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ACOUSTICS AND AIR QUALITY

ANC ACOUSTICS & NOISE CONSULTANTS

AIR QUALITY ASSESSMENT

on behalf of

GLADMAN DEVELOPMENTS LTD

for

LAND OFF SOUTH NEWINGTON ROAD, BLOXHAM

REPORT DATE: 29TH JANUARY 2019

REPORT NUMBER: 101540-2

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Summary

This air quality report is submitted in support of an outline planning application for a proposed residential development of approximately 95 dwellings on Land off South Newington Road, Bloxham.

The assessment considered whether the proposed development could significantly change air quality during the construction phase. With the implementation of mitigation measures the dust impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

This report provides a review of existing air quality in proximity to the proposed development site. The potential local air quality impacts associated with traffic generated by the development are assessed at existing and proposed residential receptors within the study area using the detailed dispersion model ADMS-Roads. A “standard” assessment has been completed whereby furute background concentraons and vehicle emission factors have been utilised and a sensitivity test has been completed whereby background concentration and vehicle emission factors remain at 2017 levels. The suitability of the site for residential use in terms of air quality is also considered.

Within the standard assessment, annual and short-term concentrations of NO_2 and PM_{10} are predicted to be below the respective air quality objectives for both ‘*without development*’ and ‘*with development*’ scenarios in 2024 (the opening year of the development) at all identified receptor locations. An assessment in accordance with Environmental Protection UK and Institute of Air Quality Management guidance on air quality significance criteria has identified that the local air quality impact of emissions from traffic associated with the proposed development is predicted to be ***negligible*** at all receptors except one where a ***slight*** impact is predicted.

Within the sensitivity test, the development was predicted to have a ***moderate*** impact at two receptors. The moderate impacts are primarily due to the high base concentration during opening year of the development.

No exceedance of the short term 1-hour NO_2 and 24-hour PM_{10} air quality objectives were predicted at receptor locations within any of the assessments undertaken.

The likelihood is that the impacts of this development on local air quality will fall somewhere between the results of the two assessments which have been completed. It is our opinion that the standard assessment represents a more likely outcome due to the overly pessimistic approach taken within the sensitivity test, particularly when considered with the small increases in NO_2 concentrations predicted, even within the sensitivity assessment, and the conservative nature of the modelling undertaken.

In line with national guidance, mitigation to reduce the impact of the development on air quality is recommended in the form of a travel plan and secured cycle spaces for all dwellings.

Prepared By	Melody Horan	Reviewed By	Lesley Goodall
Signed	[redacted]	Signed	[redacted]
Date	29th January 2019	Date	29th January 2019

Record of changes

Version	Date	Change	Initials
	29th January 2019	First issue	MH

Contents

1 Introduction

1.1 This air quality report is submitted in support of an outline planning application for a residential development at Land off South Newington Road, Bloxham. The site lies within the administrative boundary of Cherwell District Council (CDC).

1.2 The report provides a review of the existing air quality in proximity to the proposed development site and assesses the potential impact of the proposed development on local air quality, in accordance with Local Air Quality Management Technical Guidance[1].

1.3 Air pollution in urban areas is generally dominated by emissions from road vehicles. The quantity and composition of vehicle emissions is dependent on the type of fuel used, engine type, size and efficiency, vehicle speeds and the type of exhaust emissions abatement equipment employed.

1.4 The main pollutants of health concern from road traffic exhaust releases are nitrogen dioxide (NO_2) and fine particulates – normally assessed as the fraction of airborne particles of mean aerodynamic diameter less than ten micrometres (PM_{10}), since these pollutants are most likely to approach their respective air quality objectives in proximity to major roads and in congested areas. This assessment has therefore focused on the impact of the proposed development on concentrations of NO_2 and PM_{10}.

2 Site Description

2.1 The site is approximately 6 hectares in size and is located on the southern edge of Bloxham village. The site location is shown in **Appendix A**. It comprises two pastoral fields with a barn and farm access track on the southern boundary.

2.2 The site is bounded by existing residential properties to the north and the village of Bloxham. The A361 South Newington Road bounds the eastern boundary with agricultural fields beyond. Agricultural fields also lie both to the south and the west of the site.

3 Proposed Development

3.1 The proposal is to develop a greenfield site for approximately 95 residential dwellings. The mix of dwellings has not been fixed and layout is reserved for consideration at a later date. Vehicular access onto the site will be via a new access point off South Newington Road in the form of a single priority controlled junction.

4 Policy Context

4.1 Air Quality Objectives

4.1.1 The standards and objectives relevant to the LAQM framework have been prescribed through the Air Quality (England) Regulations (2000) and the Air Quality (England) (Amendment) Regulations 2002; the Air Quality

[1] Department for the Environment Food and Rural Affairs (2018) '*Local Air Quality Management Technical Guidance Document LAQM.TG (16)*', London: Defra.

Standards Regulations 2010 set out the combined Daughter Directive limit values and interim targets for Member State compliance.

4.1.2 The current air quality standards and objectives (for the purpose of LAQM) are presented in **Table 1**. Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health. Pollutant objectives, however, incorporate target dates and averaging periods which take into account economic considerations, practicability and technical feasibility.

Table 1: Air Quality Strategy Objectives (England) for the Purposes of Local Air Quality Management

Pollutant	Air Quality Objective		To be Achieved by
	Concentration	Measured As*	
Nitrogen dioxide (NO_2)	200 µg/m^3	1-hour mean not to be exceeded more than 18 times per year	31/12/2005
	40 µg/m^3	Annual mean	31/12/2005
Particles (PM_{10})	50 µg/m^3	24-hour mean not to be exceeded more than 35 per year	31/12/2004
	40 µg/m^3	Annual mean	31/12/2004
Particles ($PM_{2.5}$)	25 µg/m^3	Annual mean (target)	2020
	15% cut in annual mean (urban background exposure)		2010-2020

Note:*how the objectives are to be measured is set out in the UK Air Quality (England) Regulations (2000).

4.1.3 Where an air quality objective is unlikely to be met by the relevant deadline, local authorities must designate those areas as Air Quality Management Areas (AQMAs) and take action to work towards meeting the objectives. Following the designation of an AQMA, local authorities are required to develop an Air Quality Action Plan (AQAP) to work towards meeting the objectives and to improve air quality locally.

4.1.4 Possible exceedances of air quality objectives are generally assessed in relation to those locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective.

4.2 Local Planning Policy and Guidance

4.2.1 The Cherwell Local Plan 2011 – 2031 was adopted in July 2015.

4.2.2 Policy ESD 10 states that:

"… Air quality assessments will also be required for development proposals that would be likely to have a significantly adverse impact on biodiversity by generating an increase in air pollution."

4.2.3 Policy ESD 15 states that:

"…Well designed landscape schemes should be an integral part of development proposals to support improvements to biodiversity, the micro climate, and air pollution and provide attractive places that improve

people's health and sense of vitality."

5 Methodology

5.1 Data Sources

5.1.1 The air quality assessment of the proposed development was undertaken with reference to information from a number of sources, as detailed in **Table 2**.

Table 2: Key Information Sources

Data Source	Reference
Cherwell District Council (CDC)	CDC (2015) The Cherwell Local Plan 2011 – 2031 CDC 2018 Annual Status Report
Department for Environment Food and Rural Affairs (Defra)	Defra (2018) *Local Air Quality Management Technical Guidance TG (16)*
Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM)	EPUK and IAQM (January 2017) *Land Use Planning and Development Control: Planning for Air Quality (v1.2)*
Defra's LAQM Support Tools	Local Air Quality Management 1 km x 1 km grid background pollutant maps
Institute of Air Quality Management (IAQM)	IAQM (2014) *Assessment of Dust from Demolition and Construction* (v1.1)

5.2 Consultation

5.2.1 This project was originally assessed in regards to air quality in July 2017. Consultation in respect of the scope of this assessment and the methodology to be used was undertaken with Sean Gregory of CDC. Mr Gregory provided monitoring data and requested sensitivity testing in the form of unchanged vehicle emissions. Mr Gregory also requested a damage cost calculation be undertaken[2]. These have been completed and are detailed below.

5.3 Construction Dust Assessment

5.3.1 The IAQM provide guidance[3] on the assessment of air quality impacts arising from construction and demolition activities and has been used in this assessment. This section follows a risk assessment to determine the likely impact of the development on nearby receptor location during the construction phase and goes on to

[2] Email Sean Gregory (CDC) to Miller Goodall Ltd 1st June 2017.

[3] IAQM "Assessment of dust from demolition and construction" v1.1 2014

recommend mitigation measures which should be implemented to reduce any impact. The methodology for the assessment is shown in **Appendix B.** The study area in relation to construction dust and the buffer zones of <20 m, 20 m – 50 m and 50 – 100 m from site are shown in **Appendix C**.

5.4 Road Traffic Emissions Assessment

Air Dispersion Model

5.4.1 The Atmospheric Dispersion Modelling System for Roads (ADMS-Roads) v4.1.1.0 was used to assess the local air quality impact of development-generated vehicle exhaust emissions, on concentrations of NO_2 and PM_{10}, at existing receptors located adjacent to the assessed road network, and to assess the suitability of the site for residential use.

5.4.2 The ADMS-Roads model is a comprehensive tool for investigating air pollution in relation to road networks. The model uses algorithms for the height-dependence of wind speed, turbulence and stability to produce improved predictions. It can predict long-term and short-term concentrations, as well as calculations of percentile concentrations.

5.4.3 The ADMS-Roads model has been comprehensively validated in a large number of studies by the software manufacturer CERC (Cambridge Environmental Research Consultants). This includes comparisons with data from the UK's Automatic Urban Network (AUN) and specific validation exercises using standard field, laboratory and numerical data sets. CERC is also involved in European programmes on model harmonisation, and their models have been compared favourably against other EU and US EPA systems. Further information in relation to this is available from the CERC web site at www.cerc.co.uk.

Assessment Scenarios

5.4.4 The assessment considered the following scenarios:

- Scenario 1: 2017 - base year;
- Scenario 2: 2024 - opening year 'without development'; and
- Scenario 3: 2024- opening year 'with development'.
- Scenario 4: 2024 - opening year 'without development' sensitivity analysis- using emission factors and background concentrations from 2017;
- Scenario 5: 2024 - opening year 'with development' sensitivity analysis- using emission factors and background concentrations from 2017.

Traffic Data

5.4.5 24-hour annual average daily traffic (AADT) flow data are required for input into the air quality assessment. Traffic data was provided by Stirling Maynard Transportation (the transport consultants for the project), for use in the assessment.

5.4.6 The spatial scope for the assessment focused on those routes affected by the proposed development. The study area therefore included the following road links:

- South Newington Road;
- Church Street; and
- Barford Road.

5.4.7 The traffic data used in the assessment are detailed in **Appendix D**.

5.4.8 Vehicles within the study area were assumed to travel at 32 kph on all roads apart from the approach to junctions and roundabouts where queuing traffic sections were included in the model at 5 kph where appropriate, in accordance with Defra guidance (Defra, 2016).

Meteorological Data

5.4.9 Meteorological data for 2017 from the Brize Norton recording station was used in the ADMS-Roads model. This is the most representative recording station for the development site.

Model Verification

5.4.10 Model verification is the process of adjusting model outputs to improve the consistency of modelling results with respect to available monitored data. In this study, model uncertainty was minimised following Defra and EPUK guidance. The verification of the ADMS model output was achieved by modelling concentrations at existing monitoring locations within the study area and comparing the modelled concentration with measured concentrations.

Sensitive Receptors

5.4.11 Sensitive receptor locations were selected based on their proximity to road links affected by the proposed development, where the potential effect of development-related traffic emissions on local air pollution would be most significant.

5.4.12 Onsite sensitive receptor locations were selected based on the proposed site layout and proximity to road traffic.

Conversion of NOx to NO_2

5.4.13 Oxides of nitrogen (NO_x) concentrations were predicted using the ADMS-Roads model. The modelled road contribution of NO_x at the identified receptor locations was then converted to NO_2 using the NO_x to NO_2 calculator (v6.1, 2017)[4] in accordance with Defra guidance[1].

Emission Factors

5.4.14 DEFRA's Emission Factor Toolkit (EFT), which is used within the ADMS model to predict emissions from road vehicles, was updated in December 2017 to version V8.0. There appears to be some uncertainty over the accuracy of these emission factors for the year 2020 onwards.

5.4.15 To overcome this issue, the Air Quality Consultants CURED V3A spreadsheet has been used to calculate NO_x vehicle emissions for scenarios post-2019 within the "standard" assessment. CURED V3A uses the same fleet assumptions as are contained in EFT V8 but takes a more pessimistic view of the performance of post-2019 diesel cars and vans. It is considered to provide a worst-case sensitivity test. CURED V3A predicts higher NOx emissions than EFT V8.0.1 for all years from 2020 to 2030 (inclusive) but the same emissions as EFT V8.0.1 for all years prior to 2020. NO_x emission factors from CURED V3A were therefore utilised within the "standard" ADMS Roads model. PM_{10} emission factors from EFT V8 were used.

[4] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

5.4.16 As the sensitivity test used 2017 emissions factors for all scenarios, NO_2 and PM_{10} emission factors from EFT V8.0 were used within the sensitivity test.

Background Concentrations

5.4.17 The ADMS model requires the derivation of background pollutant concentration data that are factored to the year of assessment, to which the model adds contributions from the assessed roads.

5.4.18 There are no background monitoring locations in the vicinity of the proposed development and receptor locations, therefore background NO_x, NO_2 and PM_{10} concentrations were obtained from the Defra LAQM support tools for the 1 km x 1 km grid squares covering the proposed development site and receptor locations for the years of assessment (2017 and 2024).

5.4.19 The sensitivity test used 2017 background concentrations for all scenarios.

Assessment Significance Criteria

5.4.20 Guidance is provided by EPUK and IAQM on criteria for determining the significance of a developments impact on local air quality[5]. **Table 3** details the impact descriptors used for individual receptors in relation to annual mean pollutant concentrations. The overall significance of impacts was determined using professional judgement.

Table 3: Impact descriptors for individual receptors

Long term average Concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level (AQAL)*			
	1	2-5	6-10	>10
75% 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

*AQAL = Air Quality Assessment Level, which may be an air quality objective, EU limit or target value, or an Environment Agency 'Environmental Assessment Level (EAL)'

[5] EPUK (January 2017) Land Use Planning and Development Control: *Planning for Air Quality (v1.2)*

5.5 Damage Cost Calculation

5.5.1 The DEFRA Emission Factors Toolkit (EFT v8) has been used to determine the emissions to air from road traffic associated with the development and a damage costs calculation has been undertaken in accordance with the methodology provided by Defra in their guidance "Air Quality damage cost guidance"[6].

5.5.2 The input data into the EFT are as follows:

- Year – 2017;
- Road Type – Urban (not London);
- Speed- 48 kph; and
- Link Length- 10 km.

5.5.3 DEFRA have provided an excel-based tool to help appraise air quality impacts which identify cost damage vales to use, converts damage costs to relevant base year prices, uplifts damage cost and completes the calculation. The tool has been used within this assessment.

6 Baseline Air Quality

6.1 Local Air Quality Management

6.1.1 CDC has four areas where air quality does not meet the national objectives that aim to protect people's health and the environment and have declared four AQMAs, which were declared for the exceedance of the NO_2 annual mean objective. Bloxham does not have any AQMAs; the closest AQMA to the site is 5.4 km to the north east in Banbury.

6.1.2 The 2018 Air Quality Annual Status Report concluded overall NO2 concentrations have decreased in 2017 compared to the previous year. However, the AQMAs are still required.

6.2 Air Quality Monitoring

Nitrogen Dioxide (NO_2)

6.2.1 CDC does not have any automatic monitoring sites within its authority. CDC undertake diffusion tube monitoring of NO_2 across its authority. There are three diffusion tubes located within the study area. The results from the diffusion tubes are shown in **Table 4**; the locations of the tubes are shown in **Appendix E**.

[6] Defra (January 2019) *Air Quality damage cost guidance*

Table 4: Annual Mean NO_2 Concentrations Monitored by the LA within the Study Area

Site ID	Location		Annual Mean NO_2 Concentrations (µg/m^3)		
			2015	2016	2017
Church Street (Kerbside)	442940	235593	38.5	37.7	37.5
High Street (Roadside)	443045	236118	24.8	24.5	22.8
Bloxham Hill (Roadside)	443006	235744	NA	**46.6**	36.1
Annual Mean NO_2 air quality objective			40 µg/m^3		

6.2.2 The monitoring results in **Table 4** indicate that annual mean concentrations of NO_2 were below the NO_2 annual mean objective at Church Street, High Street and Bloxham Hill in 2017. The 2016 the annual mean concentration of NO_2 was above the NO_2 annual mean objective at Bloxham Hill.

6.2.3 The results indicate that the short-term objective for NO_2 is unlikely to be exceeded at the monitoring sites, as annual mean concentrations are less than 60 µgm^3 [1].

Particulate Matter (PM_{10})

6.2.4 CDC does not undertake PM_{10} monitoring.

6.3 Background Concentrations

6.3.1 There are no background monitoring locations in the vicinity of the proposed development site or at receptor locations included in the air quality assessment. Background concentrations of NO_x, NO_2 and PM_{10} were therefore obtained from the background concentration maps provided by Defra for the grid squares covering the proposed development and receptor locations[7]. These are shown in **Table 5** below.

Table 5: Background Pollutant Concentrations Obtained for the 1km x 1km Grid Squares Covering the Site and Receptor Locations*

Grid Square	Pollutant	2017	2024
		(µg/m^3)	(µg/m^3)
442500, 235500	NO_2	6.9	5.4
	PM_{10}	12.5	12.1
	NOx	9.0	6.9
443500,235500	NO_2	6.7	5.2
	PM_{10}	12.2	11.7
	NOx	8.7	6.7
443500, 236500	NO_2	7.4	5.7
	PM_{10}	12.3	11.8

[7] http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015

Grid Square	Pollutant	2017	2024
		(µg/m³)	(µg/m³)
	NOx	9.6	7.4

** Background concentrations obtained from the latest 2015 based background maps*

7 Construction Dust Impact Assessment

7.1 Step 1 – The Need for a Detailed Assessment

7.1.1 The site boundary is within 350 m of human receptors. In addition, there are human receptors within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, a detailed assessment of the construction phase of the development was undertaken. The detailed assessment has not addressed ecological receptors.

7.2 Step 2 – Assess the Risk of Dust Impacts

Step 2A Dust Emission Magnitude

7.2.1 The potential dust emission magnitude in relation to the development has been determined using the criteria detailed in **Table 1 in Appendix B**:

- Demolition: The total building volume to be demolished is <20,000 m³. The dust emission magnitude for construction is, therefore, considered to be **small**.
- Earthworks: The total site area is >10,000 m². The dust emission magnitude for earthworks is, therefore, considered to be **large**.
- Construction: The total building volume to be constructed is 25,000 – 100,000 m³. The dust emission magnitude for construction is, therefore, considered to be **medium**.
- Trackout: It is assumed that there are likely to be 10 - 50 HDV outward movements in any one day. The dust emission magnitude for trackout is, therefore, considered to be **medium**.

7.2.2 The scale and nature of works onsite were considered to determine the potential dust emission magnitude for demolition, earthworks and trackout activities as outlined in **Table 6**.

Table 6: Dust Emission Magnitudes for Each Activity

Activity	Dust Emission Magnitudes	Justification
Demolition	small	• total building volume to be demolished is <20,000 m³
Earthworks	large	• the site area is >10,000 m²
Construction	medium	• total building volume to be constructed is 25,000 – 100,000 m³
Trackout	medium	• there are likely to be 10 - 50 HDV outward movements in any one day

Step 2B Sensitivity of the Receptors to Dust Soiling and Health Effects

7.2.3 Human receptors are located in residential houses adjacent to the site within a distance of <20 m from construction, demolition and earthworks and 20 m of road edges used by traffic associated with the site construction. In accordance with the criteria in **Table 2 in Appendix B** and the IAQM guidance, the sensitivity of human receptors to the effects of dust soiling and health effects from construction, demolition, earthwork activities, and from trackout is therefore likely to be **high**.

Step 2B Sensitivity of the Area to Dust Soiling

7.2.4 The sensitivity of the area to dust soiling effects has been determined using the criteria detailed in **Table 3 in Appendix B:**

- Demolition - sensitivity is considered to be **low** as earthworks activities takes place 20 m - 50 m of 1 - 10 high sensitivity receptors;
- Earthworks - sensitivity is considered to be **high** as earthworks activities takes place <20 m of 10 - 100 high sensitivity receptors;
- Construction - sensitivity is considered to be **high** as construction activities takes place <20 m of 10 - 100 high sensitivity receptors; and
- Trackout activities – sensitivity is considered to be **high** as there are 10 - 100 high sensitivity receptors within 20 metres of roads which relevant vehicles are likely to use that are up to 200 metres from the site.

Step 2B Sensitivity of People to the Health Effects of PM_{10}

7.2.5 The background PM_{10} concentrations for 2017 and 2024 *'without* development' are shown in **Table 5.** Local levels of PM_{10} are therefore likely to be <24 µg/m^3, during the construction phase.

7.2.6 Using this information and **Table 4** in **Appendix B**, the sensitivity of human receptors to health impacts from dust and PM_{10} for each activity were defined as:

- Demolition - sensitivity is considered to be **low** as earthworks activities takes place 20 m - 50 m from 1 - 10 high sensitivity receptors and the background PM_{10} concentration is predicted to be <24 µg/m^3;
- Earthworks - sensitivity is considered to be **low** as earthworks activities takes place <20 m from 10 - 100 high sensitivity receptors and the background PM_{10} concentration is predicted to be <24 µg/m^3;
- Construction - sensitivity is considered to be **low** as construction activities takes place <20 m from 10 - 100 high sensitivity receptors and the background PM_{10} concentration is predicted to be <24 µg/m^3; and
- Trackout activities – sensitivity is considered to be **low** as there are 10 - 100 high sensitivity receptors within 20 metres of roads which relevant vehicles are likely to use that are up to 200 metres from the site, and the background PM_{10} concentration is predicted to be <24 µg/m^3.

7.2.7 The sensitivity of the area to dust soiling and human health in each activity is summarised in **Table 7**.

Table 7: Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	low	high	high	high
Human Health	low	low	low	low

Step 2C Risk of Impacts

7.2.8 The dust emission magnitude and sensitivity of the area were combined and the risk of impacts determined using the criteria detailed in **Table 5 to Table 8 in Appendix B.**

- Demolition – is considered to be **negligible** risk for dust soiling and **negligible** risk for human health;
- Earthworks – is considered to be **high** risk for dust soiling and **low** risk for human health;
- Construction – is considered to be **medium** risk for dust soiling and **low** risk for human health; and
- Trackout activities – is considered to be **medium** risk for dust soiling and **low** risk for human health;

7.2.9 A summary of the risks, before mitigation measures are applied, for dust soiling and human health are shown in **Table 8**.

Table 8: Risk of Dust Impacts

Potential Impact	Dust Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	negligible	high	medium	medium
Human Health	negligible	low	low	low

7.3 Step 3 – Site-Specific Mitigation

7.3.1 Step 3 of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to the site risk for each activity. Good practice mitigation measures highly recommended for the proposed development taken from the IAQM guidance are detailed below.

7.3.2 The general mitigation measures (for site management, preparing and maintaining the site, operating vehicle/machinery, operations and waste management), are appropriate for a site with a 'medium risk' classification (in this instance the site is classified as "high" risk due to earthworks)[8]. Mitigation measures specific to earthworks, construction and trackout are proposed based on the risk classifications in **Table 8**.

7.3.3 Recommended mitigation measures are shown in **Appendix F.**

[8] For those mitigation measures that are general, the highest risk category should be applied. For example, if the site is medium risk for earthworks and construction, but a high risk for demolition and track-out, the general measures applicable to a high risk site should be applied.

7.4 Step 4 – Determine Significant Effects

7.4.1 The characteristics of the site and the surrounding area suggest that mitigation would not be impracticable or ineffective. With the implementation of the above mitigation measures, therefore, the residual impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

8 Road Traffic Assessment

8.1 Existing Receptor Locations

8.1.1 Existing sensitive receptor locations were identified within the study area for consideration in the assessment. Predicted changes in NO_2 and PM_{10} concentrations, as a result of development-generated traffic, were calculated at these locations. The sensitive receptor locations are detailed in **Table 9** and **Appendix G**.

Table 9: Sensitive Receptor Locations

Receptor	Grid Ref	
R1	442833	235421
R2	443035	235917
R3	443037	236033
R4	442992	235731
R5	442958	235651
R6	442949	235593
R7	442926	235553
R8	443010	235746
R9	443043	236118
R10	442714	235375

8.2 Proposed Receptor Locations

8.2.1 One proposed residential receptor location was considered within the development site. NO_2 and PM_{10} concentrations were calculated at this location to determine whether future site users may be exposed to elevated pollutant levels. These receptor locations were chosen as representative of worst case locations due to being in the closest proximity to South Newington Road

8.2.2 The proposed sensitive receptor locations are presented in **Table 10** and **Appendix G**.

Table 10: **Proposed Sensitive Receptor Locations**

Receptor	Grid Ref	
R11	442498	235161

8.3 Model Verification

8.3.1 Monitoring is undertaken by CDC at three monitoring sites within the study area using diffusion tubes as shown in **Appendix E**. Concentrations of NO_2 at this site was predicted for use within the ADMS model in the verification process as detailed in **Table 11**.

8.3.2 All modelled road NO_x concentrations were adjusted by a factor of 1.5 **(Table 11)**. A comparison of adjusted modelled total NO_2 and monitored total NO_2 suggests that the adjusted model is performing very well, as the difference between modelled and monitored concentrations are within 96.1% of each other.

8.3.3 There is no PM_{10} monitoring undertaken within the study area, therefore it was not possible to undertake verification of PM_{10} concentrations.

Table 11: NO_2 Model Verification Procedure

Monitor	Monitored Total NO_2	Monitored Road NO_x	Background NO_2	Background NO_x	Monitored Road Contribution NO_2 (total - background)	Modelled Road Contribution NO_x (excludes background)	Ratio of Monitored Road Contribution NO_x / Modelled Road Contribution NO_x	Adjustment Factor	Adjusted Road Contribution NO_x	Adjusted Modelled Total Nox (including background NO_x)	Modelled Total NO_2 (based on empirical NO_x / NO_2 relationship)	% Difference [(modelled - monitored) / monitored] x 100
Church St	37.5	63.2	6.9	9.0	30.6	44.54	1.4	1.50	66.8055	75.8	38.97	3.9
High St	22.8	30.6	7.4	9.6	15.4	20.36	1.5	1.50	30.5436	40.2	22.78	-0.1
Bloxham Hill	36.1	60.0	6.7	8.7	29.4	41.84	1.4	1.50	62.7651	71.5	37.22	3.1

8.4 Baseline Assessment

8.4.1 The ADMS model was used to estimate contributions of vehicle exhaust emissions to annual and short term NO_2 and PM_{10} concentrations for the '*baseline*' and '*without development'* scenarios considered in the assessment.

8.4.2 The 24-hour AADT flows used in the assessment for *'without development'* scenarios are detailed in **Appendix D**. **Table 12** details the results of the baseline assessment.

Table 12: Predicted Baseline NO_2 and PM_{10} Annual Mean Concentrations (µg/m^3) at Sensitive Receptor Locations

Receptor	Receptor Height above Ground Level (m)	Scenario 1: Base Year (2017)		Scenario 2: Without Development (2024)		Scenario 4: Without Development - Sensitivity (2024)	
		NO_2 (µg/m^3)	PM_{10} (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
R1	1.5	19.5	13.6	17.9	13.2	21.5	13.4
R2	1.5	27.1	14.4	25.5	14.1	30.1	14.2
R3	1.5	21.2	13.8	19.5	13.4	23.6	13.5
R4	1.5	38.3	15.5	36.6	15.3	**42.7**	15.6
R5	1.5	25.0	13.8	23.1	13.4	27.9	13.6
R6	1.5	**40.1**	15.5	38.9	15.3	**44.7**	15.5
R7	1.5	23.6	13.9	22.9	13.5	26.3	13.7
R8	1.5	26.8	14.4	25.1	14.0	29.9	14.2
R9	1.5	22.3	13.6	23.9	13.0	24.9	13.3
R10	1.5	19.5	13.4	17.7	13.0	21.4	13.1
				Annual Mean NO_2 & PM_{10} Air Quality Objective			**40 (µg/m^3)**

8.4.3 The baseline air quality assessment for the scenario 1 (Baseline 2017) shows that concentrations of NO_2 and PM_{10} are below their respective annual mean air quality objective of 40 µg/m^3 at all receptors except R6 for NO_2.

8.4.4 In scenario 2 (2024 Without development), the concentrations of NO_2 and PM_{10} are below the respective annual mean air quality objectives at all receptors. For the sensitivity test, scenario 4 (2024 without development sensitivity test), there are two receptors, R4 and R6, which are above the NO_2 annual objective. All other receptors in scenario 4 are exposed to concentrations of NO_2 and PM_{10} are below the respective annual mean air quality objectives.

8.4.5 In accordance with Defra guidance[1], it may be assumed that exceedances of the 1-hour mean Objective for NO_2 are unlikely as the predicted annual mean concentrations are less than 60 µg/m^3. The short term PM_{10} Objective is predicted to be met at all identified receptor locations with no exceedances of the daily mean Objective of 50 µg/m^3.

8.5 Scenario 3: Road Traffic Impact Assessment

Existing Receptors

8.5.1 Predicted NO_2 and PM_{10} concentrations for the opening year (2024) *'with development'* scenario are detailed in **Table 13**. Predicted concentrations for the *'without development'* scenario and the predicted change in NO_2, and PM_{10} concentrations, as a result of the proposed development, are also shown for comparison purposes.

8.5.2 Changes in predicted pollutant concentrations between the without development scenario and the with development scenario were compared to the significance criteria detailed in EPUK and IAQM guidance[5] and contained within **Table 3** above.

Table 13 Dispersion Modelling Results and Significance of Development for the Opening Year (2024) Scenario at Existing Receptor Locations

Receptor name	Difference in opening year without and with development	Annual average NO_2 (µg/m³)	Significance	Annual average PM_{10} (µg/m³)	Significance
R1	Without Development	17.88	Negligible	13.22	Negligible
	With Development	18.24		13.25	
	% Change relative to AQAL & (Impact)	1(+0.36)		0(+0.03)	
	% of AQAL with Development	46		33	
R2	Without Development	25.48	Negligible	14.06	Negligible
	With Development	25.74		14.09	
	% Change relative to AQAL & (Impact)	1(+0.26)		0(+0.03)	
	% of AQAL with Development	64		35	
R3	Without Development	19.45	Negligible	13.38	Negligible
	With Development	19.64		13.40	
	% Change relative to AQAL & (Impact)	0(+0.19)		0(+0.02)	
	% of AQAL with Development	49		34	
R4	Without Development	36.58	Negligible	15.30	Negligible
	With Development	36.95		15.35	
	% Change relative to AQAL & (Impact)	1(+0.37)		0(+0.05)	
	% of AQAL with Development	92		38	
R5	Without Development	23.12	Negligible	13.39	Negligible
	With Development	23.37		13.42	
	% Change relative to AQAL & (Impact)	1(+0.25)		0(+0.03)	
	% of AQAL with Development	58		34	
R6	Without Development	38.93	**Slight**	15.26	Negligible
	With Development	**39.34**		15.32	

	% Change relative to AQAL & (Impact)	1(+0.41)		0(+0.06)	
	% of AQAL with Development	98		38	
R7	Without Development	22.93	Negligible	13.49	Negligible
	With Development	23.21		13.52	
	% Change relative to AQAL & (Impact)	1(+0.28)		0(+0.03)	
	% of AQAL with Development	58		34	
R8	Without Development	25.13	Negligible	14.01	Negligible
	With Development	25.39		14.04	
	% Change relative to AQAL & (Impact)	1(+0.26)		0(+0.03)	
	% of AQAL with Development	63		35	
R9	Without Development	23.89	Negligible	13.05	Negligible
	With Development	24.12		13.06	
	% Change relative to AQAL & (Impact)	1(+0.23)		0(+0.01)	
	% of AQAL with Development	60		33	
R10	Without Development	17.68	Negligible	13.02	Negligible
	With Development	18.04		13.06	
	% Change relative to AQAL & (Impact)	1(+0.36)		0(+0.04)	
	% of AQAL with Development	45		33	

8.5.3 All receptors are expected to have an increase of less than 0.5 µg/m^3 for both NO_2 and PM_{10}.

8.5.4 The results of the ADMS modelling assessment for 2024 indicate that annual mean concentrations of NO_2 and PM_{10} would be below the respective annual objectives in 2024, at all existing sensitive receptor locations within the study area, both '*with*' and '*without*' the development.

8.5.5 In accordance with Defra guidance[1], it may be assumed that exceedances of the 1-hour mean objective for NO_2 are unlikely as the predicted annual mean concentrations are less than 60 µg/m^3. The 24-hour PM_{10} objective of 50 µg/m^3 is predicted to be met at all modelled locations.

8.5.6 Predicted annual mean NO_2 and PM_{10} concentrations in the '*with development'* scenario are all 98% or less of the AQAL. It is likely that concentrations predicted at individual receptor locations are also worst case scenario as they have been chosen due to being close to the main junctions used by the development. The proposed development is therefore predicted to have a ***negligible*** impact on concentrations of NO_2 and PM_{10} in 2024 at all receptors except R6. At R6, the development is expected to have a **slight** impact in relation to NO_2 concentrations, the development is expected to cause an increase of 0.41 µg/m^3 for NO_2.

Proposed Receptors

8.5.7 Predicted NO_2 and PM_{10} concentrations for the assessment years (2024) '*with development'* scenario at proposed receptor locations are detailed in **Table 14.**

Table 14: Predicted Annual Mean Pollutant Concentrations for 2024 at Proposed Receptor Locations

Receptor	Receptor Height above Ground Level (m)	Annual Average Concentration (µg/m^3)	
		NO_2	PM_{10}
R11	1.5	12.28	12.49
Annual Mean NO_2 & PM_{10} Air Quality Objective (µg/m^3)		**40 µg/m^3**	

8.5.8 The results of the dispersion modelling assessment indicate that annual mean concentrations of NO_2 and PM_{10} would be below the respective objectives in 2024 at proposed residential receptors once the development is operational.

8.5.9 All predicted NO_2 concentrations are well below 60 µg/m^3 and therefore, in accordance with guidance in LAQM.TG (16), the 1 hour mean objective is unlikely to be exceeded. The short term PM_{10} objective is predicted to be met at all proposed receptor locations with no exceedances of the daily mean objective of 50 µg/m^3.

8.5.10 Concentrations of NO_2 and PM_{10} are predicted to be well below the respective annual mean and short-term objectives in 2024 at proposed residential receptors, the site is therefore considered suitable for residential use with regards to air quality.

8.6 Scenario 5: Road Traffic Impact Assessment Sensitivity Analysis

8.6.1 The sensitivity analysis is a conservative assessment as vehicle emission factors and background concentrations are kept at baseline (2017) levels. It is, therefore, likely that the sensitivity analysis assessment is over predicting the NO_2 concentrations.

8.6.2 Predicted NO_2 and PM_{10} concentrations for the opening year (2024) 'with development sensitivity analysis' scenario are detailed in **Table 15**. Predicted concentrations for the 'without development sensitivity analysis' scenario and the predicted change in NO_2, and PM_{10} concentrations, as a result of the proposed development, are also shown for comparison purposes.

8.6.3 Changes in predicted pollutant concentrations between the without development scenario and the with development scenario were compared to the significance criteria detailed in EPUK and IAQM guidance[5] and contained within **Table 3** above.

Table 15 Dispersion Modelling Results and Significance of Development for the Sensitivity Scenario at Existing Receptor Locations

Receptor name	Difference in opening year without and with development	Annual average NO_2 (µg/m^3)	Significance	Annual average PM_{10} (µg/m^3)	Significance
R1	Without Development	21.49	Negligible	13.35	Negligible
	With Development	21.92		13.39	
	% Change relative to AQAL & (Impact)	1(+0.43)		0(+0.04)	
	% of AQAL with Development	55		33	
R2	Without Development	30.12	Negligible	14.22	Negligible
	With Development	30.49		14.25	
	% Change relative to AQAL & (Impact)	1(+0.37)		0(+0.03)	
	% of AQAL with Development	76		36	
R3	Without Development	23.58	Negligible	13.54	Negligible
	With Development	23.86		13.57	
	% Change relative to AQAL & (Impact)	1(+0.28)		0(+0.02)	
	% of AQAL with Development	60		34	
R4	Without Development	**42.65**	**Moderate**	15.57	Negligible
	With Development	**43.18**		15.62	
	% Change relative to AQAL & (Impact)	1(+0.53)		0(+0.06)	
	% of AQAL with Development	108		39	
R5	Without Development	27.93	Negligible	13.61	Negligible
	With Development	28.30		13.64	
	% Change relative to AQAL & (Impact)	1(+0.37)		0(+0.03)	
	% of AQAL with Development	71		34	
R6	Without Development	**44.65**	**Moderate**	15.52	Negligible
	With Development	**45.22**		15.58	
	% Change relative to AQAL & (Impact)	1(+0.57)		0(+0.06)	
	% of AQAL with Development	113		39	
R7	Without Development	26.31	Negligible	13.70	Negligible
	With Development	26.68		13.73	
	% Change relative to AQAL & (Impact)	1(+0.37)		0(+0.03)	
	% of AQAL with Development	67		34	
R8	Without Development	29.85	Negligible	14.19	Negligible
	With Development	30.22		14.22	
	% Change relative to AQAL & (Impact)	1(+0.37)		0(+0.04)	

	% of AQAL with Development	76		36	
R9	Without Development	24.90	Negligible	13.28	Negligible
	With Development	25.25		13.30	
	% Change relative to AQAL & (Impact)	1(+0.35)		0(+0.02)	
	% of AQAL with Development	63		33	
R10	Without Development	21.42	Negligible	13.14	Negligible
	With Development	21.86		13.18	
	% Change relative to AQAL & (Impact)	1(+0.44)		0(+0.04)	
	% of AQAL with Development	55		33	

8.6.4 All receptors are expected to have an increase of less than 0.57 μg/m^3 for both NO_2 and PM_{10}.

8.6.5 The results of the sensitivity modelling assessment for 2024 indicate that annual mean concentrations of NO_2 and PM_{10} would be below the respective annual objectives in 2024, at all existing sensitive receptor locations within the study area, both '*with*' and '*without*' the development except at R4 and R6.

8.6.6 In accordance with Defra guidance[1], it may be assumed that exceedances of the 1-hour mean objective for NO_2 are unlikely as the predicted annual mean concentrations are less than 60 μg/m^3. The 24-hour PM_{10} objective of 50 μg/m^3 is predicted to be met at all modelled locations.

8.6.7 Excluding R4 and R6, predicted annual mean NO_2 and PM_{10} concentrations in the '*with development'* scenario are all 76% or less of the AQAL. It is likely that concentrations predicted at individual receptor locations are also worst-case scenario as they have been chosen due to being close to the main junctions used by the development. The proposed development is therefore predicted to have a ***negligible*** impact on concentrations of NO_2 and PM_{10} in 2024 at all receptors, except R4 and R6.

8.6.8 At R4 and R6, the development is expected to have a **moderate** impact for NO_2 concentrations, the development is predicted to cause an increase of 0.53 μg/m^3 for NO_2 at R4 and of 0.57 μg/m^3 for NO_2 at R6. Therefore, the NO_2 impact at R4 and R6 is predominately due to the fact that the annual average NO_2 concentrations in the 'without development sensitivity' scenario are above the annual objective.

Proposed Receptors

8.6.9 Predicted NO_2 and PM_{10} concentrations for the '*with development'* sensitivity scenario at proposed receptor locations are detailed in **Table 16**.

Table 16 Predicted Annual Mean Pollutant Concentrations for 2024 at Proposed Receptor Locations

Receptor	Receptor Height above Ground Level (m)	Annual Average Concentration (μg/m^3)	
		NO_2	PM_{10}
R11	1.5	15.16	12.43
Annual Mean NO_2 & PM_{10} Air Quality Objective (μg/m^3)		**40 μg/m^3**	

8.6.10 The results of the dispersion modelling assessment indicate that annual mean concentrations of NO_2 and PM_{10} would be below the respective objectives in the 'with development' sensitivity scenario at proposed residential receptors once the development is operational.

8.6.11 All predicted NO_2 concentrations are well below 60 µg/m^3 and therefore, in accordance with guidance in LAQM.TG (16), the 1 hour mean objective is unlikely to be exceeded. The short term PM_{10} objective is predicted to be met at all proposed receptor locations with no exceedances of the daily mean objective of 50 µg/m^3.

8.6.12 Concentrations of NO_2 and PM_{10} are predicted to be well below the respective annual mean and short-term objectives in the sensitivity with development scenario at proposed residential receptors, the site is therefore considered suitable for residential use with regards to air quality.

9 Damage Cost Calculation

9.1 The damage cost calculation confirms that the development will generate an increase in AADT of 9 HGV and 441 LGV. Traffic calculations have been provided by Stirling Maynard Transportation.

9.2 The DEFRA Emission Factors Toolkit (EFT v8.0.1) has been used to determine the emissions to air from road traffic associated with the development and a damage costs calculation has been undertaken. The calculated emissions have been multiplied by the damage cost of each pollutant to determine the air pollution damage costs associated with the development.

9.3 The calculations have been based on the total number of vehicles associated with the development, 441 LDV and 9 HDV AADT, to provide a worse-case scenario. **Table 17** below shows the damage costs calculation for NO_x and $PM_{2.5}$.

Table 17: Base Impact Damage Costs Calculation

Pollutant	Annual Emissions (kg/yr) (from the EFT calculation)	Annual Emissions (tonne/yr)	Cost per tonne	Damage Costs per Pollutant per year*
NOx	382.42	0.38	£6,199	£5,328.00
$PM_{2.5}$	22.77	0.02	£105,836	£5,296.00
Total Damage Cost Associated with the Development over 5 years				**£53,120.00**

*includes 2% uplift in accordance to Defra Guidelines.

9.4 **Table 15** shows the total damage cost calculations associated with the development over a 5-year period is £53,120.00.

10 Road Traffic Mitigation Measures

10.1 The damage cost calculation concludes that £53,120 should be spent over a five-year period to counteract any air pollution damages associated with the development.

10.2 Stirling Maynard Transportation Consultants have prepared a framework travel plan for the development to encourage sustainable travel to and from the site by future residents with the aim to reduce single occupancy car journeys and thus reduce development associated vehicle emissions. The travel plan proposes that all new residents will receive a sustainable travel pack which will include:

- Details of local public transport services to include maps, timetables and application forms for subsided public transport tickets;
- Maps of local facilities such as schools and shops;
- Maps of local cycle paths, walking routes and public rights of ways;
- Details of car share clubs;
- Details of local bicycle stores and details of discounts cycle offers;
- Secure cycle parking will be provided for all residents;
- Regular marketing of sustainable travel modes including campaigns and raising awareness of the benefits sustainable travel.

10.3 The transport consultants have confirmed that the five-year cost of a travel plan for a large development of this size would be in the region of £60,000[9]. It is, therefore, considered that the proposed mitigation is suitable in terms of counteracting the development damages to air pollution.

11 Summary of Impacts and Conclusion

11.1 A road traffic emissions assessment was undertaken to consider the impact of vehicle exhaust emissions associated with the proposed development, on identified receptor locations within the study area.

11.2 The assessment considered whether the proposed development could significantly change air quality during the construction phase. With the implementation of mitigation measures the dust impacts from the construction are considered to be not significant, in accordance with IAQM guidance.

11.3 The site is considered suitable for residential use as the proposed receptor location was below the NO_2 and PM_{10} annual objective in the opening year with development within the standard assessment and sensitivity test.

11.4 In the standard assessment, annual concentrations of NO_x and PM_{10} were predicted to be well below the respective air quality objectives for both '*without development*' and '*with development*' scenarios in 2024 at all modelled receptor locations. An assessment in accordance with Environmental Protection UK and Institute of Air Quality Management guidance on air quality significance criteria has identified that the local air quality impact of emissions from traffic associated with the proposed development is predicted to be negligible at all receptors except R6 which will have a slight impact.

11.5 The sensitivity test used 2017 background and emission factors for all modelled scenarios to provide a worst-case scenario. Within the sensitivity test, the development was predicted to have a moderate impact at two receptors. The moderate impacts are primarily due to the high base concentration during opening year of the development.

11.6 No exceedance of the short term 1-hour NO_2 and 24-hour PM_{10} air quality objectives were predicted at receptor locations within any of the assessments undertaken.

11.7 The likelihood is that the impacts of this development on local air quality will fall somewhere between the results of the two assessments which have been completed. It is our opinion that the standard assessment represents a more likely outcome due to the overly pessimistic approach taken within the sensitivity test, particularly when

[9] Email from Nigel Weeks of Stirling Maynard Transportation to Miller Goodall on 30th June 2017.

considered with the small increases in NO_2 concentrations predicted, even within the sensitivity assessment, and the conservative nature of the modelling undertaken.

11.8 In line with national guidance, mitigation to reduce the impact of the development on air quality is recommended in the form of a travel plan and secured cycle spaces for all dwellings.

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APPENDICES

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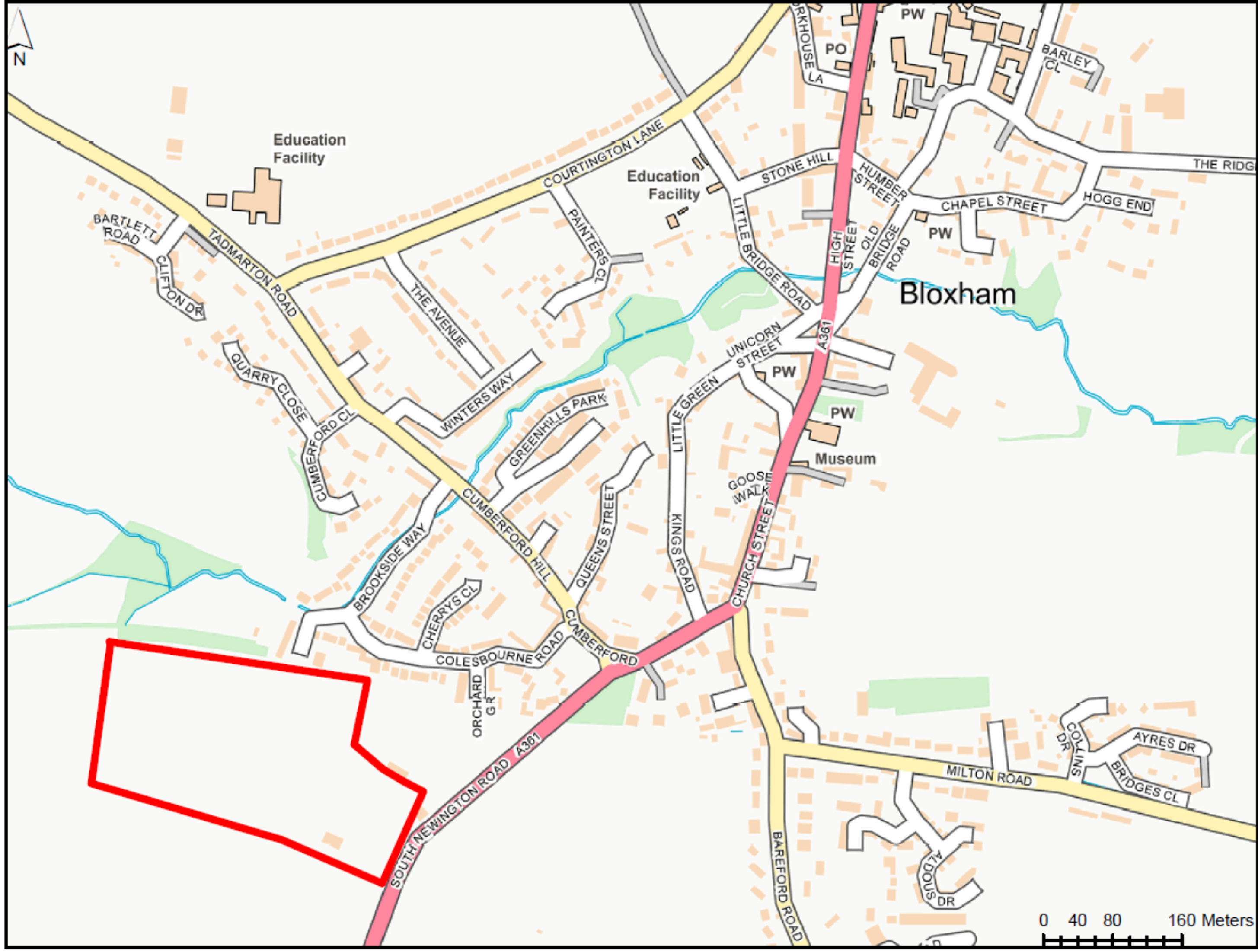
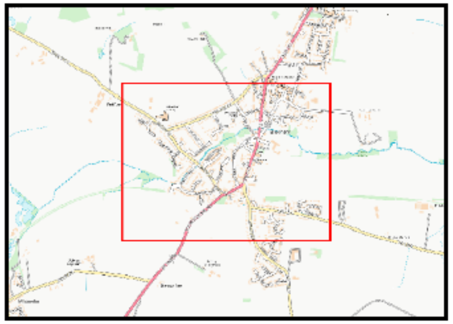
Appendix A: Site Location



Legend

Site Outline



1	23/01/2019	Initial Issue	MH	LG
Rev	Date	Purpose of revision	Drawn By	Approved By

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project: Land off South Newington Road, Bloxham

Client: Gladman Developments Ltd

Report Number: 101540-2

Scale @ A4: 1:7,943

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Appendix B: Dust Risk Assessment Methodology

The following section outlines criteria developed by the IAQM for the assessment of air quality impacts arising from construction and demolition activities[10]. The assessment procedure is divided into four steps and is summarised below:

Step 1: Screen the Need for a Detailed Assessment

An assessment will normally be required where there are human receptors within 350 m of the site boundary and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s). Ecological receptors within 50 m of the site boundary or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), are also identified at this stage. An ecological receptor refers to any sensitive habitat affected by dust soiling. For locations with a statutory designation, such as a Site of Specific Scientific Interest (SSSI), Special Area of Conservation (SACs) and Special Protection Areas (SPAs), consideration should be given as to whether the particular site is sensitive to dust. Some non-statutory sites may also be considered if appropriate.

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is 'negligible' and any effects will not be significant.

Step 2: Assess the Risk of Dust Impacts

In step two, a site is allocated to a risk category on the basis of the scale and nature of the works (Step 2A) and the sensitivity of the area to dust impacts (Step 2B). These two factors are combined in Step 2C to determine the risk of dust impacts before the implementation of mitigation measures. The assigned risk categories may be different for each of the construction activities outlined by the IAQM (construction, demolition, earthworks and trackout). A site can be divided into zones, for example on a large site where there are differing distances to the nearest receptors.

Step 2A: Define the Potential Dust Emission Magnitude

Dust emission magnitude is based on the scale of the anticipated works and is classified as Small, Medium or Large. The IAQM guidance recommends that the dust emission magnitude is determined separately for demolition, earthworks, construction and trackout. **Table 1** describes the potential dust emission class criteria for each outlined activity.

Table 1: Criteria Used in the Determination of Dust Emission Magnitude

Activity	Criteria used to Determine Dust Emission Magnitude		
	Small	Medium	Large
Demolition	Total building volume <20,000 m^3, construction materials with low potential for dust release.	Total building volume 20,000 m^3 – 50,000 m^3, potential dusty construction material.	Total building volume >50,000 m^3, potentially dusty construction material.
Earthworks	Total site area <2,500 m^2, soil type with large grain	Total site area 2,500 – 10,000 m^2, moderately dusty soil type	Total site area >10,000 m^2, potentially dusty soil type
Construction	Total building volume <25,000 m^3.	Total building volume 25,000 – 100,000 m^3.	Total building volume >100,000 m^3.

[10] IAQM "Assessment of dust from demolition and construction" 2014

Activity	Criteria used to Determine Dust Emission Magnitude		
	Small	Medium	Large
Trackout	<10 outward HDV trips in any one day. Unpaved road length <50 m.	10-50 outward HDV trips in any one day. Unpaved road length 50-100 m.	>50 outward HDV trips in any one day. Unpaved road length >100 m.

Step 2B: Define the Sensitivity of the Area

The sensitivity of the area takes into account the following factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of receptors;
- the local background PM_{10} concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of windblown dust.

The criteria detailed in **Table 2** is used to determine the sensitivity of the receptor in relation to dust soiling, health effects and ecological effects.

Table 2: Criteria for Determining Sensitivity of Receptors

Sensitivity of Receptor	Criteria for Determining Sensitivity		
	Dust Soiling Effects	Health Effects of PM_{10}	Ecological Sites
High	Dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms	Residential properties, hospitals, schools and residential care homes	International or national designation *and* the features may be affected by dust soiling
Medium	Parks, places of work	Office and shop workers not occupationally exposed to PM_{10}	Presence of an important plant species where dust sensitivity is uncertain or locations with a national designation with features that may be affected by dust deposition
Low	Playing fields, farmland, footpaths, short-term car parks and roads	Public footpaths, playing fields, parks and shopping streets	Local designation where features may be affected by dust deposition

Table 3 and **Table 4** are then used to define the sensitivity of the area to dust soiling and human health effects. This should be derived for each of construction, demolition, earthworks and trackout.

Table 3: Sensitivity of the Area to Dust Soiling Effects on People and Property.

Receptor Sensitivity	Number of Receptors	Distance from Source (m)*			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low

Receptor Sensitivity	Number of Receptors	Distance from Source (m)*			
		<20	<50	<100	<350
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

*distances considered are to the dust source

Table 4: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentrations	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	>32 µg/m^{-}	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32 µg/m^{-}	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32 µg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

The sensitivity of the area is then summarised.

Step 2C Define the Risks of Impacts

The dust emission magnitude from **Table 1** and sensitivity of the area and receptors from **Table 2**, **Table 3** and **Table 4** are combined, and the risk of impacts from each activity (demolition, earthworks, construction and trackout) before mitigation is applied, is determined using the criteria detailed in **Table 5** to **Table 8.**

Table 5: Risk of Dust Impacts - Demolition

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

Table 6: Risk of Dust Impacts- Earthworks

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

Table 7: Risk of Dust Impacts- Construction

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

Table 8: Risk of Dust Impacts- Trackout

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

Step 3 Determine Site Specific Mitigation

Step three of the IAQM guidance identifies appropriate site-specific mitigation. These measures are related to whether the site is a low, medium or high risk site.

Step 4 Determine Significance of Residual Effects

At step four the significance of residual effects is assessed. For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'.

There may be cases where, for example, there is inadequate access to water for dust suppression to be effective, and even with other mitigation measures in place there may be a significant effect. Therefore, it is important to consider the specific characteristics of the site and the surrounding area to ensure that a conclusion of no significant effect is robust.

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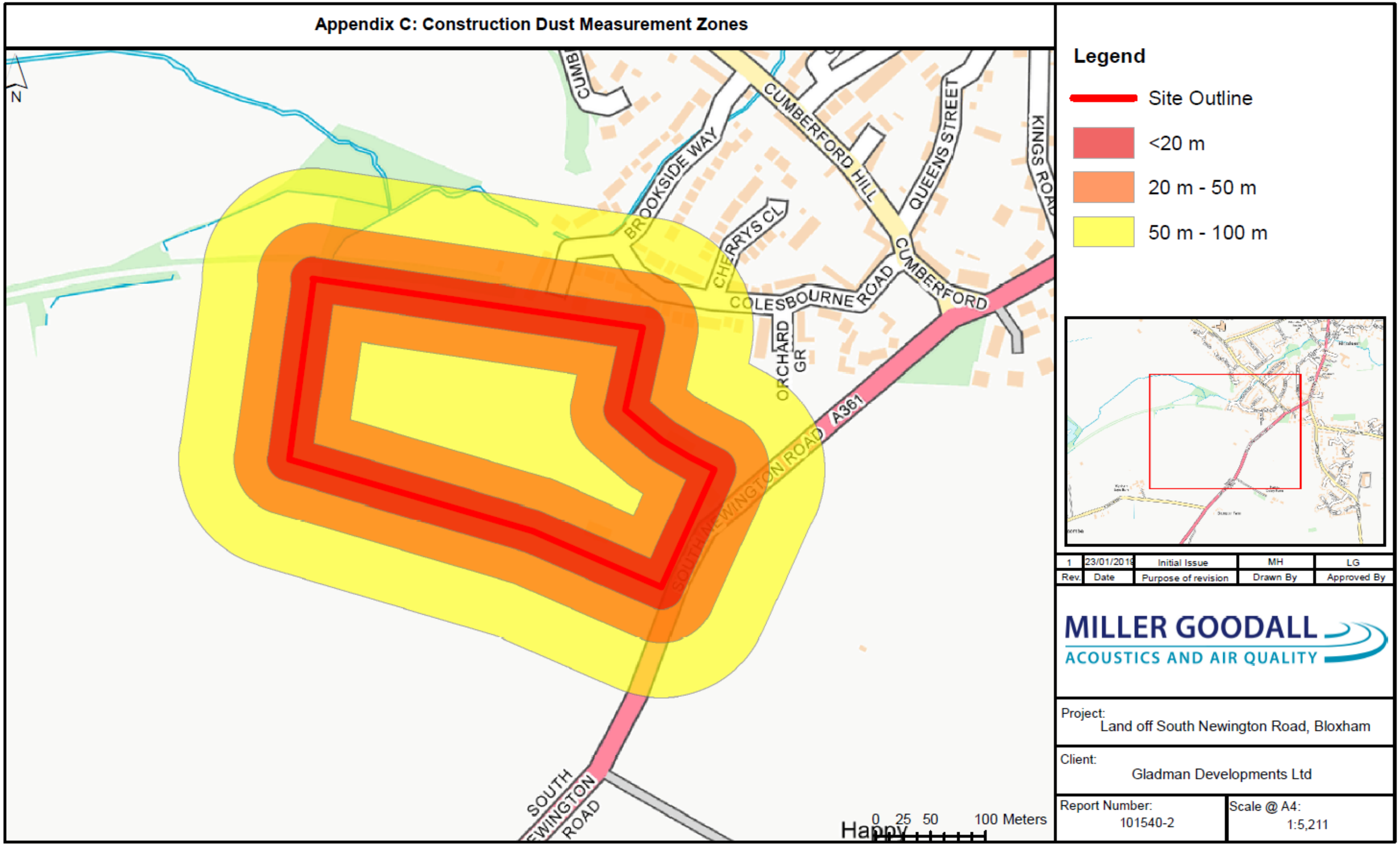
Appendix C: Construction Dust Measurement Zones
N
Legend
Site Outline
<20 m
20 m - 50 m
50 m - 100 m
BROOKSIDE WAY
CUMBERFORD HILL
QUEENS STREET
KINGS ROAD
CHERRYS CL
COLESBOURNE ROAD
CUMBERFORD
ORCHARD GR
A361
SOUTH NEWINGTON ROAD
0 25 50 100 Meters
1 | 23/01/2019 | Initial Issue | MH | LG
Rev. | Date | Purpose of revision | Drawn By | Approved By
MILLER GOODALL
ACOUSTICS AND AIR QUALITY
Project: Land off South Newington Road, Bloxham
Client: Gladman Developments Ltd
Report Number: 101540-2
Scale @ A4: 1:5,211

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Appendix D: Traffic Data used in the Air Quality Assessment

Link Number	Road	2017 Base Year/Verification		2024 Base Year		2024 With Development	
		AADT LGV	AADT HGV	AADT LGV	AADT HGV	AADT LGV	AADT HGV
1 -	Church street n of j/w South Newington Road	11,652	613	13,861	730	14,060	740
2 -	Barford Road of South Newington Road	8,864	467	10,726	565	10,916	575
3 -	South Newington Road E of Site Access until Cumberford Hill	10,588	557	12,317	648	12,716	669
4 -	South Newington Road W of Site Access	10,588	557	12,317	648	12,540	660
5 -	Site Access	0	0	0	0	441	9
6 -	South Newington Road w of j/w Church Street	10,588	557	12,360	651	12,749	671

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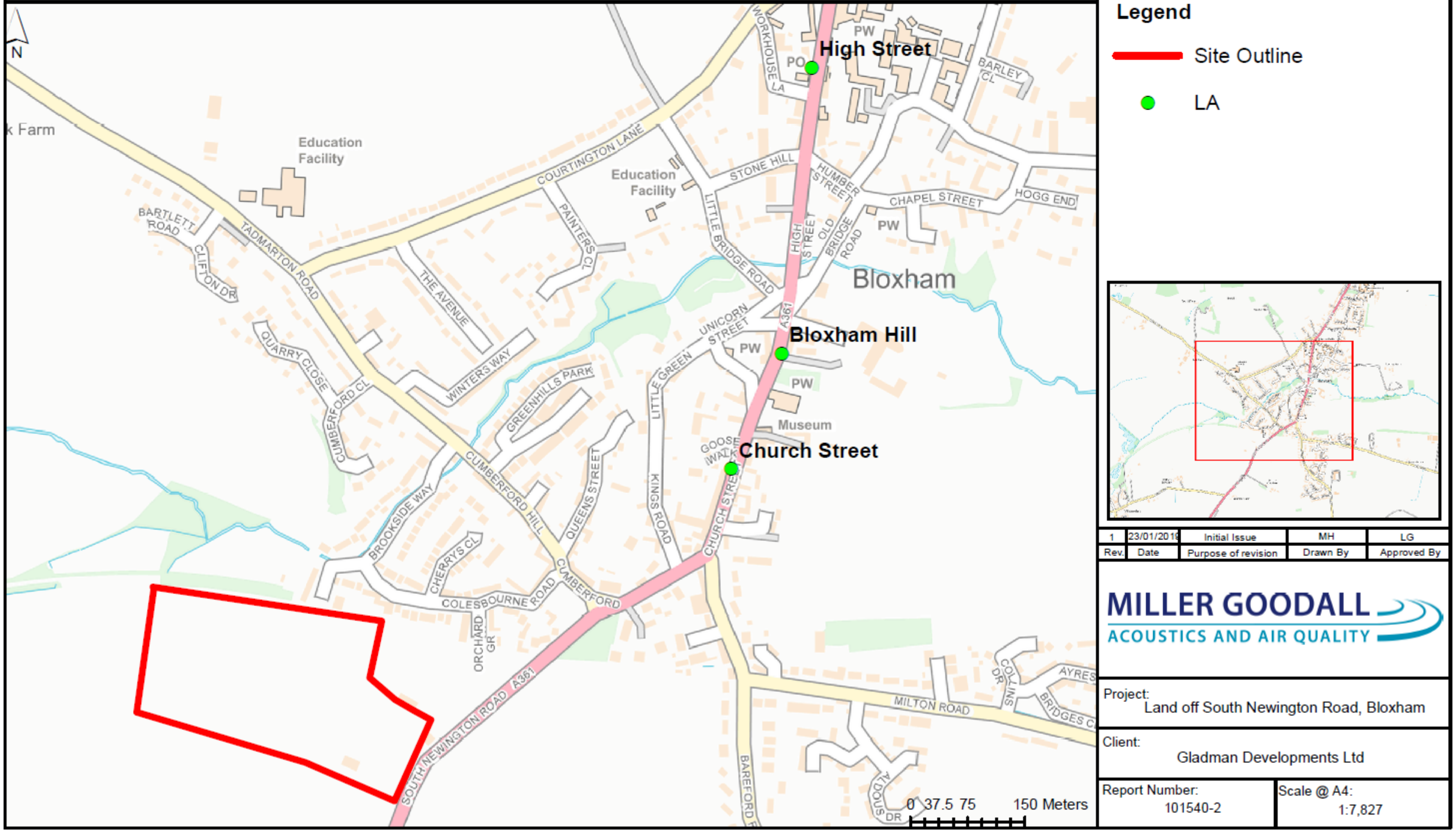
Appendix E: Local Authority Monitoring



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Appendix F: Dust Assessment Mitigation

xx Highly Recommended **x Desirable**

Measures relevant for demolition, earthworks, construction and trackout.

Mitigation Measure	High Risk
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	xx
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	xx
Display the head or regional office contact information.	xx
Develop and implement a Dust Management Plan (DMP).	xx
Site management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	xx
Make the complaints log available to the local authority when asked.	xx
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	xx
Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/ deliveries which might be using the same strategic road network routes.	xx
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary, with cleaning to be provided if necessary.	xx
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	xx
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	xx
If requested by the Local Authority: Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority; where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	xx
Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	xx

Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	xx
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	xx
Avoid site runoff of water or mud.	xx
Keep site fencing, barriers and scaffolding clean using wet methods.	xx
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	xx
Cover, seed or fence stockpiles to prevent wind whipping.	xx
Operating vehicle/machinery and sustainable travel	
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable.	xx
Ensure all vehicles switch off engines when stationary - no idling vehicles.	xx
Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.	xx
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	xx
Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.	xx
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	xx
Operations	
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	xx
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	xx
Use enclosed chutes and conveyors and covered skips.	xx
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	xx
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	xx
Waste management	
Avoid bonfires and burning of waste materials.	xx

Measures specific to demolition

There is no specific mitigation measures for demolition as risk is considered negligible.

Measures specific to earthworks.

Mitigation Measure	High Risk
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	xx
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	xx
Only remove the cover in small areas during work and not all at once.	xx

Measures specific to construction.

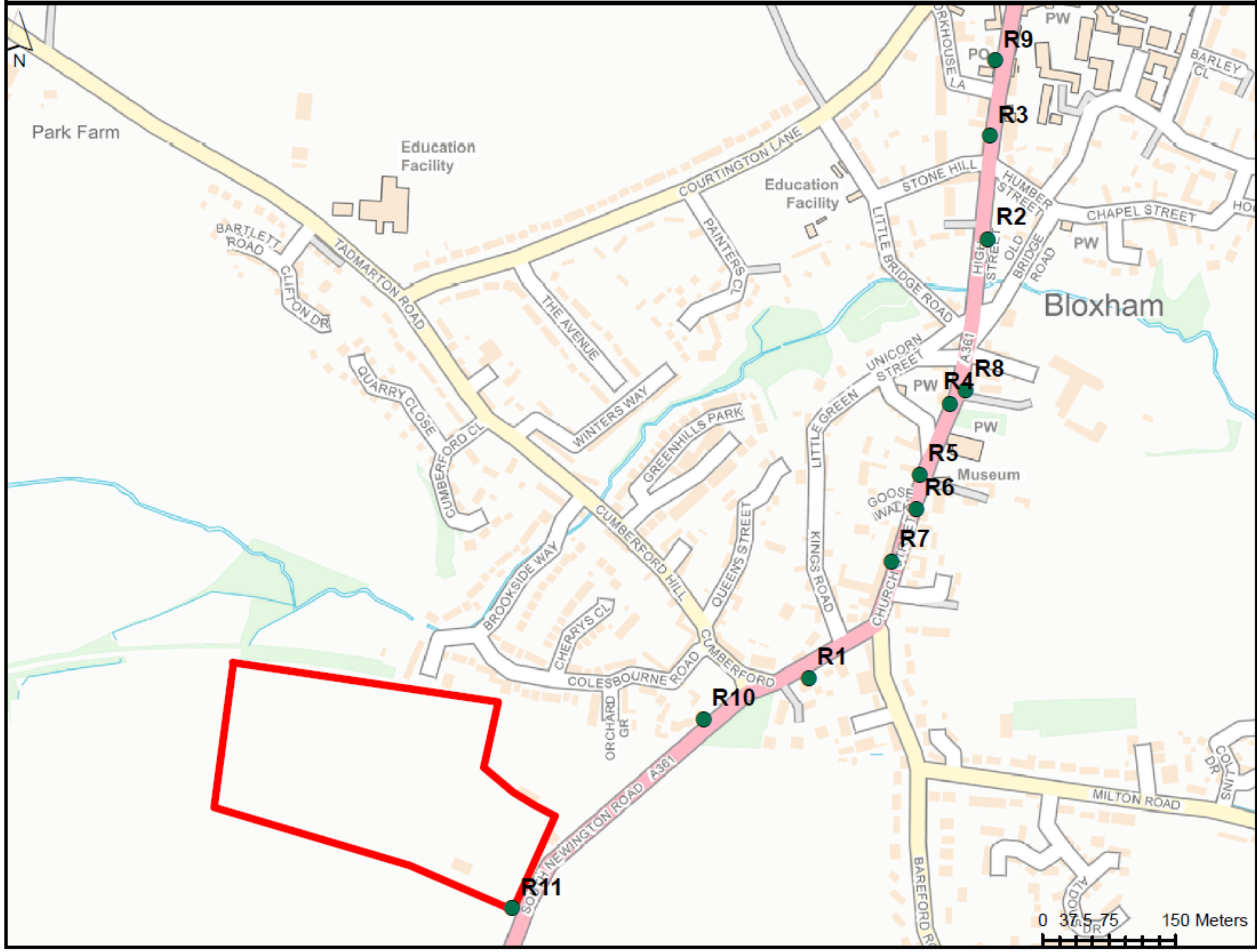
Mitigation Measure	Medium Risk
Avoid scabbling (roughening of concrete surfaces) if possible.	x
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	xx
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	x

Measures specific to trackout.

Mitigation Measure	Medium Risk
Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	xx
Avoid dry sweeping of large areas.	xx
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	xx
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable	xx
Record all inspections of haul routes and any subsequent action in a site log book.	xx
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	xx
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	xx

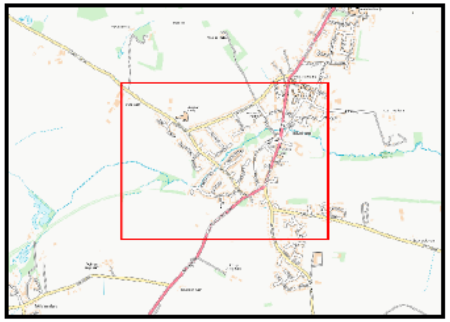
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	xx
Access gates to be located at least 10 m from receptors where possible.	xx

Appendix G: Receptor Locations



Legend

- Site Outline
- receptors Events



1	23/01/2019	Initial Issue	MH	LG
Rev.	Date	Purpose of revision	Drawn By	Approved By

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project:
Land off South Newington Road, Bloxham

Client:
Gladman Developments Ltd

Report Number:	Scale @ A4:
101540-2	1:7,724

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Glossary of Terms

AADT Annual Average Daily Traffic flow

Air Quality Standard Pollutant standards relate to ambient pollutant concentrations in air, set on the basis of medical and scientific evidence of how each pollutant affects human health and the environment

Air Quality Objective Pollutant Objectives incorporate future dates by which a standard is to be achieved, taking into account economic considerations, practicability and technical feasibility

Annual Mean A mean pollutant concentration value in air which is calculated on a yearly basis, yielding one annual mean per calendar year. In the UK air quality regulations, the annual mean for a particular substance at a particular location for a particular calendar year is:

(a) in the case of lead, the mean of the daily levels for that year;

(b) in the case of nitrogen dioxide, the mean of the hourly means for that year;

(c) in the case of PM_{10}, the mean of the 24-hour means for that year.

Annoyance (Dust) Loss of amenity due to dust deposition or visible dust plumes, often related to people making complaints, but not necessarily sufficient to be a legal nuisance.

AQAP Air Quality Action Plan

AQEG Air Quality Expert Group

AQMA Air Quality Management Area

AQMP Air Quality Management Plan

AQO Air Quality Objective

AQS Air Quality Strategy for England, Scotland, Wales and Northern Ireland

Background Concentrations The term used to describe pollutant concentrations which exist in the ambient atmosphere, excluding local pollution sources such as roads and stacks

CO Carbon monoxide

Construction Any activity involved with the provision of a new structure (or structures), its modification or refurbishment. A structure will include a residential dwelling, office building, retail outlet, road, etc.

Construction Impact Assessment An assessment of the impacts of demolition, earthworks, construction and trackout. In this Guidance, specifically the air quality impacts.

Defra Department for Environment, Food and Rural Affairs

Demolition Any activity involved with the removal of an existing structure (or structures). This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time.

Deposited Dust that is no longer in the air and which has settled onto a surface. Deposited dust is also sometimes called amenity dust or nuisance dust, with the term nuisance applied in the general sense rather than the specific legal definition.

DMRB Design Manual for Roads and Bridges

DMP Dust Management Plan; a document that describes the site-specific methods to be used to control dust emissions.

Dust Solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air. The terms dust and particulate matter (PM) are often used interchangeably, although in some contexts one term tends to be used in preference to the other. In this guidance the term 'dust' has been used to include the particles that give rise to soiling, and to other human health and ecological effects. Note: this is different to the definition given in BS 6069, where dust refers to particles up to 75 µm in diameter.

Earthworks Covers the processes of soil-stripping, ground-levelling, excavation and landscaping.

Effects The consequences of the changes in airborne concentration and/or dust deposition for a receptor. These might manifest as annoyance due to soiling, increased morbidity or morality due to exposure to PM_{10} or $PM_{2.5}$ or plant dieback due to reduced photosynthesis. The term 'significant effect' has a specific meaning in EIA regulations. The opposite is an insignificant effect. In the context of construction impacts any effect will usually be adverse, however, professional judgement is required to determine whether this adverse effect is significant based in the evidence presented.

EPAQS Expert Panel on Air Quality Standards

EPUK Environmental Protection UK

HGV Heavy Goods Vehicle

Impacts The changes in airborne concentrations and/or dust deposition. A scheme can have an 'impact' on airborne dust without having any 'effects', for instance if there are no receptors to experience the impact.

LAQM Local Air Quality Management

LDF Local Development Framework

LGV Light Goods Vehicle

Mg/m^3 Microgrammes (of pollutant) per cubic metre of air. A measure of concentration in terms of mass per unit volume. A concentration of 1 $\mu g/m^3$ means that one cubic metre of air contains one microgramme (millionth of a gramme) of pollutant

NO_2 Nitrogen Dioxide

NOx A collective term used to represent the mixture of nitrogen oxides in the atmosphere, as nitric oxide (NO) and nitrogen dioxide (NO_2)

NPPF National Planning Policy Framework

Nuisance The term nuisance dust is often used in a general sense when describing amenity dust. However, this term also has specific meanings in environmental law:

Statutory nuisance, as defined in S79(1) of the Environmental Protection Act 1990 (as amended from time to time).

Private nuisance, arising from substantial interference with a person's enjoyment and us of his land.

Public nuisance, arising from and act or omission that obstructs, damages or inconveniences the right of the community.

Each of these applying in so far as the nuisance relates to the unacceptable effects of emissions. It is recognised that a significant loss of amenity may occur at lower levels of emission than would constitute a statutory nuisance.

Note: as nuisance has a specific meaning in environmental law, and to avoid confusion, it is recommended that the term is not used in a more general sense.

$PM_{2.5}$ The fraction of particles with a mean aerodynamic diameter equal to, or less than, 2.5 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of $PM_{2.5}$, EN 14907, with a 50% efficiency cut-off at 2.5 μm aerodynamic diameter

PM_{10} The fraction of particles with a mean aerodynamic diameter equal to, or less than, 10 μm. More strictly, particulate matter which passes through a size selective inlet as defined in the reference method for the sampling and measurement of PM_{10}, EN 12341, with a 50% efficiency cut-off at 10 μm aerodynamic diameter

RSS Regional Spatial Strategy

Running Annual Mean A mean pollutant concentration value in air which is calculated on an hourly basis, yielding one running annual mean per hour. The running annual mean for a particular substance at a particular location for a particular hour is the mean of the hourly levels for that substance at that location for that hour and the preceding 8759 hours

Trackout The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy duty vehicles (HDVs) leave the construction/demolition site with dusty materials, which may then spill onto the road, and/or when HDVs transfer dust and dirt onto the road having travelled over muddy ground on site.

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