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THOULSTONE ECO LEISURE PROPOSAL, WILTSHIRE
AIR QUALITY ASSESSMENT

RAMBOLL

THOULSTONE ECO LEISURE PROPOSAL, WILTSHIRE
AIR QUALITY ASSESSMENT

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CONTENTS

EXECUTIVE SUMMARY		**I**
1.	**INTRODUCTION**	**1**
1.1	Overview	1
1.2	Scope and Objectives	1
2.	**SITE DESCRIPTION**	**2**
2.1	Site Location	2
2.2	Site Description	2
2.3	The Proposed Development	2
3.	**LEGISLATION AND POLICY FRAMEWORK**	**4**
3.1	International Legislation and Policy	4
3.2	Local Air Quality Management	4
3.3	Planning Policy	6
3.4	Local Policy	6
3.5	Additional Guidance	7
4.	**METHODOLOGY**	**8**
4.1	**Introduction**	8
4.2	**Baseline**	8
4.3	**Construction Impacts**	8
4.4	**Operational Traffic Impacts**	8
5.	**BASELINE ASSESSMENT**	**13**
5.1	Air Quality Monitoring	13
5.2	Air Quality at the Proposed Development	13
6.	**CONSTRUCTION PHASE IMPACTS**	**14**
6.1	Assessment of Impacts	14
6.2	Mitigation of Construction Impacts	15
7.	**OPERATIONAL AIR QUALITY IMPACTS**	**17**
7.1	Analysis of Results	18
7.2	Significance of Effect	19
8.	**SUMMARY AND CONCLUSION**	**20**

LIST OF TABLES

Table 3.1: Objectives included in the Air Quality Regulations (England) 2000 for the Purpose of LAQM 5
Table 3.2: Locations Where NAQOs Apply 5
Table 4.1: Traffic Data Used Within the Assessment 10
Table 4.2: Annual Mean Defra Background Concentrations for 2016 (µg/m^3) 11
Table 4.3: Impact Descriptors for Individual Receptors 12
Table 6.1: Dust Emissions Magnitude for Each Construction Phase 14
Table 6.2: Sensitivity of Area to Dust Impacts (considering distance to construction activity) 14
Table 6.3: Risk of Dust Impacts in the Absence of Mitigation 15
Table 6.4: Recommended Dust Mitigation for Low Risk Sites 15

Table 7.1: Predicted Operational Annual Mean NO_2 at On-site Receptors ($\mu g/m^3$) 17
Table 7.2: Predicted Operational Annual Mean NO_2 at Off-site Receptors ($\mu g/m^3$) 17
Table 7.3: Predicted Operational Annual Mean PM_{10} at On-site Receptors ($\mu g/m^3$) 18
Table 7.4: Predicted Operational Annual Mean PM_{10} at Off-site Receptors ($\mu g/m^3$) 18

LIST OF FIGURES

Figure 2.1: Site Location 2
Figure 2.2: Site Plan 3
Figure 4.1: On Site Receptor Locations 9
Figure 4.2: Off Site Receptor Locations 10

APPENDICES

Appendix 1
Extracts from Wiltshire Air Quality Supplementary planning document

EXECUTIVE SUMMARY

Ramboll Environment & Health UK Limited has been commissioned by James and Alka Hughes-Hallett to carry out an air quality assessment for the proposed Thoulstone Eco Leisure development.

The proposed development is planned on the former Thoulstone Park Golf Club, outside of Chapmanslade in a largely rural area. The development is for a leisure proposal with on-site accommodation for guests along with limited accommodation for staff. It will comprise mixed use classes, including 28 self-catering units, 4 staff units, a leisure block, a farm shop, restaurant and associated car parking.

Heating and hot water demand would be met through the use of a centralised heating centre in the central building. The final plant selection is yet to be finalised at this point. It is currently envisaged that ground-source heat pumps would be used for the central buildings, with air-source heat pumps in the holiday accommodation.

The site is not located near to an Air Quality Management Area (AQMA) – the nearest is approximately 4km northeast in Westbury. The area is largely rural with two free-flowing A-roads on the boundaries of the site. Air quality at the site and its immediate surroundings is therefore likely to meet relevant nitrogen dioxide (NO_2) and PM_{10} (particulate matter with dimensions between 2.5 and 10 µm) National Air Quality Objectives (NAQOs).

A number of existing sensitive receptors are located close to the proposed development and the roads approaching the site.

The assessment of potential impacts to air quality during the demolition and construction phase has identified that the activities, together with the location of nearby sensitive receptors results in a medium risk of impacts in the absence of suitable mitigation. Mitigation would be provided through a series of measures set out in a detailed dust management plan secured as part of the wider Construction Environmental Management Plan. On this basis the potential for residual effects would be reduced to at worst temporary slight adverse and for the most part would be expected to be negligible.

Any air quality impacts once the proposed development is fully operational would arise due to emissions from the proposed developments energy centre and traffic generation.

The maximum increase in annual mean NO_2 concentrations as a result of the proposed development is 0.6 µg/m^3 from operational traffic. Using the Environmental Protection UK / Institute for Air Quality Management guidance, the predicted increases are considered to result in a negligible at all modelled receptors, both on and off-site. At all existing receptor locations air quality is predicted to meet relevant air quality objectives.

Within the proposed leisure site, the predicted modelling demonstrates that air quality would be expected to comfortably meet all relevant NO_2, and PM_{10} objectives.

Overall, it is concluded that the proposed development would not result in a significant effect on air quality.

1. INTRODUCTION

1.1 Overview

Ramboll Environment & Health UK Limited has been commissioned to carry out an air quality assessment of the proposed Thoulstone Eco Leisure development, to be located off the A36 on the outskirts of Chapmanslade, Wiltshire. The development would comprise the construction of a farm shop, restaurant, conference and leisure facilities, including 28 self-catering units, and associated car park.

The site is located in a rural area approximately 4km southwest of Westbury. The proposed development is to be constructed on the site of the disused Thoulstone Park Golf club, with the demolition of the pre-existing buildings on the site.

The site is not located close to any Air Quality Management Areas (AQMAs). Existing air quality at the site is expected to comply with all relevant objectives.

This report presents the findings of a detailed air quality assessment of the potential impacts of the proposed development on local air quality during both construction and operational phases. For both phases the type, source and significance of potential impacts are identified and the measures that should be employed to minimise the impacts are described.

1.2 Scope and Objectives

Key issues relating to air quality are considered to be:

- Emissions of dust and traffic pollutants during the construction phase;
- Emissions from operational traffic; and
- Emissions from energy plant used to provide heating and hot water;

Consideration has been given to the potential for emissions of dust to arise during the construction stage. A qualitative assessment of the risk of dust impacts has been carried out using the Institute of Air Quality Management (IAQM) guidance to identify the appropriate level of mitigation that should be applied to ensure impacts can be effectively mitigated.

The air quality assessment has considered the likely air quality at the site taking into account existing and future traffic flows, to assess the operational impact from traffic emissions associated with the proposed development and to inform the need for additional mitigation. The assessment has therefore focused on NO_2 and particulate matter with an aerodynamic diameter of 10 micrometres (PM_{10}).

The proposed development would include a centralised energy centre to provide heating and hot water to various elements of the development. The choice of energy plant has not been finalised, although CHP has largely been ruled out in favour of ground source and air heat pumps. As such there is insufficient information to determine whether the emissions of NOx would exceed 5 mg/s and thus require a quantitative assessment of emissions.

Emissions from energy plant can be effectively controlled through the correct choice of plant and stack design. In the event that the NOx emissions exceed 5 mg/s it is recommended that a detailed assessment of emissions from the energy plant is provided as a pre-commencement requirement and that this is secured through an appropriately worded planning condition.

The scope of the assessment has been agreed by Steve Manning, Environmental Health Officer at Wiltshire Council.

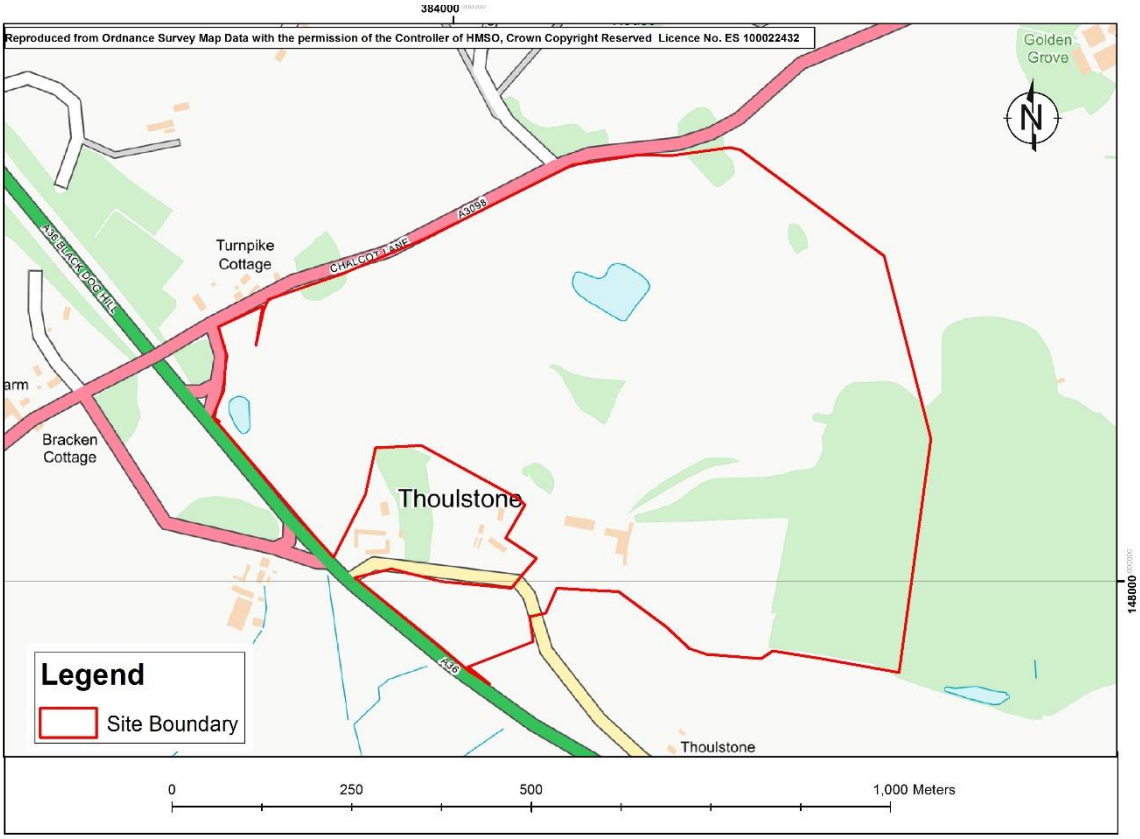
2. SITE DESCRIPTION

2.1 Site Location

The site is located off the A36 to the east of Chapmanslade, Wiltshire, as shown below in Figure 2.1.

The site is bound by the A3098 on the northern section and the A36 to the southwest, with farmland beyond these roads and immediately adjacent to the site on the eastern sections. There are a few residential properties scattered less than a 100m away from the western boundaries of the site.

Figure 2.1: Site Location



2.2 Site Description

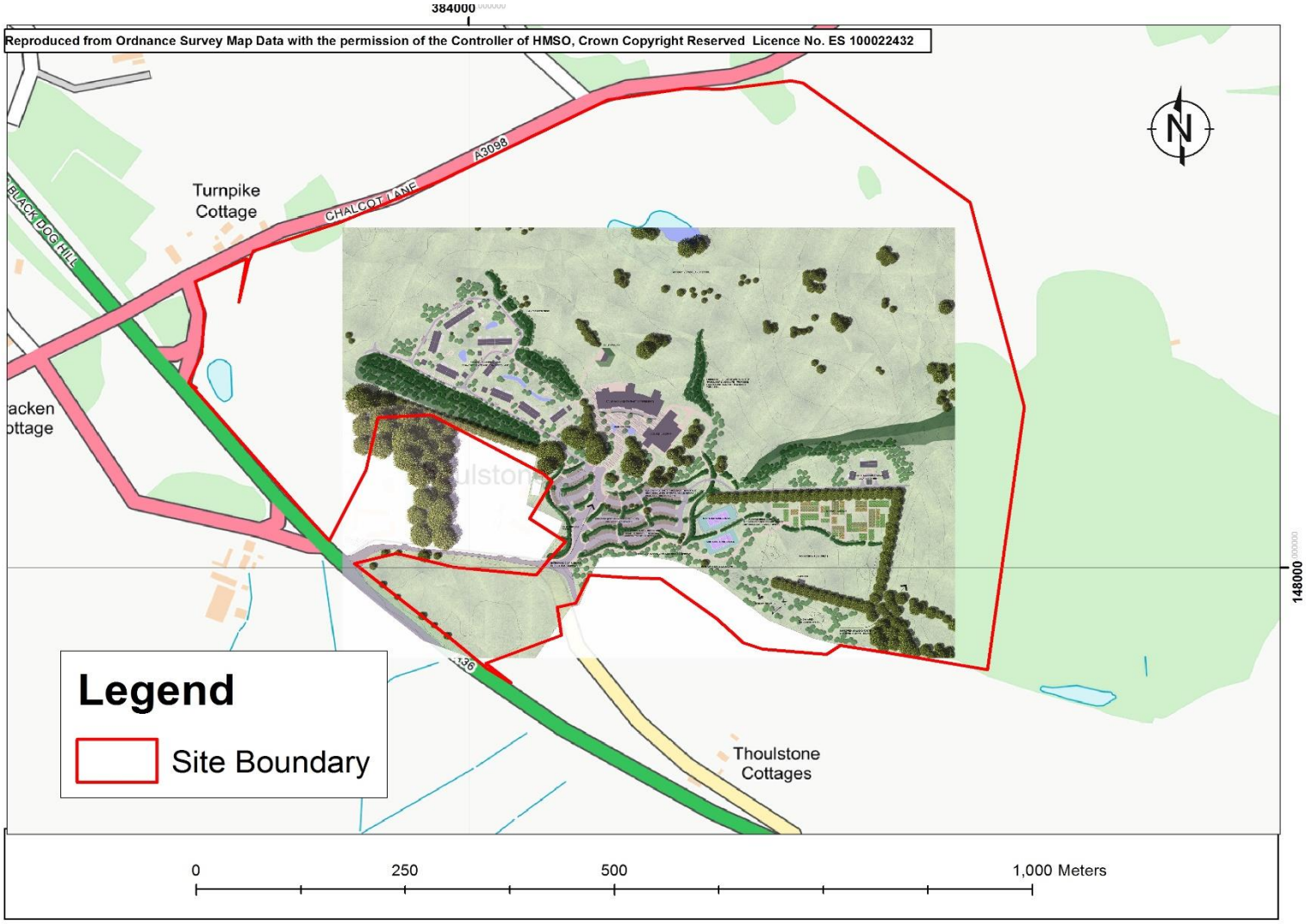
The site is a disused golf course and is currently open space comprising areas of rough grassland with hardstanding in places and some buildings. The areas of pre-existing hardstanding and buildings will largely be developed, under the current proposals, with much of the grassland maintained as green recreational space.

2.3 The Proposed Development

The proposed development comprises the construction of 28 2/3-bed self-catering holiday accommodation units, 4 3-bed staff accommodation units, a farm shop/restaurant/conference building; and a leisure (pool and gym hall) building. The completion year is currently estimated to be 2021.

A total of approximately 173 car parking spaces would be provided. Vehicle access to the development would be via an existing lane, accessed from the A36. The two central buildings would comprise leisure and commercial facilities along with an energy centre. An indicative site plan is shown in Figure 2.2.

Figure 2.2: Site Plan



3. LEGISLATION AND POLICY FRAMEWORK

3.1 International Legislation and Policy

EU Directive 2008/50/EC[1] on ambient air quality and cleaner air for Europe (the CAFE directive) sets out the ambient air quality standards for nitrogen dioxide (NO_2) and particulate matter with a particle size of less than 10 micrometres (PM_{10}), to be achieved by 1st January 2010 and 2005 respectively. The Air Quality Standards Regulations 2010[2] implements the requirements of the Directive into UK legislation.

The Directive contains a series of limit values for the protection of human health and critical levels for the protection of vegetation.

Compliance with the EU Limit Values is mandatory. However, Member States can apply for a time extension for compliance, subject to approval of an action plan by the European Commission. The UK Government applied in autumn 2011 for a time extension for compliance with the NO_2 limit values until 2015 for a number of areas throughout England.

In July 2017, the Department for Environment Food and Rural Affairs (Defra) on behalf of the UK Government produced a new Plan to improve air quality in the UK in order to meet the EU targets in the shortest possible time. An overview document has been produced[3], together with a detailed plan[4] which identifies the Local Authority Areas that will require additional measures to ensure compliance with NO_2 objectives. Defra has implemented a South West Zone Plan[5] to reduce roadside NO_2 concentrations in the region. It sets out how the UK will ensure that compliance with the NO_2 limit values is achieved in the shortest possible time. It is estimated that the South West Zone will be compliant by 2021.

3.2 Local Air Quality Management

Part IV of the Environment Act 1995[6], requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as LAQM.

The 2007 Air Quality Strategy[7] establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objective (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000[8] and the Air Quality (Amendment) (England) Regulations 2002[9]. Table 3.1 presents the NAQOs for NO_2 and PM_{10}, the two pollutants of most importance where road traffic is the dominant source of air pollutants.

The NAQOs apply to external air where there is relevant exposure to the public over the associated averaging periods within each objective. Guidance is provided within LAQM.TG (16)[10] issued by Defra for Local Authorities, on where the NAQOs apply, as detailed in Table 3.2. The objectives do not apply in workplace locations, to internal air or where people are unlikely to be regularly exposed (i.e. centre of roadways).

[1] 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 (2008), OJ I. 1521.
[2] The Air Quality Standards Regulations, 2010. SI 2010 No. 1001.
[3] Defra, July 2017, UK Plan for tackling roadside nitrogen dioxide concentrations An overview. Defra.
[4] Defra, July 2017, UK Plan for tackling roadside nitrogen dioxide concentrations Detailed plan. Defra.
[5] https://uk-air.defra.gov.uk/assets/documents/no2ten/2017-zone-plans/AQplans_UK0030.pdf
[6] Secretary of State, 1995. The Environment Act part IV Air Quality, HMSO.
[7] Department for Environment, Food and Rural Affairs, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland
[8] The Air Quality (England) Regulations (2000), SI 2000 No. 928.
[9] Air Quality (Amendment) (England) Regulations (2002), SI 2002 No. 3043
[10] https://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf

Table 3.1: Objectives included in the Air Quality Regulations (England) 2000 for the Purpose of LAQM

Pollutant	Concentrations	Measured As	Date to be achieved by
NO_2	200 µg/m^3 not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m^3	Annual mean	31 December 2005
PM_{10}	50 µg/m^3 not to be exceeded more than 35 times per year	24-hour mean	31 December 2004
	40 µg/m^3	Annual mean	31 December 2004

Table 3.2: Locations Where NAQOs Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual Mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, libraries etc.	Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
24 Hour Mean	All locations where the annual mean objective would apply. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1 Hour Mean	All locations where the annual mean and 24-hour mean objectives apply. Kerbside Sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend 1-hour or more. Any outdoor locations where the public might reasonably be expected to spend 1-hour or longer.	Kerbside sites where the public would not be expected to have regular access.

It should be noted that the EU Limit Values are numerically the same as the NAQO values but differ in terms of compliance dates, locations where they apply and legal responsibility. The compliance date for the NO_2 Limit Values is 1st January 2010, which is five years later than the date for the NAQO.

The Limit Values are mandatory whereas the NAQOs are policy objectives. Local authorities are not required to achieve them, but have to work towards their achievement. In addition, the Limit Values apply in all locations except: where members of the public do not have access and there is

no fixed habitation; on factory premises or at industrial installations; and on the carriageway/central reservation of roads except where there is normally pedestrian access.

Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as Air Quality Management Areas (AQMAs) and draw up an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

Since 2001, an AQMA has been in force on the main arterial road through Westbury, encompassing Haynes Road up to the junction with Warminster Road and Warminster Road from the junction with Haynes Road to the junction with Leigh Road. The AQMA includes PM_{10} - 24-Hour Mean and NO_2 - Annual Mean. The Thoulstone Eco Leisure development is approximately 4km southwest of this AQMA, and is in an area expected to be complying with all relevant National Air Quality Objectives.

3.3 Planning Policy

3.3.1 National Planning Policy Framework, 2012

The National Planning Policy Framework (NPPF)[11] published in March 2012 sets out the Government's planning policies for England. Planning policy requires that applications for planning permission must be determined in accordance with the development plan, unless material considerations indicate otherwise.

The NPPF is a material consideration in planning decisions. It states that the purpose of the planning system is to contribute to the achievement of sustainable development; and that planning decisions on individual applications must reflect relevant EU obligations and statutory requirements. Specifically, in terms of air quality, it requires the planning system to prevent development from contributing to, or being put at unacceptable risk from unacceptable levels of air pollution.

Planning policies should promote compliance with or contribute towards achievement of EU limit values and NAQOs, 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 new development within an AQMA is consistent with the Local AQAP.

The NPPF is supported by a series of Planning Practice Guidance. The guidance[12] in relation to air quality provides guiding principles on how planning can take account of the impact of new development on air quality.

3.4 Local Policy

3.4.1 Wiltshire Core Policy

Core Policy 55[13] within the Wiltshire Core Plan states that any development within the county that due to their scale, nature or location that are likely to exacerbate existing areas of poor air quality, will need to demonstrate that measures can be taken to effectively mitigate emission levels in order to protect public health, environmental quality and amenity. Mitigation measures should demonstrate how they will make a positive contribution to the aims of the Air Quality Strategy for Wiltshire and where relevant, the Wiltshire Air Quality Action Plan.

[11] Department for Communities and Local Government, March 2012, National Planning Policy Framework
[12] http://planningguidance.planningportal.gov.uk/blog/guidance/air-quality/
[13] Wiltshire Council, Wiltshire Core Strategy, 2015

3.4.2 Air Quality Strategy for Wiltshire[14]

The Wiltshire Air Quality Strategy is a guiding document to inform policy and direction across a range of services with the aim to improve air quality. One of its main actions was to develop and introduce Supplementary Planning Guidance and Developer Toolkits to minimise the impact of new development on air quality.

3.4.3 Wiltshire Air Quality Action Plan, 2014[15]

The purpose of this action plan is to set out the strategic and locally generated actions that will be implemented to improve air quality and work towards meeting the air quality objectives. The plan details 17 strategic actions, the implementation of which, will work towards achieving the objective for NO_2 and small particulates. These actions share synergies with many other council policies and strategies.

3.4.4 Draft Air Quality Supplementary Planning Document, 2012[16]:

This document provides technical advice on how to deal with planning applications that may have an impact on air quality with a view to maintaining consistency in the approach to proposed new developments. The document sets out situations when an assessment may be required and suggests methods for undertaking such an assessment within Wiltshire.

The document provides a flow chart, reproduced in Appendix 1, to determine whether an application is significant in terms of air quality. Additionally to assess the significance of exposure to air pollution and the levels of mitigation required, the guidance suggests that consideration should be given to the Air Pollution Exposure Criteria (APEC) which is provided in Appendix 1.

3.5 Additional Guidance

3.5.1 Environmental Protection UK and Institute of Air Quality Management Guidance

Environmental Protection UK (EPUK) together with the IAQM has produced guidance[17] on how air quality impacts should be assessed within the land-use planning and development control process. This guidance provides clear criteria to determine when a detailed air quality assessment is required and a methodology for assessing the significance of air quality effects.

3.5.2 Institute of Air Quality Management Guidance

The IAQM has produced 'Guidance on the assessment of dust from demolition and construction'[18] to assist in the assessment of air quality impacts from construction activities. This guidance provides a consistent methodology for assessing the risks of dust impacts from demolition and construction activities and for identifying the correct level of mitigation which should be applied to avoid significant air quality effects.

[14] Air Quality Strategy for Wiltshire 2011-2015, 2011
[15] Air Quality Action Plan for Wiltshire, 2014
[16] Air Quality Supplementary Planning Document, 2012
[17] Institute of Air Quality Management (IAQM) and Environmental Protection UK, 2017, Land-Use Planning & Development Control: Planning for Air Quality V1.2
[18] Institute of Air Quality Management, 2014, Guidance on the assessment of dust from demolition and construction V1.1.

4. METHODOLOGY

4.1 Introduction

The assessment has been carried out following the methodology outlined by the EPUK/IAQM guidance and has been detailed in the relevant sections below.

4.2 Baseline

To establish the existing baseline air quality in the vicinity of the site, relevant data was reviewed and assessed. Data was obtained from the following sources:

- Continuous and passive air quality monitoring conducted by Wiltshire Council and reported in the Wiltshire Annual Status Report[19]; and
- Defra air quality background maps[20]

No site-specific air quality monitoring was carried out.

4.3 Construction Impacts

The assessment of potential construction impacts follows the guidance published by the IAQM on the assessment of the impacts of construction on air quality. The IAQM assessment methodology considers three separate dust effects and defines their significance according to the sensitivity of the surrounding area, as follows:

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

The assessment was therefore carried out in a number of steps:

- Step 1, the need for a construction assessment was screened, based on the proximity of receptors;
- Step 2, the risk of dust impacts was assessed taking into account the level of activity and the proximity of sensitive receptors;
- Step 3, site specific mitigation integral to the development proposals was reviewed and supplemented where necessary; and
- Step 4, the significance of the dust effects, after applying the site-specific mitigation, was assessed.

4.4 Operational Traffic Impacts

Potential impacts on air quality due to local traffic emissions have been predicted using the Atmospheric Dispersion Modelling System (ADMS) Roads (version 4.1). This dispersion model has been extensively validated against both field and laboratory data sets and against monitoring data in cities throughout the UK.

An updated EFT was released by Defra in December 2017 (Version 8.0.1), which has been used to predict roadside concentrations of nitrogen oxides (NO_x). The predicted concentrations of NO_x were then converted to total NO_2 using the LAQM calculator (Version 6.1)[21] on the Defra air quality website to allow comparison with the NAQO.

[19] http://www.wiltshireairquality.org.uk/assets/documents/council-reports/Wiltshire%20ASR%202017%20final.pdf
[20] https://uk-air.defra.gov.uk/data/laqm-background-home
[21] https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

Defra provided updated emission factors and background data forecasts for future years[22] (2015 reference year). Previous versions of these factors are known to have been over optimistic in the projected decline in concentrations for future years. The proposed development is not expected to be completed until 2021 or beyond. To ensure a conservative approach all the modelling has been carried out using the 2016 emissions factors and background data.

4.4.1 Scenarios

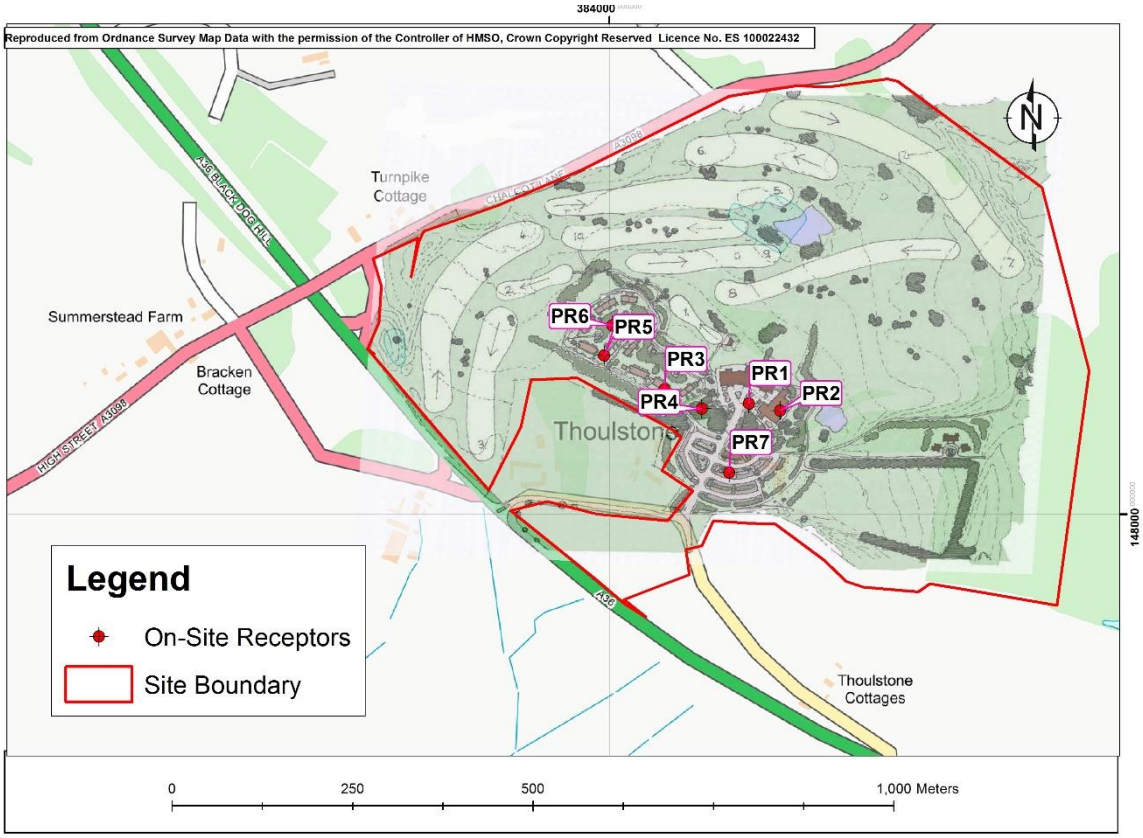
In carrying out the assessment of operational traffic impacts the following scenarios have been assessed:

- existing baseline;
- future baseline 2028; and
- future baseline 2028 with the Thoulstone Eco Leisure fully operational.

No specific committed development has been identified by the traffic consultant. A regional growth rate has been applied to the traffic count data to predict the increase in traffic volume.

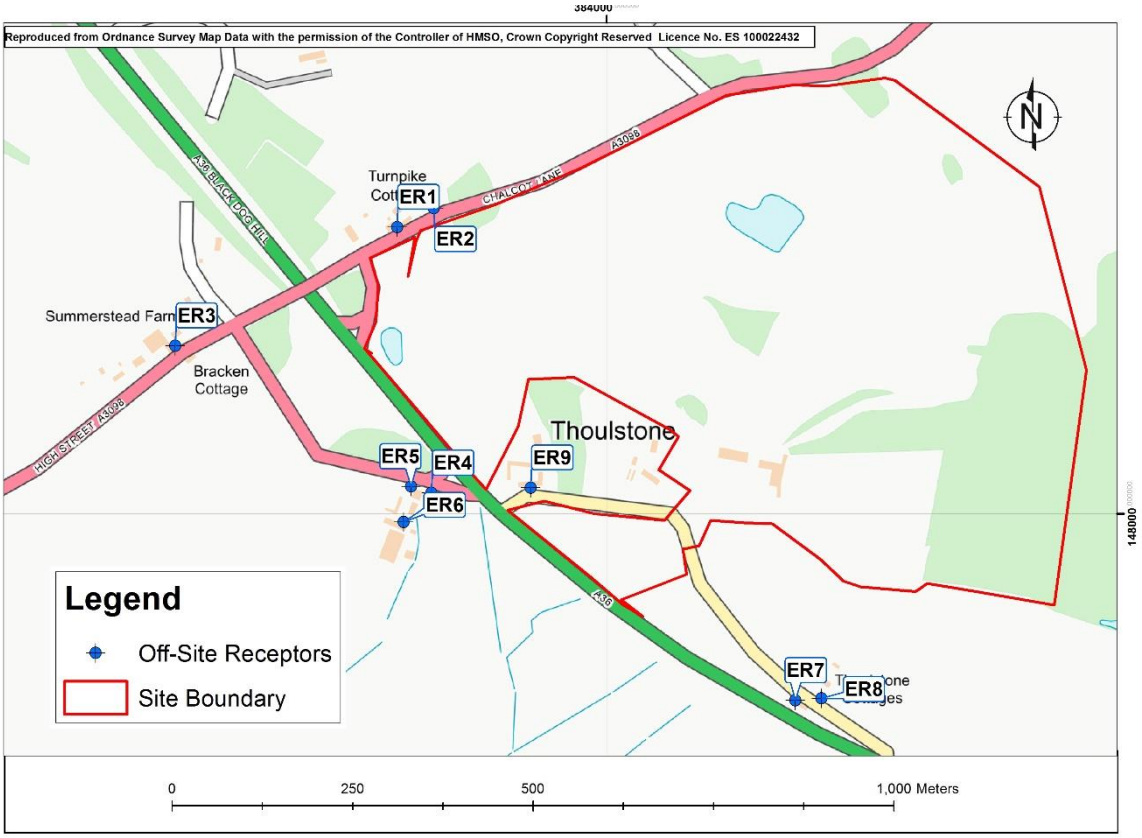
Annual mean concentrations of NO_2 and PM_{10} have been estimated at 1.5m at a number of receptors on-site as shown in Figures 4.1 and off-site as shown in Figure 4.2. The receptors represent sensitive locations on, and in the vicinity of the development.

Figure 4.1: On Site Receptor Locations



[22] https://uk-air.defra.gov.uk/data/laqm-background-home

Figure 4.2: Off Site Receptor Locations



4.4.2 Traffic Data

Traffic data for use in the ADMS model has been provided by the traffic consultants Connect Consultants Ltd. A traffic survey was conducted in 2018 to provide base traffic flows along the A36 adjacent to the Thoulstone Eco Leisure site. Combined two-way traffic values for the three scenarios were included into the model.

Table 4.1: Traffic Data Used Within the Assessment

Scenarios	**Baseline**		**Future Base 2028**		**Future Base + Proposed Development**		**Speed kph**
Road Link	**AADT All Vehicles**	**% HDV**	**AADT All Vehicles**	**% HDV**	**AADT All Vehicles**	**% HDV**	
A36 (eastbound)	7,262	1.9	8,534	1.9	8,990	1.8	80
A36 (westbound)	7,639	3.3	8,977	3.3	9,433	3.1	80
A36 (two-way)	14,900	2.6	17,511	2.6	18,423	2.5	80
AADT: Annual Average Daily Traffic HDV: Heavy Duty Vehicle (>3.5 t)							

4.4.3 Meteorological Data

The Royal Navy Air Station in Yeovilton was chosen to provide meteorological data. The development is approximately equidistance to Bristol Airport, but Yeovilton was chosen due to

being upwind of the prevailing south-westerly wind, and therefore most representative. The 2016 hourly sequential meteorological data from this station was used in the ADMS Roads model.

4.4.4 Background Concentrations

The ADMS Roads modelling software estimates concentrations arising from emissions on the local roads. It is necessary to add an estimate of the background concentrations to obtain the total concentration for comparison against the air quality objectives.

To predict NO_2 and PM_{10} concentrations, background pollutant concentrations have been obtained from the Defra maps of predicted background pollutant concentrations which have been produced to aid local authorities in carrying out their Review and Assessment of Air Quality work. The concentrations for all four grid squares relevant to the development which are used in the assessment are provided below in Table 4.2. As indicated above, to ensure a conservative approach the 2016 background concentrations were used for both the existing and future scenarios.

Table 4.2: Annual Mean Defra Background Concentrations for 2016 (µg/m^3)

X (m)	Y (m)	Total NOx	Total NO2	Total PM10
384500	148500	8.1	6.2	11.4
383500	148500	8.7	6.7	11.9
383500	147500	7.6	5.9	12.1
384500	147500	8.2	6.4	13.1

4.4.5 Model Verification

It is recommended by LAQM.TG16 that the model results are compared with measured data to determine whether the model results need adjusting to more accurately reflect local air quality.

However, there is limited monitoring data in close proximity to the site. As such it was not possible to carry out formal verification. Instead to ensure a conservative approach, based on the results of other assessments where verification has been completed, the NO_x concentrations predicted by the model have been adjusted by a factor of three to calculate NO_2 concentrations at each receptor.

As there is also no suitable monitoring of PM_{10} in the vicinity of the development site the predicted annual mean concentrations for this pollutant has also been adjusted using a factor of three.

The above approach is considered to provide a worst-case conservative assessment of air quality impacts as a result of the development proposals.

4.4.6 Significance Criteria

EPUK/IAQM

The significance criteria provided in the guidance produced by IAQM and EPUK, Land-Use Planning & Development Control: Planning for Air Quality on assessing the impacts of developments on air quality, has been used to assess the significance of effects on air quality as a result of the proposed development.

The guidance has produced a matrix which is to be used to calculate the impacts at individual receptor locations as shown in Table 4.3 which takes into account both the change in concentration and the resulting overall concentration. The guidance states that overall

significance should be based on professional judgement and *"will need to take into account such factors as:*

The existing and future air quality in the absence of the development;

The extent of current and future population exposure to the impacts; and

The influence and validity of any assumptions adopted when undertaking the prediction of impacts."

Table 4.3: Impact Descriptors for Individual Receptors

Long term average Concentration at receptor with development	**Percentage Change in Concentration Relative to Annual Mean Air Quality Objective (AQO)**			
	<1	**2 - 5**	**6 – 10**	**>10**
75% or less of AQO	Negligible	Negligible	Slight	Moderate
76 – 94% of AQO	Negligible	Slight	Moderate	Moderate
95 – 102% of AQO	Slight	Moderate	Moderate	Substantial
103 – 109% of AQO	Moderate	Moderate	Substantial	Substantial
110% of more of AQO	Moderate	Substantial	Substantial	Substantial
NAQO for NO_2 and PM_{10} is 40 µg/m^3 Changes of less than 0.5% are considered to be negligible				

Wiltshire AQSPD

In addition, the procedure set out in the Wiltshire Air Quality Supplementary Planning Document (Wiltshire AQSPD) has been adopted. The flow diagram has been used to determine whether the impact on air quality from the development is significant and the APEC classes used to determine the site suitability.

The document sets out an approach in which to assess air quality in terms of changes in pollution concentrations where there is relevant public exposure from any development, even if it is outside an AQMA. Local Authority Air Quality Officers will make a judgement on the likely impact of each development, based on the results of the air quality assessment and their professional experience.

The diagram in Figure A1 in Appendix 1 should assist in determining whether the application is significant in terms of air quality. Air quality would be considered significant in cases which would result in an introduction of a new AQMA, increase emissions or introduce new exposure to PM_{10} / NO_2, and interfere or prevent implementation of measures in the Air Quality Action Plan.

In addition, to determine the significance of exposure to air pollution and the levels of mitigation required, consideration should be given to the Air Pollution Exposure Criteria (APEC), given in Table A.1 in Appendix 1. This sets out three criteria classes for areas meeting and exceeding national objectives, including associated mitigation measures and whether a refusal on air quality grounds should be anticipated.

5. BASELINE ASSESSMENT

5.1 Air Quality Monitoring

Wiltshire Council operates both automatic and diffusion tube monitoring of air quality within its district. However, this monitoring is focused in urban areas and is therefore not representative of site conditions.

5.2 Air Quality at the Proposed Development

The site is located in a rural setting, and therefore, in the absence of relevant diffusion tube monitoring, the 2016 Defra Background Concentrations are considered to provide a good estimate of on-site existing concentrations, as shown in Table 4.2. These indicate that the development is in an area of good air quality, and comfortably complies with all NAQOs.

PM_{10} concentrations at the development site are also expected to be similar to background concentrations.

6. CONSTRUCTION PHASE IMPACTS

6.1 Assessment of Impacts

The proposed development is to be located on a pre-existing golf course, the existing buildings and much of the associated hardstanding would not be retained in the proposed design. The site is situated in a rural location, but there is a residential receptor within 100m of the site and 20m from potential routes used by construction vehicles. Therefore, according to IAQM guidance a detailed assessment of the demolition and construction impacts is required. Much of the proposed development is on land that is currently vacant, therefore demolition impacts will be limited.

Using the evaluation criteria within the IAQM's Guidance the potential dust emission magnitude has been identified for each stage of the proposed development as shown in Table 6.1 below.

Table 6.1: Dust Emissions Magnitude for Each Construction Phase

Activity	Dust Emissions Magnitude	Justification
Demolition	Small	Total building volume is approximately 6,000 m^3 - <20,000 m^3, demolition activities <10 m above ground.
Earthworks	Large	Total Site area greater than 10,000 m^3. Site area approximately 55,000 m^2, undulating topography may require landscaping and shallow excavation for large area of building foundations; potentially dusty material including topsoil.
Construction	Medium	Total building volume approximately 31,440 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.
Trackout	Medium	Medium: 10-50 HDV (>3.5t) outward movements16 in any one day17, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
[1] Assumed as no information on construction vehicles currently available.		

The next stage of the process is to define the sensitivity of the assessment area to dust soiling, human health impacts and ecological receptors. This process combines the sensitivity of the receptor with distance from the source to determine the overall sensitivity.

The sensitivity of the dust impacts is provided in Table 6.2.

Table 6.2: Sensitivity of Area to Dust Impacts (considering distance to construction activity)

Sensitivity to Dust Soiling	Sensitivity to Human Health Impacts	Sensitivity to Ecological Receptors
Low – 1 - 10 residential properties within 50 m of the site boundary.	Low – 1 - 10 residential properties within 50 m of the site boundary. PM10 concentrations from Defra modelling less than 24 µg/m3 in 2016 (11.4 µg/m3).	N/A – no designated ecological or conservation site in vicinity of the development.

The dust emission magnitude determined in Table 6.1 has been combined with the sensitivity assessment in Table 6.2 to define the risk of impacts for each phase of development in the absence of mitigation as shown in Table 6.3. Note that sensitivity to ecological receptors is negligible, and therefore, not considered any further.

Table 6.3: Risk of Dust Impacts in the Absence of Mitigation

		Dust Emission Magnitude			
		Demolition (Small)	**Earthworks (Large)**	**Construction (Medium)**	**Trackout (Medium)**
Sensitivity of surrounding area	**Dust Soiling (Low)**	Negligible	Low Risk	Low Risk	Low Risk
	Human Health (Low)	Negligible	Low Risk	Low Risk	Low Risk

It is therefore considered that the proposed development would result in a low risk of dust impacts in the absence of mitigation.

6.2 Mitigation of Construction Impacts

The control of dust emissions from construction sites relies upon good site management and mitigation techniques to reduce emissions of dust and limit dispersion. A summary of the mitigation measures recommended in the IAQM guidance to reduce impacts from Low risk sites is provided in Table 6.4. It is recommended that these measures would be set out within a Dust Management Plan which would form part of the proposed development's overall Construction Environmental Management Plan. The requirement to produce a Construction Environmental Management Plan would be secured through an appropriately worded planning condition.

Table 6.4: Recommended Dust Mitigation for Low Risk Sites

Phase	**Mitigation Measure**
Communications	Display name and contact details of responsible person for dust issues on Site boundary in addition to head/regional office contact information. Display the head or regional office contact information
Dust Management Plan	Develop and implement a Dust Management Plan (DMP) which would be included as part of the CEMP, to be approved by the Local Authority.
Site Management	Record all complaints and incidents in a site log. Take appropriate measures to reduce emissions in a timely manner, and record the measures taken within the log. Make the complaints log available to the Local Authority if requested. Record any exceptional dust incidents on or off site.
Monitoring	Undertake daily on and off site visual inspections where there are nearby receptors. Carry out regular inspections to ensure compliance with the DMP and record results in the site log book. Increase the frequency of inspections during activities with a high potential to create dust or in prolonged dry weather.
Preparing and Maintaining the Site	Plan site layout to locate dust generating activities as far as possible from receptors. Use solid screens around dusty activities and around stockpiles. Avoid site runoff of water and mud. Fully enclose the site or specific operations where there is a high potential for dust production and the site is active for an extensive period. Keep site fencing barriers and scaffolding clean using wet methods.

Phase	Mitigation Measure
	Remove dusty materials from site as soon as possible. Minimise emissions from stockpiles by covering, seeding, fencing or damping down.
Operating Vehicle/Machinery and Sustainable Travel	Enforce an on-site speed limit of 15 mph on surfaced roads and 10 mph on unsurfaced areas. Ensure vehicles switch of engines when stationary. Avoid use of generators where possible.
Operations	Cutting, grinding or sawing equipment only to be used with suitable dust suppression equipment or techniques. Ensure adequate water supply for effective dust and particulate matter suppression. Use enclosed chutes, conveyors and covered skips. Minimise drop heights of materials. Ensure suitable cleaning material is available at all times to clean up spills.
Waste Management	Avoid bonfires.
Measures Specific to Demolition	Soft strip buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust). Ensure effective water suppression is used during the demolition operations. Avoid Explosive blasting, using appropriate manual or mechanical alternatives. Bad and remove any biological debris or damp down such materials before demolition.
Measures Specific to Construction	Ensure aggregates are stored in bunded areas and are not allowed to dry out. Avoid concrete scabbling where possible.
Measures Specific to Trackout	Use water-assisted dust sweepers to clean access and local roads. Avoid dry sweeping of large areas. Ensure vehicles entering and leaving the site are appropriately covered. Inspections of haul roads to be recorded in site log, including any remedial action taken. Implement a wheel washing system.

7. OPERATIONAL AIR QUALITY IMPACTS

A summary of the predicted concentrations at sensitive receptors are presented below in Tables 7.1 to 7.4 for NO_2 and PM_{10}.

The NO_2 concentrations as a result of the proposed development is presented in Table 7.1 for proposed on-site receptors and Table 7.2 for off-site existing receptors, and PM_{10} in Table 7.3 and 7.4 for the on-site and off-site receptors, respectively.

Table 7.1: Predicted Operational Annual Mean NO_2 at On-site Receptors (µg/m^3)

Receptor	Height (m)	Without Development	With Development	Traffic Contribution	% Change in Concentration relative to Air Quality Assessment Level (AQAL)	Impact Descriptor
PR1	1.5	7.2	7.2	0.1	0	Negligible
PR2	1.5	7.1	7.2	0.0	0	Negligible
PR3	1.5	7.4	7.5	0.1	0	Negligible
PR4	1.5	7.4	7.4	0.1	0	Negligible
PR5	1.5	8.0	8.1	0.1	0	Negligible
PR6	1.5	7.3	7.4	0.1	0	Negligible
PR7	1.5	7.6	7.7	0.1	0	Negligible

Table 7.2: Predicted Operational Annual Mean NO_2 at Off-site Receptors (µg/m^3)

Receptor	Height (m)	Without Development	With Development	Traffic Contribution	% Change in Concentration relative to Air Quality Assessment Level (AQAL)	Impact Descriptor
ER1	1.5	8.7	8.8	0.1	0	Negligible
ER2	1.5	8.1	8.2	0.1	0	Negligible
ER3	1.5	7.5	7.5	0.0	0	Negligible
ER4	1.5	9.6	9.7	0.2	0	Negligible
ER5	1.5	8.9	9.1	0.1	0	Negligible
ER6	1.5	7.3	7.3	0.1	0	Negligible
ER7	1.5	18.7	19.3	0.6	2	Negligible
ER8	1.5	14.1	14.7	0.3	1	Negligible
ER9	1.5	13.2	13.5	0.3	1	Negligible

Table 7.3: Predicted Operational Annual Mean PM_{10} at On-site Receptors (µg/m^3)

Receptor	Height (m)	Without Development PM10	With Development PM10	Traffic Contri-bution	% Change in concentration relative to AQAL	Impact Descriptor
PR1	1.5	11.5	11.5	0.0	0	Negligible
PR2	1.5	11.5	11.5	0.0	0	Negligible
PR3	1.5	11.6	11.6	0.0	0	Negligible
PR4	1.5	11.6	11.6	0.0	0	Negligible
PR5	1.5	12.1	12.1	0.0	0	Negligible
PR6	1.5	11.6	11.6	0.0	0	Negligible
PR7	1.5	11.6	11.6	0.0	0	Negligible

Table 7.4: Predicted Operational Annual Mean PM_{10} at Off-site Receptors (µg/m^3)

Receptor	Height (m)	Without Develop-ment PM10	With Develop-ment PM10	Traffic Contri-bution	% Change in concentration relative to AQAL	Impact Descriptor
ER1	1.5	12.1	12.2	0.0	0	Negligible
ER2	1.5	12.1	12.1	0.0	0	Negligible
ER3	1.5	12.0	12.0	0.0	0	Negligible
ER4	1.5	12.2	12.3	0.0	0	Negligible
ER5	1.5	12.2	12.2	0.0	0	Negligible
ER6	1.5	12.3	12.3	0.0	0	Negligible
ER7	1.5	14.7	14.8	0.1	0	Negligible
ER8	1.5	14.1	14.1	0.0	0	Negligible
ER9	1.5	12.7	12.7	0.0	0	Negligible

7.1 Analysis of Results

The predicted concentrations given in Tables 7.1 – 7.4 demonstrate that air quality would be expected to comfortably meet the annual mean and hourly mean NO_2 and PM_{10} objectives throughout the proposed development and at adjacent off-site receptors. The highest predicted annual NO_2 concentration within the development site is 8.1 µg/m^3.

The modelling has indicated that the emissions from the operational traffic would give rise a maximum increase in annual mean NO_2 concentration of 0.6 µg/m^3 at off-site receptor ER7, Thoulstone Cottages, adjacent to the access road to the development from the A36. The operational traffic contribution is predicted to be a maximum of 0.1 µg/m^3 at on-site receptors.

Using the IAQM/EPUK guidance, the operational development is considered to result in a negligible impact on NO_2 concentrations at all on and off-site receptors, as outlined in Table 7.1 and Table 7.2.

The predicted results indicate that the proposed development would have a negligible impact on annual mean PM_{10} concentrations. PM_{10} concentrations are predicted to remain comfortably below the relevant NAQOs across and off the site.

As air quality comfortably meets relevant air quality objectives at the development site, the need for additional mitigation to protect introduced receptors from poor air quality has not been identified.

7.2 Significance of Effect

7.2.1 IAQM Significance Criteria

As discussed in Section 4, the overall assessment of significance should be based on professional judgement, taking into account a number of factors including the overall air quality with the development in place, the future population exposure and to what extent the assessment is considered a worst case. The road traffic modelling has used 2016 emissions factors and 2016 background data.

An adjustment factor of three has been included to all the total concentrations for the constituent pollutants, this accounts for a 'worst-case' conservative scenario. The emissions, from increased traffic has been shown to have at worst, a negligible adverse impact, with an increase of 2% at receptor ER7, relative to the AQAL. At all off-site receptor locations modelled air quality is predicted to comfortably meet relevant objectives.

Within the proposed development, the traffic emissions would result in a maximum increase in annual mean NO_2 concentrations of 0.1 $\mu g/m^3$. At all locations air quality is predicted to comfortably meet relevant objectives and therefore the development would not be introducing new sensitive receptors into an area of poor air quality.

On this basis it is concluded that the proposed development would not result in a significant effect on air quality.

7.2.2 Wiltshire SPD Criteria

The site is not in an AQMA and the development would not contribute to exceedances of the air quality objective or require a new AQMA to be designated. The increase in concentrations as a result of development traffic is considered to be negligible. It is therefore concluded through using the Wiltshire SPD flowchart that air quality is not a significant consideration.

The proposed development would fall within APEC class A as air quality would meet all relevant objectives.

7.3 Operational Mitigation

There are a number of initiatives which are to be included within the proposals to minimise impacts to air quality.

A Framework Travel Plan would be provided to reduce emissions from traffic generated by the site when operational and would include the provision of a Travel Plan Co-ordinator to promote the actions set out in the travel plan and to encourage sustainable means of travel. Cycling will be encouraged by providing secure covered cycle parking spaces for staff and customers.

The use of ultra-low emission vehicles would be encouraged through the provision of electric charging points within the car park areas.

8. SUMMARY AND CONCLUSION

A review of relevant air quality baseline data indicates that existing air quality is likely to be well below the annual mean nitrogen dioxide (NO_2) objective set in the Air Quality (England) 2000 Regulations (as amended) across the proposed development site.

The assessment of potential impacts to air quality during the demolition and construction phase has identified that the activities, together with the location of nearby sensitive receptors results in a medium risk of impacts in the absence of suitable mitigation. Appropriate mitigation would be provided through a series of measures set out in a detailed dust management plan secured as part of the wider Construction Environmental Management Plan. On this basis the potential for residual effects would be reduced to at worst temporary slight adverse and for the most part would be expected to be negligible.

Air quality impacts once the proposed development is fully operational would arise due to emissions from the proposed developments energy centre and traffic generation.

The maximum increase in annual mean NO_2 concentrations as a result of the proposed development is 0.6 µg/m^3 as a result of operational traffic. This is the receptor adjacent to the access road to the development from the A36, which would have an extra 456 vehicles both east and westbound. Using the Environmental Protection UK / Institute for Air Quality Management guidance, the predicted increases would result in negligible impacts at all modelled receptors.

Within the proposed leisure site, the predicted modelling demonstrates that air quality would meet all relevant NO_2, and particulate matter (PM_{10}) objectives, and the need for additional mitigation to protect future new receptors from poor air quality has not been identified.

Overall, it is concluded that the proposed development would result in a negligible effect on air quality.

APPENDIX 1
EXTRACTS FROM WILTSHIRE AIR QUALITY SUPPLEMENTARY PLANNING DOCUMENT

	Applicable Range Nitrogen Dioxide Annual Mean	**Applicable Range PM_{10}**	**Recommendation**
APEC-A	5% or more below national objective (i.e. 38ug/m3 and below with respect to the annual mean)	Annual Mean: > 5% below national objective 24 hr: > 1-day less than national objective	No air quality grounds for refusal; however, mitigation of any emissions should be considered.
APEC-B	Between 5% below national objective & the national objective (ie 38ug/m3 & 40ug/m3 with respect to the annual mean)	**Annual Mean:** Between 5% above or below national objective **24 hr:** Between 1-day above or below national objective.	Appropriate mitigation must be considered e.g., Maximise distance from pollutant source, proven ventilation systems, parking considerations, winter gardens, internal layout considered and internal pollutant emissions minimised.
APEC-C	above the national objective (40ug/m3 and above)	**Annual Mean:** > 5% above national objective **24 hr:** > 1-day more than national objective.	Refusal on air quality grounds should be anticipated, unless the Local Authority has a specific policy enabling such land use and ensure best endeavours to reduce exposure are incorporated. Worker exposure in commercial/industrial land uses should be considered further. Mitigation measures must be presented with air quality assessment, detailing anticipated outcomes of mitigation measures.

Table A.1: Air pollution exposure criteria

Figure A1: Determining significant impacts on air quality