes into consideration meteorological data obtained for the recording station considered to be most representative of on-site conditions.

3.4.2 IAQM has recently published guidance on the assessment of odour for planning[14]. This guidance document sets out methods for assessments supporting planning applications and is the only UK odour guidance document which contains a method for estimating the significance of potential odour effects.

3.4.3 The IAQM guidance endorses the use of multiple assessment tools for odour, stating that "*best practice is to use a multi-tool approach, where practicable*".

[14] Institute of Air Quality Management, Guidance on the Assessment of Odour for Planning, May 2014

Qualitative Risk Based Assessment

3.4.4 The IAQM guidance discusses the basis of the Source-Pathway-Receptor approach, which focuses on the concept that for an odour impact to occur, there must be a source of odour, a pathway to transport odour and a receptor to be affected by the odour.

3.4.5 The probability of an odour impact occurring and the likely magnitude of the effect resulting from the exposure determine the risk of an odour effect occurring. The risk can therefore be estimated using the following relationship:

Effect ≈ Dose x Response

3.4.6 The dose can be considered to be equivalent to the odour exposure (impact) and can be determined using a number of factors, referred to as the 'FIDOL' factors, which are defined in Table 6.

Table 6: Description of the FIDOL Factors

Factor	Description
Frequency	How often an individual is exposed to odour
Intensity	The individual's perception of the strength of odour
Duration	The overall duration that individuals are exposed to an odour over time
Odour unpleasantness	Odour unpleasantness describes the character of an odour as it relates to the 'hedonic tone' (which may be pleasant, neutral or unpleasant) at a given odour concentration/intensity. This can be measured in the laboratory as the hedonic tone, and when measured by the standard method and expressed on a standard nine-point scale it is termed the hedonic score
Location	The type of land use and nature of human activities in the vicinity of an odour source. Tolerance and expectation of the receptor. The 'Location' factor can be considered to encompass the receptor characteristics, receptor sensitivity and socio-economic factors

3.4.7 In accordance with the IAQM guidance, the FIDO of the FIDOL factors are used to determine the dose (impact). The response (i.e. receptor sensitivity) is determined by the location factor (L) of FIDOL.

3.4.8 The IAQM guidance provides a framework for considering the potential for the risk of odour impacts, taking into account the odour-generating potential of relevant site activities (i.e. the Source Odour Potential) and the effectiveness of the pollutant pathway as the transport mechanism through the air to the receptor (i.e. the Pathway Effectiveness).

3.4.9 The Source Odour Potential takes into account the scale (magnitude) of the release from the odour source, how inherently odorous the emission is and the relative pleasantness/unpleasantness of the odour.

3.4.10 The Pathway Effectiveness is determined based on the distance between the receptor and source, whether the receptors are downwind, the effectiveness of the release point in promoting good dispersion and the surrounding topography and terrain.

3.5 Information Sources

3.5.1 The following sources of information have been used in the preparation of this report:

- Part IV Environment Act, Chapter 25, Air Quality, 1995;
- DEFRA, The UK National Air Quality Strategy, March 1997;
- The Air Quality Standards Regulations 2010;
- Department for Communities and Local Government, National Planning Policy Framework (NPPF) , March 2012;
- Department for Communities and Local Government, Planning Practice Guidance: Air Quality, March 2014;
- Department for the Environment, Food and Rural Affairs, Local Air Quality Management Technical Guidance LAQM.TG(09), February 2009;
- Environment Protection UK 'Land-Use Planning & Development Control: Planning for Air Quality', May 2015;
- Institute of Air Quality Management, Guidance on the Assessment of Dust from Demolition and Construction, February 2014;
- Suffolk Coastal District Council, Progress Report (2013);
- Traffic flow information, provided by Hydrock Group Limited;
- Institute of Air Quality Management, Guidance on the Assessment of Odour for Planning, May 2014;
- Environment Agency, Technical Guidance Note H4 – Odour Management, March 2011; and
- Meteorological data for the period 2010-2014 for the Wattisham Meteorological Recording Station.

4 ASSESSMENT OF SIGNIFICANCE

4.1 Construction Phase Assessment – Dust and Fine Particulate Emissions

4.1.1 The IAQM details criteria for assessing the sensitivity of an area to dust soiling effects and health effects of PM_{10} in Tables 7 to 9 below.

4.1.2 The guidance then goes on to provide significance criteria for the classification of dust effects from demolition, earthworks, construction and track out, as summarised in Tables 10 to 12 below.

Sensitivity of the Area for Human Receptors

4.1.3 The sensitivity categories for different types of receptors, to both dust soiling effects and the health effects of PM_{10}, are described in Table 7.

Table 7: Sensitivity Categories for Human Receptors

Sensitivity Category	Dust Soiling Effects	Health effects of PM_{10}
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.
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}.

Table 7: Sensitivity Categories for Human Receptors		
Sensitivity Category	**Dust Soiling Effects**	**Health effects of PM_{10}**
Low	Enjoyment of amenity would not reasonably be expected; Property would not be diminished in appearance, aesthetics or value; People or property would 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.

4.1.4 Based upon the category of receptor sensitivity, the sensitivity of the area to dust soiling effects is determined using the criteria detailed in Table 8.

Table 8: Sensitivity of the Area to Dust Soiling Effects on People and Property					
Receptor Sensitivity	**Number of Receptors**	**Distance from Source (m)**			
		<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

4.1.5 Based upon the category of receptor sensitivity, the sensitivity of the area to the health effects of PM_{10} is determined using the criteria detailed in Table 9.

Table 9: Sensitivity of the Area to Human Health Impacts							
Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from Source (m)**				
			<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

Table 9: Sensitivity of the Area to Human Health Impacts							
Receptor Sensitivity	**Annual Mean PM_{10} Concentration**	**Number of Receptors**	**Distance from Source (m)**				
			<20m	**<50m**	**<100m**	**<200m**	**<350m**
		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	-	>10	High	Medium	Low	Low	Low
	-	1-10	Medium	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Risk of Dust Impacts

4.1.6 The risk of dust being generated by demolition activities at the site is determined using the criteria in Table 10.

Table 10: Risk of Dust Impacts - 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

4.1.7 The risk of dust being generated by earthworks and construction activities at the site is determined using the criteria in Table 11.

Table 11: Risk of Dust Impacts – 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

Table 11: Risk of Dust Impacts – Earthworks and Construction			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
Low	Low Risk	Low Risk	Negligible

4.1.8 The risk of dust being generated by trackout from the site is determined using the criteria in Table 12.

Table 12: Risk of Dust Impacts – Trackout			
Sensitivity of Area	**Dust Emission Magnitude**		
	Large	**Medium**	**Small**
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Medium Risk	Low Risk	Negligible

4.2 Operational Phase Assessment – Road Traffic Emissions

Assessing the Impact of a Proposed Development

4.2.1 Guidance has been prepared by Environmental Protection UK (EPUK) and the IAQM with relation to the assessment of the air quality impacts of proposed developments and their significance[15].

4.2.2 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.

[15] Environmental Protection UK and the Institute of Air Quality Management, Land-Use Planning and Development Control: Planning for Air Quality, May 2015

4.2.3 The impact descriptors for individual receptors are detailed in Table 13.

Table 13: 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%) should be described as negligible*

Determining the Significance of Effects

4.2.4 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'.

4.2.5 Once the impact of the proposed development has been assessed for the individual impacts, the overall significance is determined using professional judgement. This takes into account a number of factors such as:

- The existing and future air quality in the absence of the development;
- The extent of the current and future population exposure to the impacts; and
- The influence and validity of any assumptions adopted when undertaking the prediction of impacts.

4.2.6 A discussion of the impacts of the proposed development and their significance are included in sections 6.2 and 7 of this report, respectively.

4.3 Operational Phase Assessment – Odour Emissions

Risk Factors for Source-Pathway-Receptor

4.3.1 Table 14 describes the risk-rating criteria for source magnitude, pathway effectiveness and receptor sensitivity used within the assessment adopted from the IAQM guidance.

Table 14: Risk Factors for Source-Pathway-Receptor			
Risk Rating	**Source Magnitude**	**Pathway Effectiveness**	**Receptor Sensitivity**
Large Source Odour Potential/ Highly Effective Pathway for Odour Flux to Receptor/ High Sensitivity Receptor	• Large scale source • Odourous compounds with low odour detection thresholds • Hedonic tones (where known) of -2 to -4 • Mitigation: Open air operation with no containment	• Distance: Receptor is adjacent to source/site boundary • Direction: high frequency (%) of winds from source to receptor or receptors downwind of source with respect to prevailing wind direction • Effectiveness of dispersion/dilution: open processes with low level releases	Examples: residential dwellings, hospitals, schools, education and tourist/cultural.
Medium Source Odour Potential/ Moderately Effective Pathway for Odour Flux to Receptor/ Medium Sensitivity Receptor	• Medium scale source • Moderately unpleasant odours • Hedonic tones (where known) of -2 to 0. • Mitigation: Some controls but significant residual odour remains	• Distance: Receptor local to source • Where mitigation relies on dispersion/dilution: releases are elevated but comprised by building effects	Examples: places of work, commercial/retail premises and playing/recreation fields
Small Source Odour Potential/ Ineffective Pathway for Odour Flux to Receptor/ Low Sensitivity Receptor	• Small scale source • Mildly odourous compounds with relatively high odour detection thresholds • Hedonic tones (where known) 0 to +4 • Mitigation: effective mitigation with little or no residual odour	• Distance: receptor remote from source and exceeds set back distances where applicable • Direction: Low frequency (%) of winds from source to receptor or upwind of source with respect to prevailing wind. • Mitigation: high level stacks/vents not compromised by surrounding buildings	Examples: Industrial, farms, footpaths and roads

4.3.2 Hedonic scores are the quantitative values assigned to the unpleasantness of source emission samples, by measurement in the laboratory by a panel of trained assessors in an odour panel following the German method VDI 3882 Part 2. Hedonic tone is scored on a nine-point scale ranging from very pleasant (a score of +4, e.g. bakery smell) through neutral to highly unpleasant (a score of -4, e.g. rotting flesh).

4.3.3 The risk ratings above are then combined with the matrix in Table 15 (as taken from the IAQM guidance) to estimate the overall risk of odour impact at the proposed residential development.

Table 15: Risk of Odour Impact at Receptor Location			
Pathway Effectiveness	**Source Odour Potential**		
	Small	**Medium**	**Large**
Highly effective	Low Risk	Medium Risk	High Risk
Moderately effective	Negligible Risk	Low Risk	Medium Risk
Ineffective pathway	Negligible Risk	Negligible	Low Risk

4.3.4 The next stage of the risk assessment is to estimate the effect of that odour impact on the exposed receptor, taking into account its sensitivity, using Table 16 as taken from the IAQM guidance.

Table 16: Likely Magnitude of Odour Effect at the Specific Receptor Location			
Risk of Odour Exposure (Impact)	**Receptor Sensitivity**		
	Low	**Medium**	**High**
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

5 BASELINE SITUATION

5.1 Operational Phase Assessment – Road Traffic Emissions

Background Air Pollutant Concentrations

5.1.1 DMRB states that for local impact assessments it is necessary to specify background concentrations upon which local, traffic-derived pollution is superimposed. These may be through local long term, ambient measurements at background sites, remote from immediate sources of pollution. As an alternative to measured background levels, DMRB recommends the use of background concentrations obtained from default concentration maps, which have been prepared for use with the revised LAQM.TG(09) guidance.

5.1.2 As no source of representative pollutant monitoring data is available, it has not been possible to carry out verification of predicted NO_2 and PM_{10} concentrations. Background NO_2 and PM_{10} concentrations have therefore been obtained from the 2011-based default concentration maps provided by Defra on their Local Air Quality Management web pages[16].

5.1.3 Current evidence suggests that background NO_2 concentrations are not decreasing in accordance with expected reductions. 2015 background concentrations and emission factors have therefore been applied to the 2025 opening year. This is considered to be a conservative approach, as it is likely that there will be some improvement in background air quality, and emission factors, before 2025.

5.1.4 The background pollutant concentrations used in the assessment are detailed in Table 17.

Table 17: Background NO_x, NO_2 and PM_{10} Concentrations Obtained from the 2011-Based Defra Default Concentration Maps (Annual Mean Concentrations in µg/m^3)

Receptors	Pollutant		
	Oxides of Nitrogen (NO_x)	Nitrogen Dioxide (NO_2)	Fine Particulate Matter (PM_{10})
ESR 1 and 2 (625500, 248500)	20.91	14.08	16.84
ESR 3, 4 and 5 (626500, 248500)	19.33	13.09	16.04
ESR 6 (627500, 248500)	18.21	12.38	15.87
ESR 7 (625500, 247500)	20.25	13.65	16.92
ESR 8 (627500, 249500)	19.90	13.44	15.72

[16] DEFRA Local Air Quality Management webpage: http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

Modelled Baseline Concentrations

5.1.5 The baseline assessment (i.e. scenarios 1 and 2) has been carried out for the seven existing sensitive receptors located outside of the Woodbridge AQMA (i.e. ESR 1 to ESR 7). The results of the assessment for ESR 8 (93a Thoroughfare) are detailed in section 6.2 of this report. The uncorrected NO_2 and PM_{10} concentrations are detailed in Table 18, and are also included in Appendix B.

Table 18: Predicted NO_2 and PM_{10} (uncorrected) Concentrations at Existing Sensitive Receptor Locations for 2015 and 2025 'Without Development' Scenarios

Receptor	Calculated Annual Mean Concentrations (µg/m³)			
	NO_2*		PM_{10}	
	Scenario 1: 2015	Scenario 2: 2025	Scenario 1: 2015	Scenario 2: 2025
ESR 1	17.74	18.21	17.71	17.83
ESR 2	16.76	17.52	17.56	17.78
ESR 3	15.00	15.48	16.53	16.66
ESR 4	16.80	17.27	16.89	17.01
ESR 5	17.19	17.98	16.98	17.18
ESR 6	16.22	17.14	16.73	16.95
ESR 7	16.98	19.69	17.79	18.52

** NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[17] in accordance with LAQM.TG(09).*

Scenario 1: 2015 Base Year

5.1.6 The 2015 baseline annual mean NO_2 concentrations (uncorrected) are predicted to range from 15.00 to 17.74µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m³) is not predicted to occur.

5.1.7 The 2015 baseline annual mean PM_{10} concentrations (uncorrected) are predicted to range from 16.53 to 17.79µg/m³ for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m³) is not predicted to occur.

[17] NO_x to NO_2 Calculator, Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOXNO2calc)

Scenario 2: 2025 Opening/Future Year, Without Development

5.1.8 The 2025 'without development' annual mean NO_2 concentrations (uncorrected) are predicted to range from 15.48 to 19.69µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m^3) is not predicted to occur.

5.1.9 The 2025 'without development' annual mean PM_{10} concentrations (uncorrected) are predicted to range from 16.66 to 18.52µg/m^3 for the seven existing sensitive receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m^3) is not predicted to occur.

5.2 Operational Phase Assessment – Odour Emissions

Existing Odour Sources

5.2.1 Woodbridge STW is located approximately 90m to the south of the proposed development. It is recognised that STW can often be odorous in nature and this will contribute to background odour levels at surrounding receptors.

5.2.2 Existing odour sources in the vicinity of the proposed development include:

- Woodbridge STW; and
- Agricultural activities within nearby Farms and Fields.

5.2.3 Sources of odour at the STW will be associated with the treatment of wastewater at various stages of the treatment process. The potential for the STW to give rise to odour will depend on factors such as site management, maintenance and the storage and odour mitigation of odourous materials such as sludge.

6 IMPACT ASSESSMENT

6.1 Construction Phase Assessment – Dust and Fine Particulate Emissions

6.1.1 The main activities involved with the construction phase of works are as follows:

- **Earthworks** which may be required prior to the construction phase of works. The main sources of dust can include:
    - Cleaning the site;
    - Stripping and stockpiling of topsoil and subsoil;
    - Ground excavation;
    - Bringing in, tipping and spreading materials on site;
    - Stockpiling materials;
    - Levelling ground;
    - Trenching;
    - Road construction; and
    - Vehicle movements on site roads.
- **Construction** which will involve the construction of individual building access roads, the car parking areas and the buildings themselves; and
- **Trackout** which is defined as the transport of dust and dirt by vehicles, travelling from a construction site on to the public road network. This may occur through the spillage of dusty materials onto road surfaces or through the transportation of dirt by vehicles that have travelled over muddy ground on the site. This dust and dirt can then be deposited and re-suspended by other vehicles.

6.1.2 There are no demolition activities associated with the proposed development. Therefore demolition doesn't need to be considered further in the assessment.

Step 2A

6.1.3 Step 2A of the construction phase dust assessment has defined the potential dust emission magnitude from earthworks, construction and trackout in the absence of site specific mitigation.

6.1.4 Examples of the criteria for the dust emission classes are detailed in the IAQM guidance.

Step 2B

6.1.5 Step 2B of the construction phase dust assessment has defined the sensitivity of the area, taking into account the significance criteria detailed in Tables 7 to 9, earthworks and construction and trackout. The sensitivity of the area to each activity is assessed for potential dust soiling and human health effects.

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

6.1.7 It is not known at this stage which direction construction vehicles will travel along Ipswich Road. However, as a worst case scenario, it has been assumed that they will turn eastwards out of the proposed development onto Ipswich Road. Therefore for trackout, there are between 10 and 100 residential receptor locations within 50m of where trackout may occur, for a distance of up to 500m from the site entrance.

Step 2C

6.1.8 Step 2C of the construction phase dust assessment has defined the risk of impacts from each activity. The dust emission magnitude is combined with the sensitivity of the surrounding area.

6.1.9 The risk of dust impacts from each activity, with no mitigation in place, has been assessed in accordance with the criteria detailed in Tables 10 to 12.

Summary

6.1.10 Table 19 details the results of Step 2 of the construction phase assessment for human receptors.

Table 19: Construction Phase Dust Assessment (Step 2) – 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	Medium

Table 19: Construction Phase Dust Assessment (Step 2) – Human Receptors				
	Activity			
	Demolition	**Earthworks**	**Construction**	**Trackout**
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
a. Total site area estimated to be more than 10,000m² *b. Total building volume to be constructed estimated to be more than 100,000m³* *c. Estimation of the dust emission class based on the assumption of 10-50 HGV movements per day* *d. Background annual mean PM_{10} concentration is taken from the LAQM Defra default concentration maps, for the appropriate grid squares for 2015, as detailed in Table 17*				

6.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Receptor Locations

6.2.1 The impact assessment has been carried out for the seven representative existing sensitive receptor locations outside of the Woodbridge AQMA (i.e. ESR 1 to ESR 7). The results of the assessment for ESR 8 (93a Thoroughfare) are detailed in section 6.2 of this report.

6.2.2 Table 20 shows the changes in pollutant concentrations for the Opening/Future Year (2025) for 'without development' and 'with development' scenarios. The uncorrected NO_2 and PM_{10} concentrations are included in Appendix B.

Table 20: Predicted NO_2 and PM_{10} (Uncorrected) Concentrations at Existing Sensitive Receptor Locations for 2025 'Without Development' and 'With Development' Scenarios			
Receptor	**Level of Development**	**Calculated Annual Mean Concentrations (µg/m³)**	
		NO_2	**PM_{10}**
ESR 1	Without development	18.21	17.83
	With development	18.40	17.88
	Percentage Change Relative to AQAL	*+0.47%*	*+0.12%*
ESR 2	Without development	17.52	17.78
	With development	17.59	17.80
	Percentage Change Relative to AQAL	*+0.18%*	*+0.05%*

Table 20: Predicted NO_2 and PM_{10} (Uncorrected) Concentrations at Existing Sensitive Receptor Locations for 2025 'Without Development' and 'With Development' Scenarios			
Receptor	**Level of Development**	**Calculated Annual Mean Concentrations (µg/m³)**	
		NO_2	**PM_{10}**
	Without development	15.48	16.66
	With development	15.50	16.67
	Percentage Change Relative to AQAL	*+0.05%*	*+0.02%*
ESR 4	Without development	17.27	17.01
	With development	17.30	17.02
	Percentage Change Relative to AQAL	*+0.08%*	*+0.01%*
ESR 5	Without development	17.98	17.18
	With development	18.02	17.19
	Percentage Change Relative to AQAL	*+0.10%*	*+0.02%*
ESR 6	Without development	17.14	16.95
	With development	17.22	16.96
	Percentage Change Relative to AQAL	*+0.20%*	*+0.05%*
ESR 7	Without development	19.69	18.52
	With development	19.75	18.54
	Percentage Change Relative to AQAL	*+0.15%*	*+0.04%*

Scenario 3: 2025 Opening/Future Year, With Development

6.2.3 The 2025 'with development' annual mean NO_2 concentrations (uncorrected) are predicted to range from 15.50 to 19.75µg/m³ for the seven existing sensitive receptor locations modelled. Exceedance of the annual mean objective concentration for NO_2 (40µg/m³) is not predicted to occur.

6.2.4 The 2025 'with development' annual mean PM_{10} concentrations (uncorrected) are predicted to range from 16.67 to 18.54µg/m³ for the seven existing sensitive receptor locations modelled. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m³) is not predicted to occur.

Assessment of Impact

6.2.5 Using the descriptors detailed in Table 12, the impact of the proposed development can be assessed at each of the seven existing sensitive receptors considered.

6.2.6 The impact on NO_2 concentrations in 2025 is detailed in Table 21.

Table 21: Impact on NO_2 Concentrations in 2025

Receptor	Percentage Change Relative to AQAL	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1	<0.5%*	<75%	Negligible
ESR 2	<0.5%*	<75%	Negligible
ESR 3	<0.5%*	<75%	Negligible
ESR 4	<0.5%*	<75%	Negligible
ESR 5	<0.5%*	<75%	Negligible
ESR 6	<0.5%*	<75%	Negligible
ESR 7	<0.5%*	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

6.2.7 The impact on PM_{10} concentrations in 2025 is detailed in Table 22.

Table 22: Impact on PM_{10} Concentrations in 2025

Receptor	Percentage Change Relative to AQAL	Annual Mean Concentration in Relation to AQAL	Impact
ESR 1	<0.5%*	<75%	Negligible
ESR 2	<0.5%*	<75%	Negligible
ESR 3	<0.5%*	<75%	Negligible
ESR 4	<0.5%*	<75%	Negligible
ESR 5	<0.5%*	<75%	Negligible
ESR 6	<0.5%*	<75%	Negligible
ESR 7	<0.5%*	<75%	Negligible
* Changes of less than 0.5% should be described as negligible			

Existing Sensitive Receptor Location within the Woodbridge AQMA

6.2.8 In addition to the assessment of the seven existing sensitive receptor locations outside of the Woodbridge AQMA, a further receptor has been considered within the AQMA boundary. ESR 8 (93a Thoroughfare) has been considered at the request of SCDC.

6.2.9 It has been requested by SCDC that rather than focusing upon absolute pollutant concentrations within the Woodbridge AQMA, the assessment should focus just upon the road component of pollutant concentrations at the chosen receptor location within the AQMA. The assessment has therefore focused upon NO_x and NO_2 concentrations, as the AQMA has been declared for exceedance of the annual mean objective for NO_2.

6.2.10 As a result, the DMRB screening tool has been run using the usual procedure to predict the road contribution NO_x concentration at ESR 8. The road contribution NO_2 concentration has then been derived using the NO_x to NO_2 calculator.

6.2.11 The results of the assessment for ESR 8 are detailed in Table 23.

Table 23: Predicted Road Contribution NO_x and NO_2 concentrations at an Existing Sensitive Receptor Location Within the Woodbridge AQMA, for 2015 and 2025 'Without Development' and 'With Development' Scenarios (Uncorrected)

Receptor	Calculated Annual Mean Concentrations (µg/m³)					
	Road Contribution NO_2 *			Road Contribution NO_x		
	Scenario 1: 2015	Scenario 2: 2025	Scenario 3: 2025	Scenario 1: 2015	Scenario 2: 2025	Scenario 3: 2025
ESR 8	4.46	5.47	5.50	8.67	10.70	10.75

** NO_2 concentrations obtained by inputting predicted NO_x concentrations into the NO_x to NO_2 calculator[18] in accordance with LAQM.TG(09).*

6.2.12 The results of the assessment show that, in 2025, the increase in the road contribution NO_x as a result of the proposed development is 0.05µg/m³. The increase in the road contribution NO_2 is 0.03µg/m³ (i.e. 0.08% of the AQAL).

6.2.13 Although these results do not present the total annual mean NO_x and NO_2 concentrations at this receptor, the criteria included within Table 12 do provide an indication of the increase in NO_2 concentrations with the development in place. The increase is 0.08% of the AQAL and this increase would be described as negligible.

[18] NO_x to NO_2 Calculator, Defra Local Air Quality Management web pages (http://laqm.defra.gov.uk/tools-monitoring-data/no-calculator.html)

Proposed Sensitive Receptor Locations

6.2.14 Air pollutant concentrations have also been modelled for the three proposed receptor locations for the 2025 'with development' scenario, as detailed in Table 24. The uncorrected NO_2 and PM_{10} concentrations are included in Appendix B.

Table 24: Predicted NO_2 and PM_{10} (Uncorrected) Concentrations at Proposed Sensitive Receptor Locations for the 2025 'With Development' Scenario

Proposed Receptor Location	Calculated Annual Mean Concentrations (µg/m³)	
	NO_2	PM_{10}
PR 1	17.42	17.82
PR 2	19.20	18.38
PR 3	14.96	17.26

Scenario 3: 2025 Opening/Future Year, With Development

6.2.15 The 2025 'with development' annual mean NO_2 concentration (uncorrected) is predicted to range from 14.96 to 19.20µg/m³ at the three proposed receptor locations considered. Exceedance of the annual mean objective concentration for NO_2 (40µg/m³) is not predicted to occur.

6.2.16 The 2025 'with development' annual mean PM_{10} concentration (uncorrected) is predicted to range from 17.26 to 18.38µg/m³ at the three proposed receptor locations considered. Exceedance of the annual mean objective concentration for PM_{10} (40µg/m³) is not predicted to occur.

6.3 Operational Phase Assessment – Rail Emissions

6.3.1 The Norwich to Ipswich railway line borders the proposed development to the south. The edge of the railway tracks are located approximately 7m from the site boundary.

6.3.2 The Defra technical guidance document LAQM.TG(09) provides guidance on those railway lines and associated infrastructure which experience heavy diesel traffic and that may therefore need to be assessed in detail.

6.3.3 A detailed assessment may be required, for these specific railway lines, where background NO_2 concentrations are higher than 25µg/m³ and there is existing or proposed relevant exposure within 30m of the edge of the railway line.

6.3.4 The section of railway line adjacent to the proposed development site is not included within LAQM.TG(09). In addition, background NO_2 concentrations for this area are well below 25µg/m^3.

6.3.5 Rail emissions, from the Norwich to Ipswich railway line are not considered to be significant at the proposed development.

6.4 Operational Phase Assessment – Odour Emissions

FIDOL Assessment

6.4.1 The scale of the odour exposure, using information provided by the met data, can be summarised using the FIDOL factors included in Table 6. The results of the assessment are detailed in Table 25.

Table 25: FIDOL Assessment

Factor	Description
Frequency	• Greater risks of high odour concentrations are likely to occur during relatively calm weather. The wind rose included in Appendix C shows that this is likely to be, at worst, 0.34% of the time • Due to the nature of the STW, the site activity is likely to be constant throughout the year
Intensity	• It has not been possible to determine the intensity of the odour; however the intensity is considered likely to be low due to dilation/dispersion that will take place over the distance between the source and receptors
Duration	• The source emissions are likely to be continuous throughout the year
Odour unpleasantness	• In accordance with guidance from the EA, odours associated with waste water may be described as 'most' offensiveness
Location	• The proposed land use is residential in nature. The closest boundary of the site is located approximately 85m to the south of the closest feature of the STW, however, the closest residential properties may be located at a distance slightly further away than this

6.4.2 The FIDOL assessment demonstrates that the proposed development is subject to the three links in the Source-Pathway-Receptor chain, and is therefore subject to experience some odour exposure. The risk of odour exposure and subsequent odour effects (impacts) on the proposed development site, will therefore take into account the Source Odour Potential, Pathway Effectiveness and Receptor Sensitivity.

Source Odour Potential

6.4.3 The precise operational measures and mitigation of the STW are unknown and therefore a worst case approach has been considered to determine the Source Odour Potential.

6.4.4 Using the standard descriptor terms as contained on the odour wheel taken from odour guidance produced by DEFRA[19], odourous compounds such as Dimethyl Disulphide (associated with the odour of cabbage) and hydrogen sulphide (associated with the odour of rotten eggs) are characteristic of the odours associated with wastewater and bio solids. As detailed in in the SEPA guidance, these examples of odourous compounds have low odour detection thresholds of less than <0.02ppm.

6.4.5 Based on the hedonic tones scores in the SEPA odour guidance, and the categories included within the EA H4 guidance, odours from STW can be classed as being within the 'most offensive' category. The hedonic score could range between -3.68 (sewer odour) and -2.47 (ammonia).

6.4.6 A summary of the risk factors for the Source Odour Potential are detailed in Table 26.

Table 26: **Source Odour Potential**

Factors affecting Source Magnitude	**Risk Factors**
Magnitude of Odour Release (taking into account odour-control measures)	Medium scale
Inherent Odorous Nature of Compounds	Odorous compounds with low odour detection thresholds
Odour Unpleasantness	Hedonic tones likely to be between -2 to -4

6.4.7 In accordance to the criteria detailed in Table 14, the Odour Source Potential is judged to be Large.

Pathway Effectiveness

6.4.8 It is important to consider the proposed receptors in terms of proximity to the odour source and the prevailing wind direction to determine the pathway effectiveness.

6.4.9 To provide information on how odour dispersion might be affected by the local weather conditions, wind speed and wind direction data have been obtained from ADM Limited for the period 2010 to 2014, for the Wattisham recording station which is located approximately 23km to the north-west.

6.4.10 The wind rose for this station is presented in Appendix C. This data shows that the prevailing wind at Wattisham is from the south westerly sectors. The proposed residential development site is not located downwind of the STW with respect to the prevailing wind direction.

[19] Department for Environment, Food and Rural Affairs, Odour Guidance for Local Authorities, March 2010

6.4.11 Low wind speeds are most effective at carrying odour i.e. less than 3ms (6 knots), as the wind fails to dilute and disperse the odour effectively. Higher wind speeds become increasingly effective at diluting and dispersing odour. The proposed development is downwind of the STW approximately 6.16% of the time, however, wind speeds are lower than 3ms for only 3.46% of the time.

6.4.12 The closest proposed residential dwellings are located along the southern edge of the proposed development and are therefore situated approximately 90m to the south east of the STW, at the closest point. The closest proposed residential receptor to the STW is shown on drawing LE12277-001 and presented as OSR1.

6.4.13 There is also a proposed public open space within the south east corner of the proposed development site. This area would be considered as an area of lower sensitivity. The assessment, therefore, considers the highest sensitivity receptors (i.e. the proposed residential dwellings), as users are expected to be present continuously or at least for extended periods of time and therefore are at a greater risk of impact from odour exposure.

6.4.14 It should however be noted that there is an existing sensitive receptor located in close proximity to the STW. This residential dwelling (i.e. Creek Farm, Sandy Lane) is located approximately 60m to the north east of the STW. This receptor location is considered to be more 'worst case' than the location of the closest proposed residential dwelling, given that it is downwind of the STW in respect to the prevailing wind direction.

6.4.15 In April 2014, SCDC confirmed that there was no history of odour complaints associated with the STW.

6.4.16 The optimum conditions for odour generation are periods when there are higher temperatures, which are most likely to occur during the summer months. When considering that the potential for odour effects is likely to be highest when both warmer temperatures prevail and the proposed receptors are located downwind of the STW (particularly when wind speeds are less than 3m/s), this further reduces the proportion of time when odour effects may be experienced.

6.4.17 The precise details of the operational activities and management of the STW is unknown. Therefore the effectiveness of dispersion and dilution is likely to be subject to any existing mitigation of emissions, the location of the STW (in relation to the prevailing wind and the proposed development site), and the wind speed. In addition, the fact that there is no odour complaint history, despite the relative proximity of an

existing sensitive receptor, has also been taken into account. The effectiveness of the odour pathway is presented in Table 27.

Table 27: Effectiveness of Odour Pathway

Receptor	Distance from Source	Direction from Source	Downwind	Pathway Effectiveness
Proposed Residential Dwellings	90m at the closest point	South East	No	Ineffective

6.4.18 From this, the pathway effectiveness is judged to be Ineffective.

Receptor Sensitivity

6.4.19 The proposed development is residential and is therefore judged to be of a High sensitivity.

Potential Odour Effects

6.4.20 The assessment of the potential odour effects at the proposed residential development is presented in Table 28.

Table 28: Likely Odour Effect at Proposed Residential Development

Source Odour Potential	Effectiveness of Pathway	Risk Of Odour Impact	Receptor Sensitivity	Likely Odour Effect
Large	Ineffective	Low Risk	High	Slight Adverse Effect

6.4.21 Based on a large source odour potential, where the pathway is deemed to be ineffective, the risk of odour impact (dose) is deemed to be low in accordance with the criteria detailed in Table 15.

6.4.22 A low risk of odour combined with a high receptor sensitivity is deemed to lead to a Slight Adverse effect, in accordance with the criteria detailed in Table 16.

7 ASSESSMENT OF SIGNIFICANCE

7.1 Operational Phase – Road Traffic Emissions

7.1.1 The significance of the overall effects of the proposed development has been assessed. This assessment is based on professional judgement and takes into account a number of factors, including:

- Baseline pollutant concentrations in the 2015 Base Year are all below the relevant annual mean objectives;
- With regard to the future baseline (i.e. the 2025 Opening Year 'without development' scenario), all pollutant concentrations are predicted to be below the relevant annual mean objectives, even when a worst case scenario is considered;
- The assessment predicts a negligible impact on NO_2 and PM_{10} concentrations at all seven existing sensitive receptor locations outside of the Woodbridge AQMA, with the development in place;
- The assessment predicts a negligible impact on NO_2 concentrations at the further receptor considered within Woodbridge AQMA; and
- All pollutant concentrations within the proposed development site are predicted to be below the relevant annual mean objectives.

7.1.2 Based on these factors, the effect of the proposed development on human health is considered to be 'not significant'.

7.2 Operational Phase – Odour Emissions

7.2.1 With regard to reaching a conclusion on the overall significance of likely odour effects, the IAQM guidance states that the findings of the different odour assessment tools used in the assessment should be drawn together.

7.2.2 The significance of the overall odour effects arising from the STW has been assessed, taking into account the following points:

- Based on a large source odour potential, and an ineffective pathway, the likely odour effect is deemed to be Slight Adverse. However, due to lack of detailed information about the operation of the STW, and any mitigation measures employed at the site, a worst case approach has been adopted;
- The Environmental Health Department at SCDC has confirmed that there is no history of odour complaints associated with the operation of the existing STW

for existing residential properties. At present, the closest existing receptor location (i.e. Creek Farm, Sandy Lane) is located approximately 60m to the north east of the STW. This receptor location is considered to be more 'worst case' than the location of the closest proposed residential dwelling, given that it is downwind of the STW in respect to the prevailing wind direction;

- A review of meteorological data from the local area suggest that the proposed development is expected to be located downwind of the source of odour for 6.16% of an average year, however, low winds speeds are estimated for approximately 3.46% of the time, with still conditions only likely to be experienced for 0.34% of the time. Higher wind speeds become increasingly effective at diluting and dispersing odour;
- When considering that the potential for odour effects is likely to be highest when both warmer temperatures prevail and the proposed receptors are located downwind of the STW (particularly when wind speeds are less than 3m/s), this further reduces the proportion of time when odour effects may be experienced; and
- The proposed development is not located downwind of the STW in respect to the south westerly prevailing wind direction.

7.2.3 Overall, taking into account the results of the qualitative assessment, the local meteorological data and odour complaint history, the potential impact from odour at the proposed development site is judged to be 'not significant', in accordance with the IAQM guidance.

8 MITIGATION MEASURES

8.1 Construction Phase Assessment – Dust and Fine Particulate Emissions

Step 3

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

8.1.2 Step 2C of the construction phase assessment identified that:

- The risk of dust soiling effects is classed as medium for earthworks, construction and trackout; and
- The risk of human health effects is classed as low for earthworks, construction and trackout.

8.1.3 This assumes that no mitigation measures are applied, except those required by legislation. Site specific mitigation measures do not need to be recommended if the risk category is negligible.

8.1.4 The risk of dust soiling and human health effects is not negligible for the activities and therefore site specific mitigation will need to be implemented to ensure dust effects from these activities will be 'not significant'.

8.1.5 A best practice dust mitigation plan will be written and implemented for the site. This will set out the practical measures that could be incorporated as part of a best working practice scheme. This will take into account the recommendations included within the IAQM guidance, which may include but are not limited to:

- Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable;
- 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; and
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of site. This may require the sweeper being continuously in use.

8.1.6 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 successful contractor.

Step 4

8.1.7 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.

8.1.8 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'.

8.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Receptor Locations

8.2.1 An air quality assessment has been undertaken to consider the potential impact of development-generated vehicles on air quality at seven existing sensitive receptor locations outside Woodbridge AQMA; as well as one location within the AQMA boundary.

8.2.2 The air quality assessment predicts that there will be a negligible impact on concentrations of NO_2 and PM_{10} at the seven existing sensitive receptor locations outside Woodbridge AQMA, in 2025 with the development in place.

8.2.3 Exceedance of the NO_2 and PM_{10} annual mean air quality objectives of 40µg/m^3 is not predicted to occur in 2025, for the seven existing sensitive receptor locations outside of the Woodbridge AQMA, for the 'without development' and 'with development' scenarios.

8.2.4 In addition, road contribution NO_x and NO_2 concentrations have been considered at one receptor location within the Woodbridge AQMA. The increase in NO_2 concentrations, with the development in place, is considered to be negligible.

Proposed Sensitive Receptor Locations

8.2.5 The air quality assessment has also predicted pollutant concentrations at three proposed receptor locations within the proposed residential development. These receptors are considered to be representative of the proposed residential areas closest to the proposed site access roads, Top Street, Ipswich Road and the A12.

8.2.6 Predicted NO_2 and PM_{10} concentrations are well below the annual mean air quality objectives of 40µg/m^3, in 2025, at all three proposed sensitive receptor locations considered.

Mitigation Strategies

8.2.7 The effect of the operation of the proposed development is predicted to be 'not significant', even when a worst case approach is adopted which assumes no improvement in backgrounds or vehicle emission factors. It may however be possible to further reduce the impact with the implementation of various mitigation strategies, which could include:

- The implementation of a green travel plan; or
- Low NO_x boilers to be installed at the proposed dwellings.

9 CONCLUSIONS

9.1 Construction Phase Assessment – Dust Emissions

9.1.1 The construction phase assessment has been undertaken to determine the risk and significance of dust effects from earthworks, construction and trackout, from the proposed development. The assessment has been undertaken in accordance with the guidance on assessing the impacts of construction phase dust published by the IAQM.

9.1.2 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.

9.1.3 With site specific mitigation measures in place, such as those detailed in Section 7 of this report, the significance of dust effects from earthworks, construction and trackout are considered to be 'not significant'.

9.2 Operational Phase Assessment – Road Traffic Emissions

Existing Sensitive Receptor Locations

9.2.1 The air quality assessment has considered the potential impact of development-generated vehicles on air quality at seven representative existing sensitive receptor locations outside Woodbridge AQMA; as well as one location within the AQMA boundary.

9.2.2 For both NO_2 and PM_{10}, all seven existing receptor locations outside of the Woodbridge AQMA are predicted to experience a negligible impact, as a result of the proposed development in 2025.

9.2.3 All predicted NO_2 and PM_{10} concentrations are well below the objective/limit values and no exceedances of the relevant annual mean air quality objective of 40µg/m^3 are predicted to occur at the seven existing receptor locations outside Woodbridge AQMA in 2025, for both the 'without development' and 'with development' scenarios.

9.2.1 In addition, road contribution NO_x and NO_2 concentrations have been considered at one receptor location within the Woodbridge AQMA and compared to the criteria within the IAQM guidance.

9.2.2 The increase in NO_2 concentrations, with the development in place, is considered to be negligible at the receptor location considered within the Woodbridge AQMA.

Proposed Sensitive Receptor Locations

9.2.3 The air quality assessment has also predicted pollutant concentrations at three proposed receptor locations within the proposed residential development. These receptors are considered to be representative of the proposed residential areas closest to the proposed site access roads, Top Street, Ipswich Road and the A12.

9.2.4 NO_2 and PM_{10} concentrations are predicted to be well below the respective annual mean air quality objectives in 2025, at the three proposed sensitive receptor locations considered.

9.3 Operational Phase Assessment – Rail Emissions

9.3.1 The assessment has also considered rail emissions from the Norwich to Ipswich railway line which borders the site to the south. This has been undertaken in accordance with the Defra technical guidance LAQM.TG(09).

9.3.2 The Norwich to Ipswich railway line is not included within LAQM.TG(09) as a line which requires detailed assessment. In addition, background NO_2 concentrations for this area are well below 25µg/m^3. As a result, rail emissions, as a result of the railway line are not considered to be significant at the proposed development.

9.4 Operational Phase Assessment – Odour Emissions

9.4.1 An assessment has been carried out, in accordance with IAQM guidance, to consider the potential risk of odour effects at the proposed development due to the Woodbridge STW. This is located approximately 90m from the site, at the closest point.

9.4.2 Based on the source odour potential and pathway effectiveness, the risk of odour impact is considered to be low. Taking into account the high receptor sensitivity, there is predicted to be a Slight Adverse effect at the proposed development. The overall effect is therefore considered to be 'not significant' in accordance with the IAQM guidance.

9.5 Mitigation Strategies

9.5.1 The effect of the operation of the proposed development is predicted to be 'not significant', even when a worst case approach is adopted which assumes no improvement in backgrounds or emission factors. It may however be possible to further reduce the impact with the implementation of various mitigation strategies, which could include:

- The implementation of a green travel plan; or
- Low NO_x boilers to be installed at the proposed dwellings.

Summary

9.5.2 This air quality assessment indicates that the proposed development generated traffic will have a 'not significant' impact on existing sensitive receptor locations in 2025, including those within the Woodbridge AQMA. It may however be possible to further reduce the impact with the implementation of mitigation strategies.

9.5.3 Rail emissions are not considered to be not significant within the proposed development.

9.5.4 The results of the odour assessment suggest that the potential for odour effects is 'not significant', when taking into account local meteorological data and the odour complaint history (in accordance with the IAQM guidance).

Appendix A:
Traffic Flow Information
Used in the Air Quality Assessment

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24hr AADT Flows Provided by Hydrock Group Limited on 22/10/2015

Link	Link Name	Speed Limit (kph)	2015 Base Year		2025 Opening Year No Development (+Committed)		2025 Opening Year Development (+Committed)	
			Total	HGV %	Total	HGV %	Total	HGV %
1	A12 South West	96	42468	5.5	53860	25.1	54807	5.0
2	A12 North East	96	39676	5.4	50523	4.9	50622	4.9
3	Ipswich Road (East of A12 North East)	48	11662	2.9	13867	2.8	14913	2.7
4	Ipswich Road (West of Top Street)	48	11594	2.0	13993	2.0	15038	1.9
5	Top Street North	96	9276	2.1	13064	1.7	13726	1.7
6	Ipswich Road (East of Top Street)	48	14046	2.2	19421	1.8	20412	1.8
7	Ipswich Road (West of Proposed Site Access)	48	14581	1.5	19941	1.3	20933	1.3
8	Ipswich Road (East of Proposed Site Access)	48	14581	1.5	19941	1.3	20230	1.3
9	Site Access (Ipswich Road)	48					1171	1.0
10	Ipswich Road (West of California)	48	13982	2.0	19238	1.7	19527	1.7
11	California	32	473	1.5	597	1.3	597	1.3
12	Ipswich Road (East of California)	32	10702	2.0	14276	1.7	14565	1.7
13	Old Barrack Road	48	3933	3.2	5803	2.5	5803	2.5
14	Ipswich Road (West of Sandy Lane)	32	10571	2.0	13822	1.8	14110	1.7
15	Sandy Lane	48	1588	1.8	1869	1.7	1869	1.7
16	Ipswich Road (East of Sandy Lane)	48	11865	2.0	15309	1.8	15597	1.8
17	Ipswich Road (West of Medical Centre)	48	13829	2.4	17177	2.2	17466	2.2
18	Medical Centre	32	1608	0.9	1972	0.8	1972	0.8
19	Cumberland Street (East of Medical Centre)	48	12464	2.6	15842	2.4	16131	2.4
20	Cherry Tree Road	32	969	0.0	1177	0.0	1177	0.0
21	Cumberland Street	48	12659	2.5	16067	2.3	16354	2.3
22	Cumberland Street (North of Station Road)	32	2277	0.0	2816	0.0	2858	0.0
23	Station Road	48	11232	2.8	14241	2.6	14486	2.6
24	Thoroughfare (South)	32	1407	0.5	1483	0.5	2034	0.4
25	St Johns Street	48	4353	1.4	5263	1.4	5298	1.4

Link	Link Name	Speed Limit (kph)	2015 Base Year		2025 Opening Year No Development (+Committed)		2025 Opening Year Development (+Committed)	
			Total	HGV %	Total	HGV %	Total	HGV %
26	Thoroughfare (North)	48	11984	2.3	15258	2.1	15461	2.1
27	Lime Kiln Quay Road	48	11184	2.2	14177	2.1	14423	2.0
28	Top Street South (South of Site Access)	96	9099	2.0	19689	2.0	19798	2.0
29	Top Street South (North of Site Access)	96	9099	2.0	19689	2.0	19852	2.0
30	Proposed Site Access (Top Street)	48					272	1.5

Appendix B:
Uncorrected Modelling Results

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Annual Mean NO_2, NOx and PM_{10} Concentrations ($\mu g/m^3$)

Receptor	2015 Base Year			2025 Opening/Future Year Without Development			2025 Opening/Future Year With Development		
	NO_x	NO_2	PM_{10}	NO_x	NO_2	PM_{10}	NO_x	NO_2	PM_{10}
ESR 1	21.20	17.74	17.71	22.12	18.21	17.83	22.50	18.40	17.88
ESR 2	19.26	16.76	17.56	20.77	17.52	17.78	20.90	17.59	17.80
ESR 3	16.75	15.00	16.53	17.68	15.48	16.66	17.72	15.50	16.67
ESR 4	20.27	16.80	16.89	21.20	17.27	17.01	21.25	17.30	17.02
ESR 5	21.03	17.19	16.98	22.62	17.98	17.18	22.69	18.02	17.19
ESR 6	19.79	16.22	16.73	21.60	17.14	16.95	21.76	17.22	16.96
ESR 7	20.10	16.98	17.79	25.51	19.69	18.52	25.63	19.75	18.54
ESR 8	28.57	17.90	16.74	30.60	18.91	16.98	30.65	18.94	16.99
PR 1							27.56	17.42	17.82
PR 2							31.14	19.20	18.38
PR 3							22.77	14.96	17.26

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Appendix C:
Wind Rose for Wattisham
Meteorological Recording Station for 2010-2014

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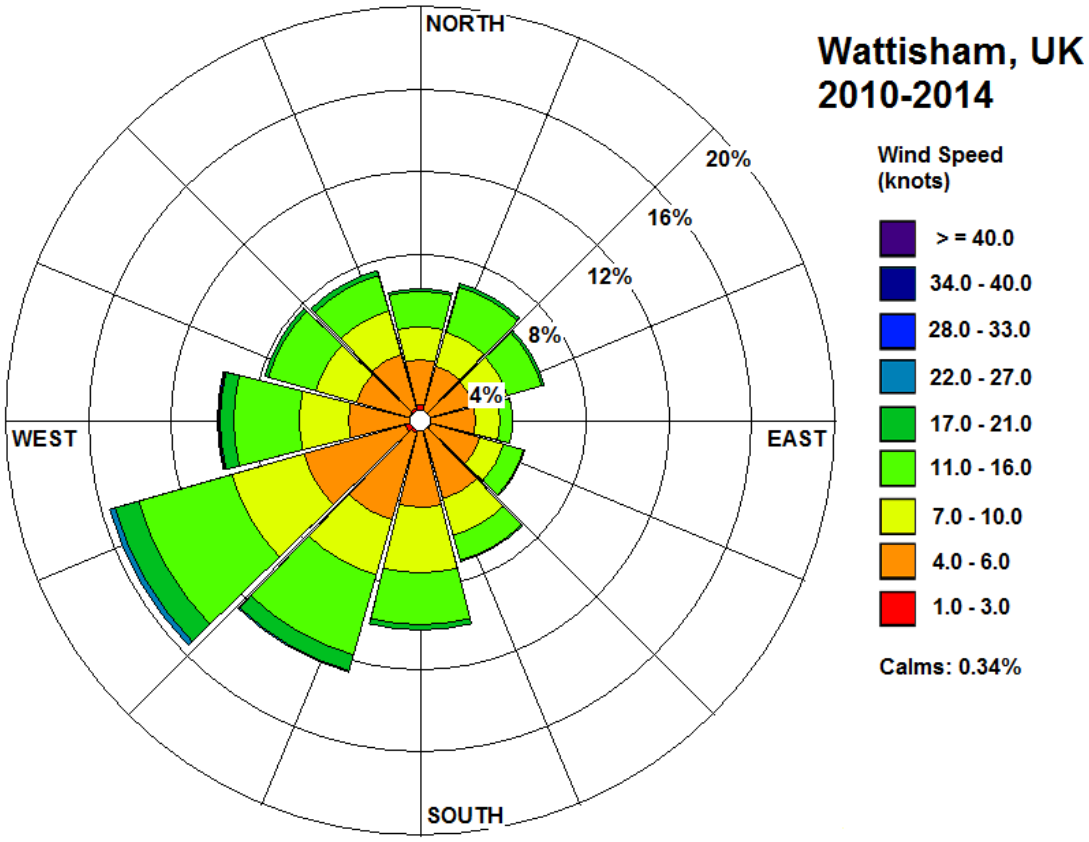
Wattisham, UK
2010-2014
Wind Speed
(knots)
> = 40.0
34.0 - 40.0
28.0 - 33.0
22.0 - 27.0
17.0 - 21.0
11.0 - 16.0
7.0 - 10.0
4.0 - 6.0
1.0 - 3.0
Calms: 0.34%
NORTH
EAST
SOUTH
WEST
4%
8%
12%
16%
20%

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Drawing

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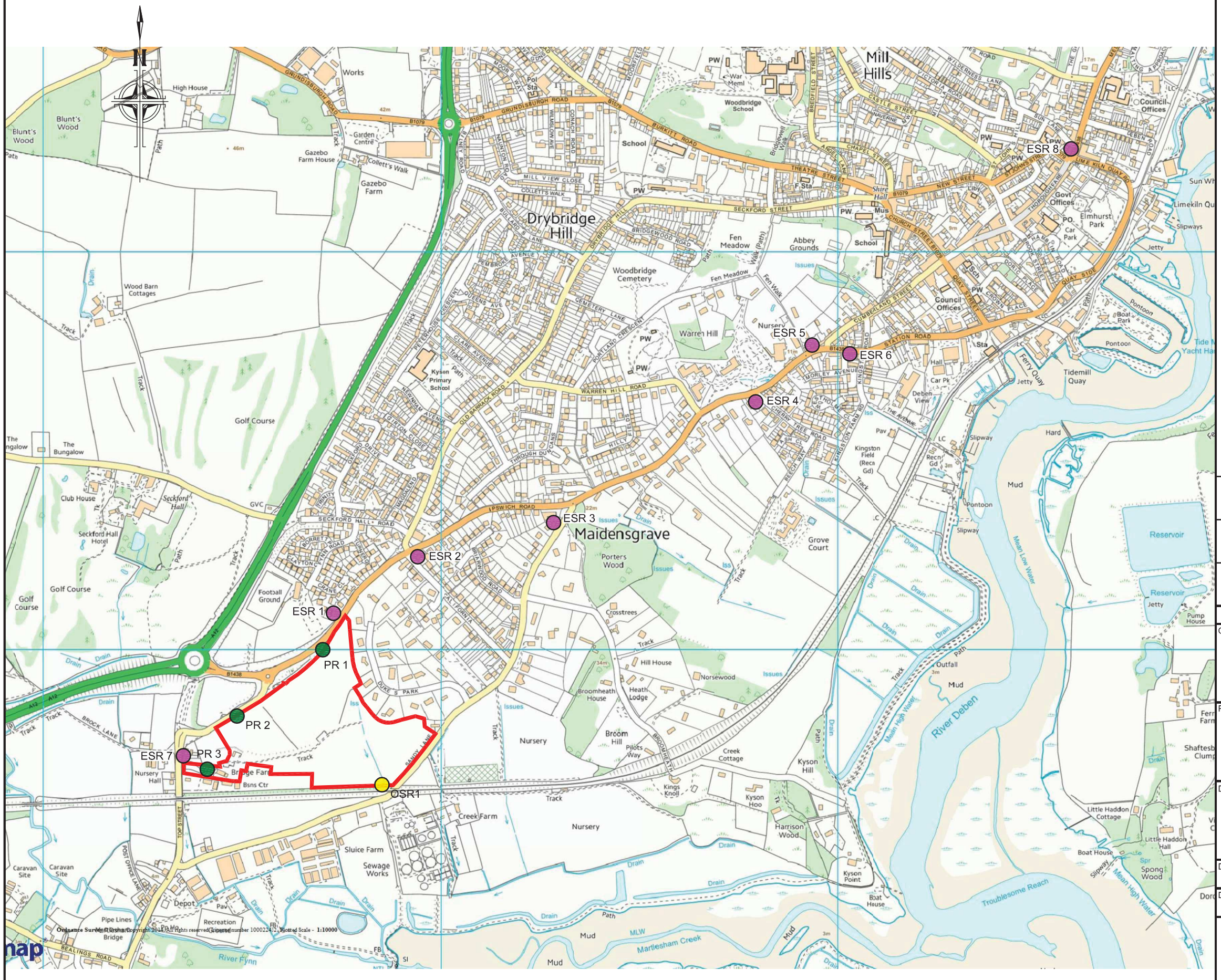

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DO NOT SCALE FROM THIS DRAWING | A3

REFERENCE

- SITE BOUNDARY
- EXISTING RECEPTOR LOCATION
- PROPOSED RECEPTOR LOCATION
- ODOUR SENSITIVE RECEPTOR LOCATION

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D
A	First Issue	16/11/15	SG	ET	MD

CLIENT

Gladman Developments Limited

PROJECT

Duke's Park
Woodbridge

DRAWING TITLE

Existing and Proposed
Sensitive Receptors

DRG No.	SCALE	DATE
LE12277-001	1:10,000 @ A3	16/11/15

DRAWN BY	CHECKED BY	APPROVED BY
SG	ET	MD

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		■ LEIGH	TEL 01942 260101
☐ NEWCASTLE UPON TYNE	TEL 0191 232 0943	☐ SHEFFIELD	TEL 0114 245 6244
☐ WEST BROMWICH	TEL 0121 580 0909	☐ EDINBURGH	TEL 0131 555 3311
☐ LONDON	TEL 020 7287 2872	☐ LIVERPOOL	TEL 0151 494 5431

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