CALDECOTE FARM

NEWPORT PAGNELL · MILTON KEYNES

CHAPTER 10

ENVIRONMENTAL STATEMENT

AIR QUALITY

JULY 2021

newlands developments

10.0 AIR QUALITY

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CHAPTER 10

ENVIRONMENTAL STATEMENT

AIR QUALITY

10.1 INTRODUCTION

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10.1 INTRODUCTION

10.1.1 This chapter of the ES has been produced by Vanguardia and sets out the air quality impacts associated with the Proposed Development on land at Caldecote Farm, Newport Pagnell.

10.1.2 The assessment will focus on air pollutants that are likely to arise from the construction and occupation phases of the Proposed Development. These pollutants are oxides of nitrogen (NOx), nitrogen dioxide (NO2), particulate matter (PM10 and PM2.5) and dust for human and ecological receptors.

10.1.3 During the site clearance and construction activities, temporary impacts may arise from the emission of air pollutants and dust. During both the construction and occupation phases, vehicular traffic and emissions from stationary plant associated with the Proposed Development have the potential to lead to changes in the total air quality concentrations and the level of exposure for both human and ecological receptors.

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10.2 RELEVANT POLICY

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10.2 RELEVANT POLICY

EU Legislative Context

10.2.1 The following text is taken from the leglislation.gov.uk[1] website and sets out how EU Legislation will be retained in the United Kingdom after the Brexit transition.

> *" The UK is no longer a member of the European Union. EU legislation as it applied to the UK on 31 December 2020 is now a part of UK domestic legislation, under the control of the UK's Parliaments and Assemblies, and is published on legislation.gov.uk.*
>
> *[...]*
>
> *EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. This is set out in sections 2 and 3 of the European Union (Withdrawal) Act 2018 (c. 16)."*

10.2.2 European air quality legislation is consolidated under Directive 2008/50/EC, which came into force on 11th June 2008. This Directive consolidates previous legislation which was designed to deal with specific pollutants in a consistent manner and provides new air quality objectives for fine particulates. The consolidated Directives include:

- Directive 1999/30/EC – the First Air Quality "Daughter" Directive – sets ambient air limit values for NO2 and oxides of nitrogen, sulphur dioxide, lead and PM10;
- Directive 2000/69/EC – the Second Air Quality "Daughter" Directive – sets ambient air limit values for benzene and carbon monoxide; and,
- Directive 2002/3/EC – the Third Air Quality "Daughter" Directive – seeks to establish long-term objectives, target values, an alert threshold and an information threshold for concentrations of ozone in ambient air.

10.2.3 The fourth daughter Directive was not included within the consolidation and is described as:

- Directive 2004/107/EC – sets health-based limits on polycyclic aromatic hydrocarbons, cadmium, arsenic, nickel and mercury, for which there is a requirement to reduce exposure to as low as reasonably achievable.

UK Air Quality Regulations

10.2.4 The Air Quality Standards Regulations, (Amendments 2016)[2] seek to simplify the air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives but also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. Statutory Instrument SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995)[3], for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

UK Air Quality Strategy[4]

10.2.5 The Government's policy on air quality within the UK is set out in the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS). The AQS provides a framework for reducing air pollution in the UK with the aim of meeting the requirements of European Union Legislation.

10.2.6 The AQS sets out national health-based standards and objectives for nine key air pollutants to protect human health and ecosystems. These pollutants are benzene, 1-3 butadiene, carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, sulphur dioxide and polycyclic aromatic hydrocarbons.

1 EU legislation and UK law. Accessible at: https://www.legislation.gov.uk/eu-legislation-and-uk-law
2 The Air Quality Standards Regulations (Amendments), 2016
3 Parliament of the United Kingdom. (1990), 'Environmental Protection Act', Chapter 43. Queen's Printer of Acts of Parliament.
4 Department for Environment, Food and Rural Affairs (July 2007) Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volumes 1 & 2)

10.2.7 The pollutant standards relate to ambient pollutant concentrations in air, based on medical and scientific evidence regarding how each pollutant affects human health. Pollutant objectives are the future dates by which each standard is to be achieved, considering economic considerations, practical and technical feasibility.

10.2.8 The air quality objectives are managed through the Local Air Quality Management, (LAQM) regime, which is defined within the Air Quality (England) Regulations 2000, (SI 928) and The Air Quality (England) (Amendment) Regulations 2002, (SI 3043). Table 10.1 below, shows the targets and limits that are permitted for protection of human health, (where applicable) and which are relevant to this assessment.

Table 10:1: Human Health Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Time Period	Objective
Nitrogen Dioxide (NO2)	1-hour Mean	200 µg/m3 not to be exceeded more than 18 times a year
	Annual Mean	40 µg/m3
Fine Particles (PM10)	24-hour Mean	50 µg/m3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m3
Fine Particles (PM2.5)	Annual Mean	25 µg/m3

Environment Act 1995

10.2.9 Part IV of the Environment Act 1995 requires Local Authorities to regularly and systematically review and assess air quality within their boundaries against a series of objectives and appraise developments and transport plans against these assessments. Where an air quality objective is unlikely to be met, the local authority must designate an Air Quality Management Area, (AQMA) and draw up an Air Quality Action Plan setting out the measures it intends to introduce in pursuit of the objectives within its AQMA.

National Planning Policy

10.2.10 A summary of the national, regional and local planning policy and plans relevant to the Proposed Development and the assessment of air quality impacts is provided below.

National Planning Policy Framework[5]

10.2.11 A revised National Planning Policy Framework was published in July 2018 and updated in February 2019. The NPPF (2019), sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other development can be produced.

10.2.12 Paragraph 103 of the NPPF states:
"The planning system should actively manage patterns of growth in support of these objectives. Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health. However, opportunities to maximise sustainable transport solutions will vary between urban and rural areas, and this should be taken into account in both plan-making and decision-making."

5 Department for Communities and Local Government (DCLG), (2019). National Planning Policy Framework

10.2.13 Paragraph 170 states:
"Planning policies and decisions should contribute to and enhance the natural and local environment by:

[....]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans;

[....]"

10.2.14 Paragraph 181 states:
"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan".

National Planning Policy Guidance[6]

10.2.15 The National Planning Policy Guidance was published in March 2014, and the Air Quality section was last updated in November 2019.

10.2.16 Paragraph: 001 Reference ID: 32-001-20191101 states:
"The 2008 Ambient Air Quality Directive sets legally binding limits for concentrations in outdoor air of major air pollutants that affect public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:
- *fine particulate matter (PM2.5)*
- *ammonia (NH3)*
- *nitrogen oxides (NOx)*
- *sulphur dioxide (SO2)*
- *non-methane volatile organic compounds (NMVOCs)*

"As well as having direct effects on public health, habitats and biodiversity, these pollutants can combine in the atmosphere to form ozone, a harmful secondary air pollutant (and potent greenhouse gas) which can be transported great distances by weather systems. Odour and dust can also be a planning concern, for example, because of the effect on local amenity."

10.2.17 Paragraph: 005 Reference ID: 32-005-20191101 states:
"Whether air quality is relevant to a planning decision will depend on the proposed development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the proposed development would be particularly sensitive to poor air quality in its vicinity.

Where air quality is a relevant consideration the local planning authority may need to establish:
- *The 'baseline' local air quality, including what would happen to air quality in the absence of the development;*
- *whether the proposed development could significantly change air quality during the construction and operational phases (and the consequences of this for public health and biodiversity);*
- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality; and*
- *whether occupiers or users of the development could experience poor living conditions or health due to poor air quality"*

6 Department for Communities and Local Government (2019). National Planning Policy Guidance. HMSO, http://planningguidance.planningportal.gov.uk/

National Air Quality Plan[7]

10.2.18 In July 2017, Defra published an Air Quality Plan for tackling roadside NO2 concentrations throughout the United Kingdom. Along with a package of infrastructure, initiatives and grants, the plan requires Local Authorities to produce local action plans by March 2018, with the aim of reducing the air quality concentrations below the objective as soon as practically possible, should they be predicting exceedances of the air quality objectives beyond 2020.

10.2.19 There is currently no practical way to take account of the effects of the National Air Quality Plan in the modelling undertaken for this assessment; however, consideration has been given to whether there is currently, or is likely to be in the future, a limit value exceedance in the vicinity of the Proposed Development. This assessment has principally been carried out in relation to the air quality objectives, rather than the EU limit values that are the focus of the Air Quality Plan.

Clean Air Strategy[8]

10.2.20 Defra launched a new Clean Air Strategy in January 2019. The strategy sets out a wide range of actions by which the UK Government will seek to reduce pollutant emissions and improve air quality. Actions are targeted at four main sources of emissions: Transport, Domestic, Farming and Industry. The document complements the Industrial Strategy (archived), the Clean Growth Strategy and the 25 Year Environment Plan and is a key part of delivering the government's 25 Year Environmental Plan.

10.2.21 The document has adopted international targets to reduce emissions of fine particulate matter, ammonia, nitrogen oxides, sulphur dioxide and non-methane volatile organic compounds by 2020 and 2030. The document proposes tougher goals to cut public exposure to particulate matter pollution, as recommended by the World Health Organisation.

10.2.22 The strategy not only targets the reduction of emissions, but also a reduction in exposure.

Reducing Emissions from Road Transport: Road to Zero Strategy[9]

10.2.23 The Reducing emissions from road transport: Road to Zero Strategy (2018) document produced by the Office for Low Emission Vehicles (OLEV), Office for Zero Emission Vehicles (OZEV) and the Department for Transport (DfT) sets out how the government aims to end the sale of new conventional petrol and diesel cars and vans by 2040, with almost every car and van having zero emissions by 2050. Furthermore, the aim of the government is to see at least 50%, and as many as 70%, of new car sales being ultra-low emission by 2030 (and up to 40% of new van sales).

10.2.24 A number of measures have been set out in the document which outline how the government will support this gradual transition, some of which are consumer incentives, research and development and innovation support based.

10.2.25 Since this document was released, the Prime Minister has announced that, as part of the Ten Point Plan for a Green Industrial Revolution (2020)[10], the government will end the sale of new petrol and diesel cars and vans from 2030, 10 years earlier than set out in the document above.

10.2.26 This ambitious plan will see road traffic-related NOx emissions to reduce significantly over the coming decades, likely beyond the scale of reductions forecast in air quality tools used to assess air quality impacts.

7 Department for Environment, Food and Rural Affairs (2017). UK plan for tackling roadside nitrogen dioxide concentrations.
8 Department for Environment, Food and Rural Affairs (2019). Clean Air Strategy 2019 Act. HMSO, London.
9 Department for Transport, Office for Low Emission vehicles and Office for Zero Emission Vehicles, 2018. Reducing emissions from road transport: Road to Zero Strategy
10 Department for Transport and Office for Zero Emission Vehicles, 2020. The Ten Point Plan for a Green Industrial Revolution

Local Planning Policy

Milton Keynes Borough Council (MKBC)

10.2.27 The Milton Keynes Local Plan, Plan:MK 2016 – 2031, [11] was adopted in March 2019, and replaces the Core Strategy (2013 and Local Plan (2005). The plan sets out the Council's strategy for meeting the Borough's needs until 2031. Policies relating to air quality are as followed:

10.2.28 Policy EH7 – Promoting Healthy Communities, states:

"Milton Keynes Council is committed to reducing health inequalities, increasing life expectancy and improving quality of life of the Borough. Proposals should be designed to achieve the aspirations below:

[...]

5. Seeking to improve air quality and reduce noise by locating and designing pollution generating land uses and roads to avoid adverse impacts on sensitive land uses, and securing necessary mitigation measures to make development acceptable.

[...]"

10.2.29 Policy NE6 – Environnemental Pollution, states:

A. "When considering development proposals, the Council will adopt the approach set out below to ensure that pollution will not have an unacceptable impact on human health, groundwater, general amenity, biodiversity or the wider natural environment.

[...]

Air Quality:

D. Prevailing air quality and potential impacts upon air quality arising from airborne emissions, dust and odour associated with the construction and operation of a proposal (including vehicular traffic) will be considered when determining planning applications. Proposals that would result in or be subject to unacceptable risk to human health and the natural environment from air pollution, or would prejudice compliance with national air quality objectives, will be refused.

E. An Air Quality Assessment that demonstrates how prevailing air quality and potential impacts upon air quality have been considered, and how air quality will be kept to an acceptable standard through avoidance and mitigation, will be required for major and minor development proposals if any of the following apply:

1) *The development is likely, due to the nature of the proposal, and through in-combination effects, to give rise to significant air pollution;*
2) *The site is within an Air Quality Management Area;*
3) *The site is within 50 metres of a major road or heavily trafficked route*
4) *The site is within proximity to a source of air pollution which could present a significant risk to human health; and/or*
5) *The type of development would mean its occupiers would be particularly sensitive to air pollution, such as schools, health care establishments or housing for older people.*

F. The potential impact of proposals upon odour levels, or their sensitivity to prevailing sources and levels of odour, should be considered and addressed. Where appropriate, the Council will require an Odour Impact Assessment to be provided, including an Odour Management Plan where necessary.

[...]"

11 Milton Keynes Council, 2019. Plan:MK 2016 - 2031.

10.2.30 Policy SC1 – Sustainable Construction, states:

"[...]

Materials and Waste:

[...]

D. Prioritise the use of materials and construction techniques that have smaller ecological and carbon footprints, help to sustain or create good air quality, and improve resilience to a changing climate where appropriate.

[...]

Other Relevant Policy, Standards and Guidance

Local Air Quality Management Review and Assessment Technical Guidance (2021)[12]

10.2.31 The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality management, review and assessment process. This guidance, referred to in this document as LAQM.TG(16), has been used where appropriate in the assessment.

Guidance on the Assessment of Dust from Demolition and Construction (2016)[13]

10.2.32 The Institute of Air Quality Management, (IAQM) have published this guidance which provides a methodology to undertake a qualitative assessment of the potential dust / emission risks during the construction phase of a Proposed Development. The assessment consists of a five step processes to assess the potential level of risks, (Large, Medium, Small or Negligible), regarding the four main phases of development, (demolition, earthworks, construction, and trackout). The assessment includes consideration of pre-mitigation, and post-mitigation impacts, based upon the scale and nature of the development.

Land-Use Planning & Development Control: Planning for Air Quality (2017)[14]

10.2.33 The Environmental Protection UK (EPUK) and the IAQM have published guidance that offers comprehensive advice on:

- when an air quality assessment may be required;
- what should be included in an assessment;
- how to determine the significance of any air quality impacts associated with a development; and,
- the possible mitigation measures that may be implemented to minimise these impacts.

12 Department for Communities and Local Government (Last Updated 2021) 'LAQM Technical Guidance LAQM.TG(16)', London DEFRA.
13 Institute of Air Quality Management, 2016. Guidance on the Assessment of Dust from Demolition and Construction, IAQM, London
14 Environmental Protection UK & Institute of Air Quality Management (EPUK & IAQM), 2017. Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, London.

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10.3 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

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10.3 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

Consultation

10.3.1 In January 2021 an individual scoping email was issued to the Environmental Health department at MKBC setting out the specific scope and methodology of the assessment. The proposed methodology was accepted by the local council.

The Identification of the Study Area

10.3.2 The assessment relates to that area over which the effects of the Proposed Development will have a potential influence in terms of air quality.

Construction Dust Phase for Human and Ecological Receptors

10.3.3 The IAQM (2016) assessment guidance sets out the following criteria and recommended requirements for the undertaking of a qualitative assessment of dust and emissions associated with the construction phase:

- a 'human receptor' within:
  - 350 m of the boundary of the Site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).
- an 'ecological receptor' within:
  - 50 m of the boundary of the Site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the Site entrance(s).

10.3.4 It is considered that within these distances the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

Operational / Construction Traffic Phase for Human Receptors

10.3.5 The EPUK & IAQM, (2017)[1] assessment guidance sets thresholds for the recommended requirements for the undertaking of full impact assessment on sensitive human receptors due to the changes in daily vehicular traffic as a result of a Proposed Development. The criteria considers the change in annual average daily traffic movements by the following:

- A change of LDV (light duty vehicle) flow of:
  - More than 100 AADT within or adjacent to an AQMA; or
  - More than 500 AADT elsewhere.
- A change of HDV (heavy duty vehicles) flow of:
  - More than 25 AADT within or adjacent to an AQMA; or
  - More than 100 AADT elsewhere.

10.3.6 It is considered that below these thresholds the impacts upon sensitive human receptors would be 'negligible'.

Assessment Methodology

Methods of Baseline Data Collection

10.3.7 The existing baseline concentrations of NO2, PM10, and PM2.5, in the vicinity of the site have been assessed using the MKBC air quality review and assessment reports. The Defra background mapping website has also been utilised to provide background, NOx, NO2, PM10, and PM2.5 concentrations. The Defra website has mapped background concentrations at a resolution of 1x1km for the whole of the UK. Estimated concentrations are available for all years between 2018 and 2030.

1 Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), 2017. "Land-use Planning & Development Control: Planning for Air Quality".

10.3.8 It should be noted that a recent statement from Defra states:

"Users of the updated LAQM tools should be aware that the projections in the 2018 reference year background maps and associated tools are based on assumptions which were current before the Covid-19 outbreak in the UK. In consequence these tools do not reflect short or longer term impacts on emissions in 2020 and beyond resulting from behavioural change during the national or local lockdowns."

10.3.9 To identify any sensitive ecological designated sites, a review of the Defra Magic Map website and the UK Air Pollution Information System, (APIS) website has been undertaken.

Modelled Receptor Locations

10.3.10 The concentrations of NO2, PM10, and PM2.5 have been predicted at several human receptor locations along the local highway network, where the traffic data indicates a change in traffic flows.

10.3.11 When selecting the receptor locations, careful consideration has been made of junction locations, and where several highway links combine.

10.3.12 To note, according to LAQM.TG(16) air quality standards should only apply to locations where members of the public may be reasonably likely to be exposed to air pollution for the duration of the relevant limit value. As such, existing and proposed residential locations surrounding the Site have been selected to inform the risk assessment in terms of the relevant annual mean exposure.

10.3.13 The modelling locations are set out in Table 10.2 and illustrated in Figure 10.1.

Table 10:2: Receptor Locations

No.	Type	X	Y	Z (Height)
S1	Existing School Receptor	487682	242846	1
R1	Existing Residential Receptor	487200	243673	1.5
R2	Existing Residential Receptor	487278	243590	1.5
R3	Existing Residential Receptor	487486	243253	1.5
R4	Existing Residential Receptor	487518	243282	1.5
R5	Existing Residential Receptor	488420	242664	1.5
R6	Existing Residential Receptor	488771	242814	1.5
R7	Existing Residential Receptor	488987	242398	1.5
R8	Existing Residential Receptor	489144	241728	1.5
R9	Existing Residential Receptor	489947	240349	1.5
R10	Existing Residential Receptor	488051	241518	1.5
R11	Existing Residential Receptor	487308	242592	1.5
R12	Existing Residential Receptor	486669	242874	1.5
R13	Existing Residential Receptor	486186	243144	1.5

No.	Type	X	Y	Z (Height)
R14	Existing Residential Receptor	487849	242311	1.5
R15	Existing Residential Receptor	489408	240892	1.5
PR1	Proposed Residential Receptor	487783	242527	1.5
PR2	Proposed Residential Receptor	487795	242402	1.5
PR3	Proposed Residential Receptor	488079	242660	1.5
PRS1	Proposed School Receptor	487855	242062	1

10.3.14 A review of the Defra Magic Map website indicates no ecological receptors as referred to above are in a close proximity to the Site. On this basis, an impact assessment has been scoped out.

Construction Phase

Construction Phase Dust Assessment Methodology

10.3.15 To assess the potential impacts associated with dust and PM10 release during the construction phase and to determine any required mitigation measures, an assessment based upon IAQM (2016) guidance has been undertaken.

10.3.16 The criteria in the IAQM (2016) guidance divides the activities on construction sites into four different types to assess their different level of impacts upon receptors. These are:

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

10.3.17 The risk of dust effects (Low, Medium or High) is determined by the scale (magnitude) and nature of the works being undertaken, along with the distance to the receptor.

10.3.18 The full assessment of the potential dust effects, in isolation of any ongoing works or committed developments, has been undertaken within Section 10.5 of this ES Chapter, with the full methodology set out in Appendix 10.2.

Construction / Operational Phase Vehicular Impact Assessment Methodology

10.3.19 The number of daily vehicular movements associated with the construction phase of the Proposed Development will vary on a daily basis, depending upon the construction activity being undertaken at the time. Therefore, the highest daily flows have been taken to assess the worst-case scenario over the construction period.

10.3.20 The traffic estimates for both the construction and operational phases has been provided by ADC Infrastructure and has been compared to the EPUK & IAQM (2017) criterion thresholds, to determine if a full impact assessment is required.

Road Traffic Emissions – Air Dispersion Modelling

10.3.21 Air quality at specified receptor locations have been predicted using the ADMS-Roads model, (v5.0.0.1) dispersion modelling software, which is recognised as the leading air pollution modelling packages in the UK. The model uses advanced algorithms for the height-dependence of wind speed, turbulence and atmospheric stability to produce improved predictions of air pollutant concentrations. It can predict short and long-term concentrations, including percentile concentrations. The use of the ADMS-Roads model was agreed with the air quality Environment Health Officer(s) at MKBC.

10.3.22 The model requires the user to provide various input data, including emissions from each section of road and the road characteristics, (including road width, where applicable) and meteorological data. To note, the meteorological data used within the model has been taken from Bedford Meteorological Site (for 2019), with the windrose illustrated in Figure 10.2.

10.3.23 The model has been utilised to predict concentrations of NOx, PM10 and PM2.5, based upon the vehicle flow, composition, and speed. The NO2 concentrations have been post processed by using the NOx to NO2 calculator (v8.1[2]).

10.3.24 The most recently available emission factor tool kit (EFT) (Version 10.1), released by Defra in August 2020, has been used to predict the traffic related emissions for 2019, 2020 and 2023.

10.3.25 It has been widely known for some time that NOx/NO2 levels are not reducing as quickly as anticipated and this was identified by Defra in 2011. This was recently reiterated in an IAQM Interim Position Statement (v1.1)[3] released in July 2018 recognising that emissions from diesel vehicles have not declined as expected by Defra. This document has since been formally withdrawn, stating:

"There is a growing body of evidence to suggest that the latest COPERT vehicle emission factors, which feed into the EFT (v9 and onwards), reflect the real-world NOx emissions more accurately.

It is judged that an exclusively vehicle emissions-based sensitivity test is no longer necessary.

On this basis, the EFT may be used for future year modelling with greater confidence when considering the per vehicle emission, provided that the assessment is verified against measurements made in the year 2016 or later."

10.3.26 On this basis it is anticipated the most up to date (EFT) v10.1 could be relied upon to provide a good representation of the air quality concentrations and impacts, and no sensitivity test has therefore been undertaken.

Road Traffic Emissions – Modelling Scenarios

10.3.27 The traffic data used to undertake the assessment has been provided by ADC Infrastructure for both the construction and operational phases. The following scenarios have been considered within this ES Chapter:

- 2019 Baseline (for model verification);
- 2020 Baseline;
- 2020 Baseline + Proposed Development (Construction Traffic);
- 2023 Baseline; and
- 2023 Baseline + Proposed Development (Operational Traffic).

10.3.28 Vanguardia have been advised that all committed developments, site allocations, background traffic growth has been considered within the traffic data which feeds into this assessment.

2 Department for Environmental Food & Rural Affairs. Accessible at: Background maps. Tools. Local Air Quality Management Support - Defra, UK
3 Institute of Air Quality Management, 2018. Dealing with Uncertainty in Vehicle NOx Emissions within Air Quality Assessments.

Significance Criteria

Human Receptor Impact Descriptors and Assessment of Significance

10.3.29 Currently there is no official guidance in the UK on how to describe the nature of air quality impacts, nor how to assess their significance. The approach developed by EPUK & IAQM (2017) has therefore been used.

10.3.30 The guidance recommends that the degree of an impact is described by expressing the magnitude of incremental change in pollution concentration, as a proportion of the relevant assessment level and examining this change in the context of the new total concentration and its relationship with the assessment criterion, as summarised in Table 10.3.

Table 10.3: 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% of 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

10.3.31 The approach set out in the EPUK & IAQM (2017) guidance, provides a method for describing the impact magnitude at individual receptors only. The guidance outlines that this change may have an effect on the receptor, depending on the severity of the impact and other factors that may need to be taken into account. The assessment framework for describing impacts can be used as a starting point to make a judgement on significance of effect. However, whilst there may be 'slight', 'moderate' or 'substantial' impacts described at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances.

10.3.32 Following the approach to assessing significance, outlined in the EPUK & IAQM (2017) guidance, the significance of likely residual effects of both the construction and operational phases of the Proposed Development on air quality has been established through professional judgement and the consideration of the following factors:

- The geographical extent (local, district or regional) of effects;
- The duration (temporary or long term);
- Their reversibility (reversible or permanent);
- The magnitude of changes in pollution concentrations;
- The exceedance of standards (e.g. AQS objectives); and
- The changes in pollutant exposure.

10.3.33 A summary of the professional experience of the staff contributing to this assessment is provided in Appendix 10.1.

Assumptions / Limitations

10.3.34 There are many uncertainties when considering both measured and predicted pollution concentrations. The model is dependent upon the traffic data provided for the project, and should this be subject to change, so may the resulting pollution concentrations.

10.3.35 The background air quality concentration has been taken from the Defra background mapping. The Defra website includes estimated background air pollution data for NOx, NO2, PM10 and PM2.5 for each 1km by 1km OS grid square. Background pollutant concentrations are modelled from the base year of 2018 and based upon ambient monitoring, meteorological data from 2018 and then includes projections for future years, up to (currently) 2030.

10.3.36 To note, projected concentrations for 2020 and beyond were based on assumptions prior to the Covid-19 outbreak. Therefore, these concentrations do not reflect short- or longer-term impacts on emissions as a result of the national or local lockdowns.

10.3.37 In order to reduce the uncertainty associated with predicted concentrations, a model verification process has been undertaken following guidance set out in LAQM.TG(16) and is set out in Appendix 10.4.

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10.4 BASELINE CONDITIONS

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10.4 BASELINE CONDITIONS

Local Air Quality Management

10.4.1 Under the Air Quality Strategy there is a duty on all Local Authorities to consider the air quality within their boundaries and to report annually to Defra. Local air quality management in the area has been assessed by MKBC, through the national Review and Assessment process and, in fulfilment of Part IV of the Environment Act 1995.

10.4.2 MKBC has declared one Air Quality Management Area (AQMA) covering the roads in Olney. This has been declared for exceedances of the NO2 annual mean objective.

10.4.3 The proposed development lies approximately 8.5 km southwest of the AQMA.

10.4.4 Table(s) 10.4 – Table 10.6 provides details and NO2 concentrations of the closest monitoring locations to the Site. The automatic and non-automatic monitoring sites are illustrated in Figure 10.3 and Figure 10.4 respectively.

Table 10:4: Automatic Air Quality Monitoring Data Annual Mean (µg/m3)

Site	Monitoring Type	Pollutant	2015	2016	2017	2018	2019
Roadbox 1	Roadside	NO2	27.0	32.8	30.5	25.6	27.1

Table 10:5: Local Authority Air Quality Monitoring Data Exceedances

Site	Monitoring Type	Pollutant	2015	2016	2017	2018	2019
Roadbox 1	Roadside	NO2	0	0 (110.3)	0	0	0

Table 10:6: Diffusion Tube Air Quality Monitoring Data Annual Mean (µg/m3)

Site	Monitoring Type	Pollutant	2015	2016	2017	2018	2019
H1 & H2	Roadside	NO2	22.8	25.5	26.6	23.8	23.1
I1 & I2	Kerbside	NO2	27.7	30.6	29.5	26.7	28.6
J1 & J2	Kerbside	NO2	30.1	31.4	31.1	30.0	30.3
TT1 & TT2	Roadside	NO2	27.6	27.1	27.5	26.8	26.5
N1 & N2	Suburban	NO2	20.1	23.2	21.0	21.5	19.4
EEE1 & EEE2	Suburban	NO2	-	-	-	-	18.2
K1 & K2	Suburban	NO2	25.6	23.4	24.8	22.2	22.3

10.4.5 The annual mean concentrations for the closest automatic and diffusion tube monitoring sites have not approached or exceeded the AQ objective of 40µg/m3. Furthermore, the hourly exceedances limit has not been exceeded at the closest automatic monitor.

UK-AIR Background Pollution

10.4.6 Defra provides estimated background concentrations of the UKAQS pollutants on the UK Information Resource (UK-AIR) website[1]. These estimates are produced using detailed modelling tools and are presented as concentrations at central 1km2 National Grid square locations across the UK. These were updated in August 2020 and are based on monitoring and meteorological data from 2018.

10.4.7 Being background concentrations, the UK-AIR data are intended to represent a homogenous mixture of all emission sources in the general area of a particular grid square location. Concentrations of pollutants at various sensitive receptor locations can, therefore, be calculated by modelling the emissions from a nearby pollution source, such as a busy road, and then adding this to the appropriate UK-AIR background datum.

10.4.8 The predicted background pollution concentrations for NO2, PM10 and PM2.5 for 2019, 2020 and 2023 are presented in Table 10.7. The data was taken from the central grid square location closest to each of the previously specified modelling receptor locations.

10.4.9 Projected concentrations for 2020 and beyond were based on assumptions prior to the Covid-19 outbreak.

Table 10.7: Background Annual Mean Concentrations used in this Assessment (µg.m-3)

Year	NO2[2]	PM10	PM2.5
2019	14.52 – 23.15	16.68 – 19.79	10.65 – 12.23
2020	13.90 – 22.03	16.38 – 19.48	10.42 – 11.99
2023	12.28 – 18.64	15.86 – 18.95	10.00 – 11.57

10.4.10 It should be noted that NO2 concentrations have been calibrated against Automatic Urban and Rural Network (AURN) sites with more than 75% data capture. The methodology for this is set out in the Air Quality Consultants document[3].

Modelled Baseline Concentrations

10.4.11 The modelled baseline concentrations set out in Table 10.8 for the 2020 baseline scenario, have been carried out for the receptor locations set out in Table 10.2 and illustrated in Figure 10.1.

1 UK Information Resource (UK-AIR) website (www.uk-air.defra.gov.uk)
2 The background concentrations NO2 from the Defra background mapping have been calibrated against the background concentrations monitored in 2019 across the AURN network (where monitoring is greater than 75%)
3 Air Quality Consultants, 2020. Calibrating Defra's 2018- based Background NOx and NO2 Maps against 2019 Measurements.

Table 10.8: 2020 NO2, PM10, and PM2.5 Concentrations at Specified Receptors Data (µg/m3)

Receptor	Calculated Annual Mean (µg/m3)		
	2020		
	NO2	PM10	PM2.5
S1	26.5	19.8	12.4
R1	18.0	18.2	11.6
R2	20.7	18.7	11.9
R3	19.4	18.4	11.7
R4	20.2	18.5	11.8
R5	18.0	16.9	10.7
R6	24.1	18.0	11.3
R7	24.5	18.2	11.5
R8	21.7	18.5	11.2
R9	31.0	19.8	12.1
R10	28.9	19.0	11.9
R11	25.2	19.3	12.1
R12	32.2	20.2	12.8
R13	28.4	21.1	13.0
R14	24.3	19.2	12.0
R15	31.3	19.8	12.2
PR1	25.0	19.4	12.1
PR2	24.9	19.3	12.1
PR3	20.4	17.4	11.0
PRS1	27.4	19.6	12.3

10.4.12 The modelled annual mean concentrations for NO2, PM10 and PM2.5 are all below the respective annual mean objective at all receptor locations.

10.4.13 The annual mean PM10 concentrations are below 32 µg/m3 and it is therefore unlikely that the 24-hour mean PM10 objective will be exceeded. Furthermore, the annual mean NO2 concentrations are all below 60 µg/m3, which is regarded to be an indicator that the hourly mean objective will also not be breached.

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10.5 ASSESSMENTS OF LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS

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10.5 ASSESSMENTS OF LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS

Construction

Dust Risk Assessment

10.5.1 The construction phase of the Proposed Development will involve activities that could produce polluting emissions into the air. Predominantly, these will be emissions of dust.

10.5.2 The estimates for the dust emission magnitude for demolition, earthworks, construction and trackout below, are, where appropriate, based on the construction information provided by the Applicant and the professional experience of the assessor. Mitigation measures have not been considered in these estimates.

Dust Magnitude Risk Assessment

Demolition

10.5.3 A review of the site indicates no buildings are currently on-site, and therefore no demolition is likely to take place, and therefore this has been omitted from the dust assessment.

Earthworks

10.5.4 At approximately 190,000 m2, the entire site area is considered 'Large' with reference to the IAQM (2016) guidance. Overall, the impact from the dust emission associated with earthworks will be '**Large**', due to the scale of the Proposed Development.

Construction

10.5.5 During construction, high risk activities that have the greatest potential to cause emissions of dust may include piling, concrete batching and piling and general handling of construction materials. Furthermore, wind-blow from stockpiles of friable materials also has the potential to cause dust emissions, particularly at higher wind speeds.

10.5.6 Details of the construction methodology will be known once the Principal Contractor has been appointed and detailed design has been carried out and therefore they are not precisely detailed at present. The total volume of the proposed buildings is likely to be in the IAQM's '**Large**' category (>100,000m3).

Trackout

10.5.7 Construction traffic, when travelling over soiled road surfaces, has the potential to generate dust emissions, and also to soil the local road network. During dry weather, unsurfaced and soiled roads can lead to dust being emitted due to pick-up by vehicle wheels. The potential for roads to be soiled is dependent on the length of the onsite unpaved road.

10.5.8 The number of daily vehicles movements which may track out dust and dirt is unknown, but it is likely to be over 50 outward movements, and therefore it is considered the dust emission is '**Large**'.

Dust Magnitude Risk Assessment Summary

10.5.9 The summary of the dust emission magnitude, as a result of demolition, earthworks, construction and track-out, as specified in the IAQM (2016) guidance and discussed above, are listed in Table 10.9 below. Overall, the impact from dust emissions during construction will be large without any implementation of mitigation measures.

Table 10.9: Emission Magnitude and PM10 Risk for Construction, based on the IAQM (2016) Dust Guidance

Source	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Large
Trackout	Large

Sensitivity of the Area

10.5.10 Having established the emission magnitude for dust above, the sensitivity of the area is considered to establish the significance of effects. The effect of the dust, (i.e. the result of the change in dust levels) depends on the sensitivity of the receptor to change. High sensitivity human receptors include residential dwellings, schools and hospitals.

10.5.11 The impacts of dust emissions from the sources discussed above have the potential to cause an annoyance to human receptors living in the local area. Within distances of 20 m of the Application Site boundary there is a high risk of dust impacts, regardless of the prevailing wind direction. Up to 100 m from the construction site there may still be a high risk, particularly if the receptor is downwind of the dust source.

10.5.12 With the exponential decline in dust with distance from dust generating activities, it is considered that for receptors more than 350 m from the Application Site boundary, the risk is negligible. Furthermore, the risks at over 100 m are only likely to be significant in certain weather conditions, e.g. downwind of the source during dry periods.

10.5.13 The approximate number of high sensitivity human receptors in the vicinity of the Application Site is detailed in Table 10.10 below. The main existing receptors within the vicinity of the Application Site are existing residential buildings to the northwest/east, with a number of commercial premises located on the eastern boundary of the Application Site.

Table 10.10: Approximate Number of High Sensitivity Human Receptors close to the Application Site

Distance to Site (m)	No. of High Sensitivity Receptors	Details
<20	0	-
20 – 50	1-10	Commercial receptors to the south east of the Site-
50-100	1-10	Residential receptors off Glenfield. Commercial receptors to the south west of the Site on the northbound side of the M1.
100 - 350	>100	Residential dwellings to the north and the south west of the Site.

10.5.14 The background annual mean concentration of PM10 is well below the AQS. The prevailing wind is from the south-west, as indicated by the Bedford Meteorological Station wind rose in Figure 10.2. MKBC considered this meteorological station to be most representative of the Application Site. This includes considerations of proximity to the Application Site and completeness of the data available. Most of the nearby potentially sensitive receptors are to the east of the Application Site, downwind of the prevailing south-westerly wind, and are therefore more likely to be affected by dust. It is considered, that the potential sensitivity of the area surrounding the Application Site to dust soiling effects is low, with the likelihood of exceedances of the PM10 AQSs being low.

Risk of Impacts

10.5.15 Having established the likely dust emission magnitude and sensitivity of the area, the risk of impacts can be determined in accordance with the IAQM (2016) guidance; these are summarised in Table 10.11.

Table 10.11: Summary Risk Effects of Construction, based on the IAQM's Dust Guidance

Source	Dust Soiling	Human Health	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Low Risk	Low Risk	N/A
Construction	Low Risk	Low Risk	N/A
Trackout	Low Risk	Low Risk	N/A

10.5.16 Overall, construction of the Proposed Development, (without mitigation measures) is considered to have a low risk for dust soiling effects and a low risk for PM10 health effects. The IAQM (2016) guidance indicates that the evaluation of pre-mitigation effects for the construction phase holds little value and would be arbitrary. The risk category determined here is used to inform mitigation and ensure an overall negligible significance of effects following mitigation.

Construction Vehicular Impact Assessment

10.5.17 ADC infrastructure have advised that on average the construction phase will generate a maximum of 198 light goods vehicle and 143 heavy goods vehicle movements a day. This level of impact does exceed the EPUK & IAQM (2017) thresholds for a full impact assessment, as set out in paragraph 10.3.5 (for a site located outside an AQMA). Therefore, a full impact assessment has been included in this assessment.

10.5.18 The predicted impacts of the Proposed Development construction traffic, upon the annual mean concentrations of NO2, PM10 and PM2.5 in 2020, (for the previously specified receptors) are set out in Table(s) 10.12, 10.13 and 10.14. These also describe the impacts at each receptor using the magnitude and significance impact descriptors given in Table 10.3.

Table 10.12: 2020 Annual Mean NO2 Concentrations (µg.m-3) Construction Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean NO2 Concentration (µg/m3)		Change due to Proposed Development		
	2020 Without	2020 With Construction	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	26.5	26.5	0.0	0%	Negligible
R1	18.0	18.0	0.0	0%	Negligible
R2	20.7	20.7	0.0	0%	Negligible
R3	19.4	19.4	0.0	0%	Negligible
R4	20.2	20.2	0.0	0%	Negligible
R5	18.0	18.0	0.0	0%	Negligible
R6	23.9	24.1	0.2	0%	Negligible
R7	24.3	24.5	0.1	0%	Negligible
R8	21.7	21.7	0.1	0%	Negligible

Receptor	Predicted Annual Mean NO2 Concentration (µg/m3)		Change due to Proposed Development		
	2020 Without	2020 With Construction	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
R9	31.0	31.0	0.0	0%	Negligible
R10	28.8	28.9	0.1	0%	Negligible
R11	25.2	25.2	0.0	0%	Negligible
R12	32.2	32.2	0.0	0%	Negligible
R13	28.4	28.4	0.0	0%	Negligible
R14	24.2	24.3	0.1	0%	Negligible
R15	31.3	31.3	0.0	0%	Negligible
PR1	24.9	25.0	0.1	0%	Negligible
PR2	24.8	24.9	0.1	0%	Negligible
PR3	20.4	20.4	0.1	0%	Negligible
PRS1	27.3	27.4	0.1	0%	Negligible

10.5.19 The data in Table 10.12 shows that the sensitive receptors are not expected to be affected by pollutant concentrations that exceed the 40µg/m3 annual mean AQS for NO2. In the 'with construction' scenario, the highest predicted concentration of NO2 is at Receptor 12 at 32.2 µg/m3; this is 21.8% below the AQS.

10.5.20 There is not expected to be a significant temporary increase in annual mean NO2 concentrations as a result of the construction traffic. With reference to the EPUK & IAQM (2017) significance criteria in Table 10.3 the maximum predicted increase in concentration of NO2 of 0.2µg/m3 at Receptor R6, which is considered as a negligible impact, with concentrations comfortably within the annual mean objective targets. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

10.5.21 For the hourly AQS for NO2 (200µg/m3 not to be exceeded more than 18 times per year), TG(16) states that if the annual mean is below 60µg/m3, this short term AQS should be met. There is no exceedance of this threshold concentration at any of the existing receptors; therefore, it can reasonably be assumed that the short term AQS will be met.

Table 10.13: 2020 Annual Mean PM10 Concentrations (µg/m3) Construction Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean PM10 Concentration (µg/m3)		Change due to Proposed Development		
	2020 Without	2020 With Construction	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	19.8	19.8	0.0	0	Negligible
R1	18.2	18.2	0.0	0	Negligible
R2	18.7	18.7	0.0	0	Negligible
R3	18.4	18.4	0.0	0	Negligible
R4	18.5	18.5	0.0	0	Negligible
R5	16.9	16.9	0.0	0	Negligible
R6	17.9	18.0	0.0	0	Negligible
R7	18.2	18.2	0.0	0	Negligible
R8	18.5	18.5	0.0	0	Negligible
R9	19.8	19.8	0.0	0	Negligible
R10	19.0	19.0	0.0	0	Negligible
R11	19.3	19.3	0.0	0	Negligible
R12	20.2	20.2	0.0	0	Negligible
R13	21.1	21.1	0.0	0	Negligible
R14	19.2	19.2	0.0	0	Negligible
R15	19.8	19.8	0.0	0	Negligible
PR1	19.3	19.4	0.0	0	Negligible
PR2	19.3	19.3	0.0	0	Negligible
PR3	17.3	17.4	0.0	0	Negligible
PRS1	19.6	19.6	0.0	0	Negligible

10.5.22 The data in Table 10.13, show that there are not predicted to be any exceedances of the 40µg/m3 annual mean AQS for PM10. In the 'with construction' scenario, concentrations of PM10 are predicted to be at least 47.3% below the AQS at all receptors. The impact is expected to be negligible at all receptors with reference to the EPUK & IAQM (2017) criteria. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

10.5.23 For PM10, the following equation is given to derive the number of days that the daily mean limit of 50µg/m3 is likely to be exceeded:

No.24 hour exceedances = -18.5 + 0.00145 x annual mean3 + (206/annual mean)

10.5.24 The highest predicted annual mean PM10 concentration in the area is 21.1 µg/m3.

10.5.25 Based on the above formula, this equates to 4.9 exceedance days, which is 86% below the 35-day limit. Therefore, the construction traffic will not lead to the exposure of any existing receptors to unacceptable short-term concentrations of PM10.

Table 10.14: 2020 Annual Mean PM2.5 Concentrations (µg/m3) Construction Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean PM2.5 Concentration (µg/m3)		Change due to Proposed Development		
	2020 Without	2020 With Construction	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	12.4	12.4	0.0	0%	Negligible
R1	11.6	11.6	0.0	0%	Negligible
R2	11.9	11.9	0.0	0%	Negligible
R3	11.7	11.7	0.0	0%	Negligible
R4	11.8	11.8	0.0	0%	Negligible
R5	10.7	10.7	0.0	0%	Negligible
R6	11.3	11.3	0.0	0%	Negligible
R7	11.5	11.5	0.0	0%	Negligible
R8	11.2	11.2	0.0	0%	Negligible
R9	12.1	12.1	0.0	0%	Negligible
R10	11.9	11.9	0.0	0%	Negligible
R11	12.1	12.1	0.0	0%	Negligible
R12	12.8	12.8	0.0	0%	Negligible
R13	13.0	13.0	0.0	0%	Negligible
R14	12.0	12.0	0.0	0%	Negligible
R15	12.2	12.2	0.0	0%	Negligible
PR1	12.1	12.1	0.0	0%	Negligible
PR2	12.1	12.1	0.0	0%	Negligible

Receptor	Predicted Annual Mean PM2.5 Concentration (µg/m3)		Change due to Proposed Development		
	2020 Without	2020 With Construction	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
PR3	11.0	11.0	0.0	0%	Negligible
PRS1	12.3	12.3	0.0	0%	Negligible

10.5.26 The data in Table 10.14 show that there are not predicted to be any exceedances of the 25µg/m3 annual mean AQS for PM2.5. In the 'with construction' scenario, concentrations of PM2.5 are predicted to be at least 48% below the AQS at all receptors. The impact is expected to be negligible at all receptors with reference to the EPUK & IAQM (2017) criteria. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

Operation

2023 Vehicular Impact Assessment

10.5.27 A review of the predicted traffic numbers associated with the operational phase for 2023 have been screened against the EPUK & IAQM (2017) thresholds set out in paragraph 10.3.5. The predicted traffic impacts indicate a potential breach of the EPUK & IAQM (2017) thresholds. Therefore, a full impact assessment for the operational phase has been undertaken.

10.5.28 Table(s) 10.15, 10.16 and 10.17 present the annual mean NO2, PM10 and PM2.5 concentrations predicted in the Proposed Development opening year of 2023.

Table 10.15: 2023 Annual Mean NO2 Concentrations (µg/m3) Operational Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean NO2 Concentration (µg/m3)		Change due to Proposed Development		
	2023 Without	2023 With Development	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	22.0	22.1	0.1	0	Negligible
R1	15.5	15.5	0.0	0	Negligible
R2	17.6	17.6	0.0	0	Negligible
R3	16.6	16.6	0.0	0	Negligible
R4	17.1	17.2	0.0	0	Negligible
R5	15.3	15.3	0.1	0	Negligible
R6	19.9	20.2	0.3	1	Negligible
R7	20.2	20.3	0.2	0	Negligible
R8	18.1	18.2	0.1	0	Negligible

Receptor	Predicted Annual Mean NO2 Concentration (µg/m3)		Change due to Proposed Development		
	2023 Without	2023 With Development	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
R9	25.3	25.3	0.0	0	Negligible
R10	23.6	23.7	0.1	0	Negligible
R11	20.8	20.8	0.1	0	Negligible
R12	26.1	26.1	0.0	0	Negligible
R13	23.0	23.0	0.0	0	Negligible
R14	20.1	20.3	0.2	1	Negligible
R15	25.5	25.5	0.0	0	Negligible
PR1	20.6	21.3	0.7	2	Negligible
PR2	20.5	21.1	0.5	1	Negligible
PR3	17.1	17.2	0.1	0	Negligible
PRS1	22.4	22.6	0.2	0	Negligible

10.5.29 The data in Table 10.15 show that the sensitive receptors are not expected to be affected by pollutant concentrations that exceed the 40µg/m3 annual mean AQS for NO2. In the 'with development' scenario, the highest predicted concentration of NO2 is at Receptor 12 at 26.1µg/m3, this is 34.8% below the AQS.

10.5.30 There is not expected to be a significant increase in annual mean NO2 concentrations as a result of the operational traffic. With reference to the EPUK & IAQM (2017) impacts criteria in Table 10.3, the maximum predicted increase in concentration of NO2 of 0.7 µg/m3 at Receptor PR1, which is considered as negligible, with concentrations comfortably within the annual mean objective targets. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

10.5.31 For the hourly AQS for NO2 (200µg/m3 not to be exceeded more than 18 times per year), TG(16) states that if the annual mean is below 60µg/m3, this short term AQS should be met. There is no exceedance of this threshold concentration at any of the modelled receptors; therefore, it can reasonably be assumed that the short term AQS will be met.

Table 10.16: 2023 Annual Mean PM10 Concentrations (µg/m3) Operational Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean PM10 Concentration (µg/m3)		Change due to Proposed Development		
	2023 Without	2023 With Development	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	19.3	19.3	0.0	0	Negligible
R1	17.7	17.7	0.0	0	Negligible
R2	18.2	18.2	0.0	0	Negligible
R3	17.9	17.9	0.0	0	Negligible
R4	18.0	18.0	0.0	0	Negligible
R5	16.4	16.4	0.0	0	Negligible
R6	17.4	17.5	0.1	0	Negligible
R7	17.7	17.8	0.1	0	Negligible
R8	18.0	18.0	0.0	0	Negligible
R9	19.2	19.2	0.0	0	Negligible
R10	18.5	18.5	0.0	0	Negligible
R11	18.7	18.8	0.0	0	Negligible
R12	19.7	19.7	0.0	0	Negligible
R13	20.5	20.5	0.0	0	Negligible
R14	18.6	18.7	0.0	0	Negligible
R15	19.3	19.3	0.0	0	Negligible
PR1	18.8	18.9	0.1	0	Negligible
PR2	18.8	18.8	0.1	0	Negligible
PR3	16.8	16.9	0.0	0	Negligible
PRS1	19.1	19.1	0.1	0	Negligible

10.5.32 The data in Table 10.16, show that there are not predicted to be any exceedances of the 40µg/m3 annual mean AQS for PM10 in any of the scenarios modelled. In the 'with development' scenario, concentrations of PM10 are predicted to be at least 48.8% below the AQS at all receptors. The impact is expected to be negligible at all receptors with reference to the EPUK & IAQM (2017) criteria. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

10.5.33 For PM10, the following equation is given to derive the number of days that the daily mean limit of 50µg/m3 is likely to be exceeded:

No.24 hour exceedances = -18.5 + 0.00145 x annual mean3 + (206/annual mean)

10.5.34 The highest predicted annual mean PM10 concentration in the area is 20.5 µg/m3.

10.5.35 Based on the above formula, this equates to 4.1 exceedance days, which is 88.3% below the 35-day limit. Therefore, the operational traffic will not lead to the exposure of any modelled receptors to unacceptable short-term concentrations of PM10.

Table 10.17: 2023 Annual Mean PM2.5 Concentrations (µg/m3) Operational Impacts at the Sensitive Receptor Locations

Receptor	Predicted Annual Mean PM2.5 Concentration (µg/m3)		Change due to Proposed Development		
	2023 Without	2023 With Development	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
S1	11.9	11.9	0.0	0%	Negligible
R1	11.2	11.2	0.0	0%	Negligible
R2	11.4	11.4	0.0	0%	Negligible
R3	11.3	11.3	0.0	0%	Negligible
R4	11.4	11.4	0.0	0%	Negligible
R5	10.3	10.3	0.0	0%	Negligible
R6	10.9	10.9	0.0	0%	Negligible
R7	11.0	11.1	0.0	0%	Negligible
R8	10.8	10.8	0.0	0%	Negligible
R9	11.6	11.7	0.0	0%	Negligible
R10	11.5	11.5	0.0	0%	Negligible
R11	11.6	11.7	0.0	0%	Negligible
R12	12.3	12.3	0.0	0%	Negligible
R13	12.6	12.6	0.0	0%	Negligible
R14	11.6	11.6	0.0	0%	Negligible
R15	11.7	11.7	0.0	0%	Negligible
PR1	11.7	11.7	0.1	0%	Negligible
PR2	11.7	11.7	0.0	0%	Negligible

Receptor	Predicted Annual Mean PM2.5 Concentration (µg/m3)		Change due to Proposed Development		
	2023 Without	2023 With Development	µg/m3	As a % of AQS	Descriptor
	A	B	B-A		
PR3	10.6	10.6	0.0	0%	Negligible
PRS1	11.8	11.9	0.0	0%	Negligible

10.5.36 The data in Table 10.17 show that there are not predicted to be any exceedances of the 25µg/m3 annual mean AQS for PM2.5 in any of the scenarios modelled. In the 'with development' scenario, concentrations of PM2.5 are predicted to be at least 49.6% below the AQS at all receptors. The impact is expected to be negligible at all receptors with reference to the EPUK & IAQM (2017) criteria. Based upon this and professional judgment the impacts are considered be 'Not Significant.'

Impact of Climate Change

10.5.37 Changes in atmospheric composition and their impact on climate change are uncertain and it is not possible to quantify them at the local level. This ES Chapter has included air quality dispersion modelling. Throughout the modelling process, detailed meteorological data has been input into the model which considers fluctuations in weather conditions throughout a full calendar year (2019).

10.5.38 Through the implementation of the operational mitigation measures set out in Section 10.6 of this ES Chapter it is considered that no significant effects are likely to arise in relation to climate change.

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10.6 MITIGATION

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10.6 MITIGATION

10.6.1 This section provides a description of the mitigation measures proposed to minimise the potential significant adverse effects identified by the assessment as set out previously. Mitigation measures reduce the severity of impacts, and hence the levels at which effects are considered significant. Where possible, enhancement measures have also been proposed.

10.6.2 The final details of any mitigation measures are likely to be developed as part of compliance with planning conditions for the Proposed Development and will form part of any detailed environmental management undertaken. The contractor and relevant statutory agencies may be involved in this, and measures relating to general construction activities will be set out in a Construction Environmental Management Plan (CEMP).

Construction

10.6.3 A construction dust assessment has been undertaken for the Proposed Development and is presented in Section 10.5 of this ES Chapter. The assessment has been used to identify the need for standard and best practice mitigation measures to be implemented during the construction phase of the Proposed Development. These measures will be controlled and implemented through a CEMP, which is anticipated to be secured via a suitably worded planning condition.

10.6.4 A range of measures are suggested and summarised below, which would typically be utilised during the demolition and construction phases.

Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- 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.

Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- Record all inspections of haul routes and any subsequent action in a site log book; and
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

10.6.5 In accordance with the IAQM (2016) guidance mitigation measures will be adopted and implemented through the CEMP in order to minimise impacts from dusts and fine particles. It should be noted that these measures will also provide adequate control of potential impacts on early phases of the Proposed Development that may be finished prior to construction of the overall site.

10.6.6 In addition, the IAQM (2016) lists recommended mitigation measures for 'Low', 'Medium' and 'High' Dust Impact Risks. The measures for 'Low' risk sites are included in Appendix 10.3. These will be defined fully in the CEMP, when full details of the construction methodology are known. The Considerate Constructors Scheme will also help to mitigate against any off-site effects.

10.6.7 Where dust generation cannot be avoided in areas close to neighbouring properties, additional mitigation measures will be put in place, such as: windbreaks, sprinklers, and/or time/weather condition limits on the operation of some items of plant or the carrying out of potentially dust-generating activities.

Operation

10.6.8 The Proposed Development is not expected to have significant impacts on air quality at any local receptors. Therefore, any mitigation measure to aid in reducing impacts should be proportionate to this impact. This is highlighted in the EPUK & IAQM (2017) guidance, which reiterates the PPG which states:

"Mitigation options where necessary, will depend on the proposed development and should be proportionate to the likely impact"

10.6.9 On the basis that the impacts of the proposal are deemed negligible for the operational scenario, as well as the concentrations for NO2, PM10 and PM2.5 being below the relevant air quality objectives, in line with the PPG it is not deemed mitigation is necessary.

Mitigation Considered as Part of Proposals

10.6.10 The following inherent operational mitigation measures are likely to be in place:

- Electric Vehicle Charging Points;
- Bike Shelters;
- Changing / Shower Facilities; and
- Occupier Travel Plan(s).

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10.7 RESIDUAL EFFECTS

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10.7 RESIDUAL EFFECTS

Construction

10.7.1 With the CEMP in place the residual air quality effects are 'negligible' and not significant for all receptors.

Operation

10.7.2 The residual impacts remain unchanged as the impact without mitigation is not considered significant when considering the impact of the Proposed Development alone.

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10.8 CUMULATIVE EFFECTS

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10.8 CUMULATIVE EFFECTS

10.8.1 As previously set in this ES Chapter, Vanguardia have been advised that all committed developments, site allocations, background traffic growth has been traffic data utilised and feeds into this assessment.

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10.9 CONCLUSIONS

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10.9 CONCLUSIONS

10.9.1 No Air Quality Management Areas are declared within the close vicinity of the Application Site. Data from the UK-AIR indicates that background pollution concentrations at the Application Site are expected to be well below the key AQSs for NO2, PM10 and PM2.5.

10.9.2 The construction of the Proposed Development will give rise to emissions that could cause some dust soiling effects on adjacent uses. The effective implementation of the CEMP and Considerate Constructors Scheme will reduce emissions and their potential impacts so that there will be no significant effects.

10.9.3 A detailed dispersion model has been used to predict pollutant concentrations at receptors adjacent to roads during the operation where the greatest changes in traffic flows from the Proposed Development are expected for the construction and operational phases. It has been shown that any NO2, PM10 or PM2.5 concentrations impacts during the construction and operational phases are anticipated to be negligible and not significant.

10.9.4 The Proposed Development is expected to comply with relevant national planning policies, with respect to air quality. In particular, it is expected to comply with the National Planning Policy Framework, as no new or existing receptors will be put at an unacceptable risk from polluted air as a result of the Proposed Development. Furthermore, the Proposed Development is considered to adhere to local policy.

FIGURE 10.1 RECEPTOR LOCATIONS

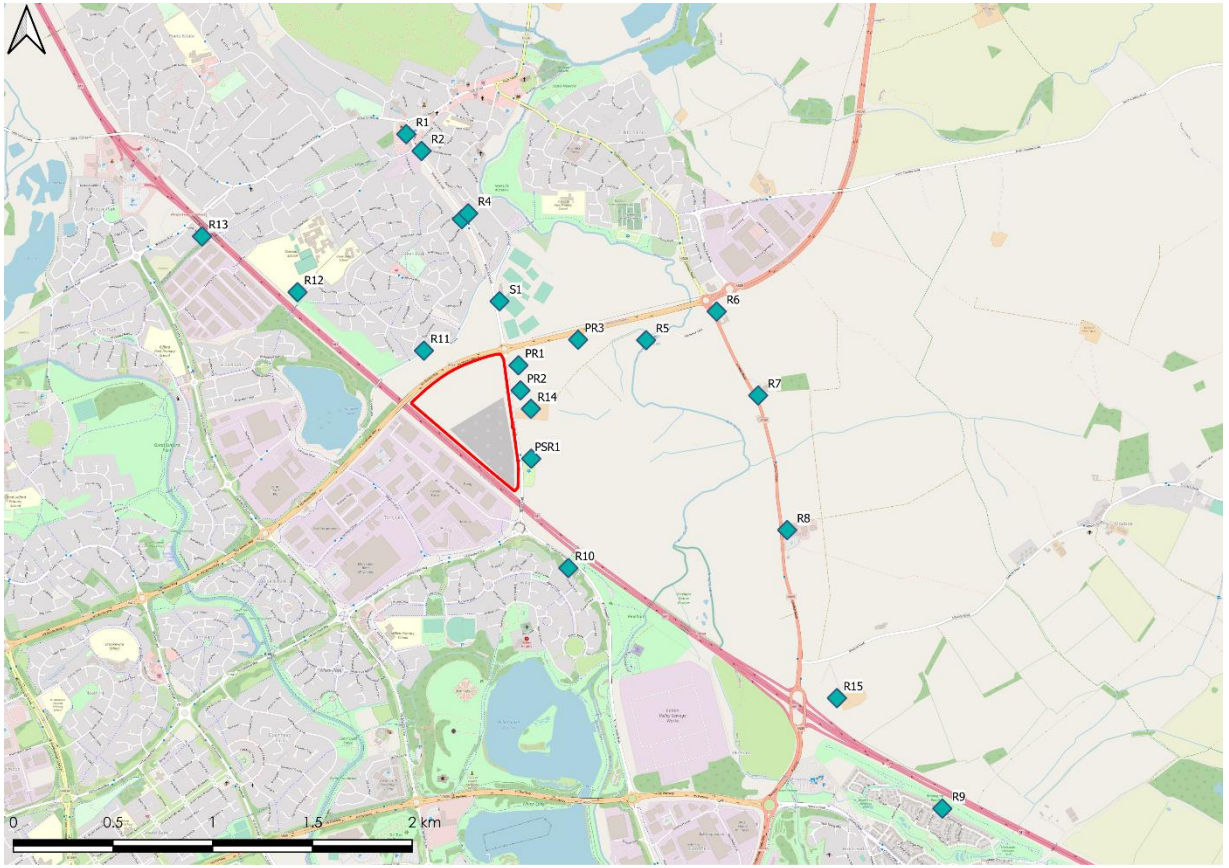


FIGURE 10.2 BEDFORD METEOROLOGICAL STATION (2019)

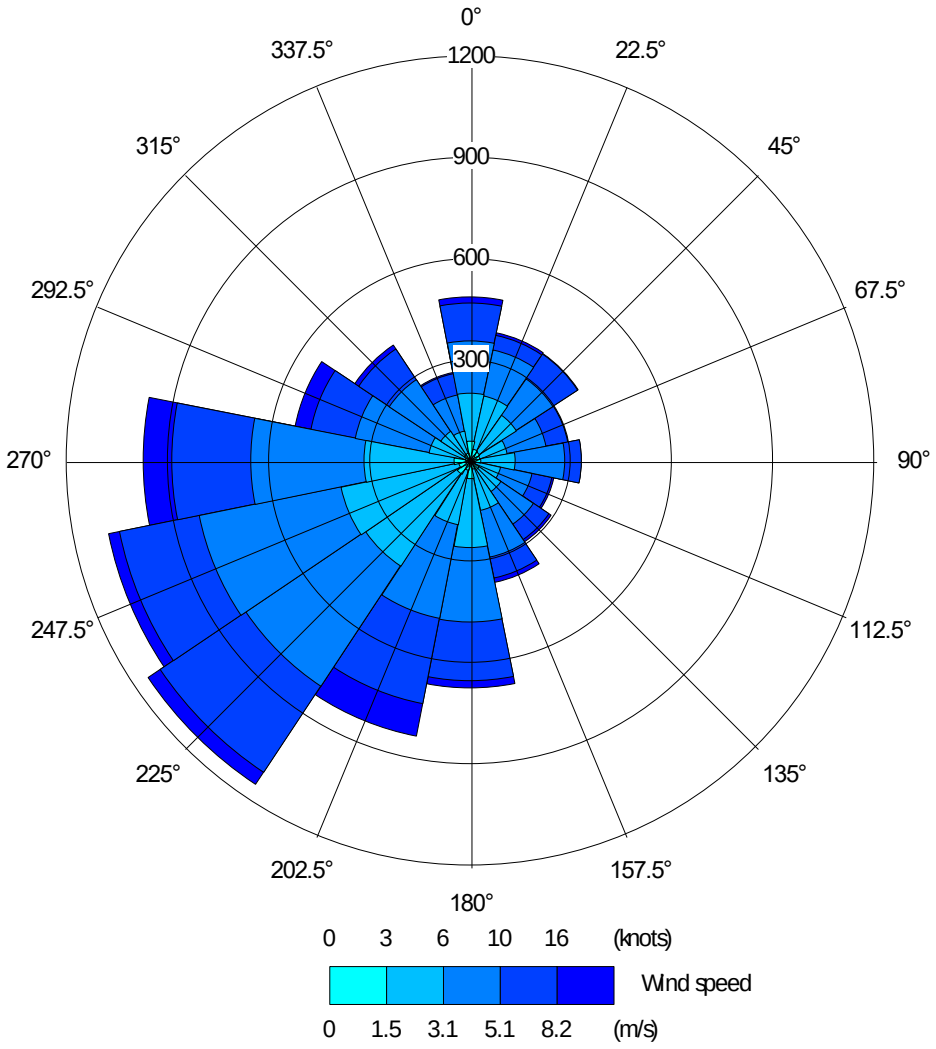
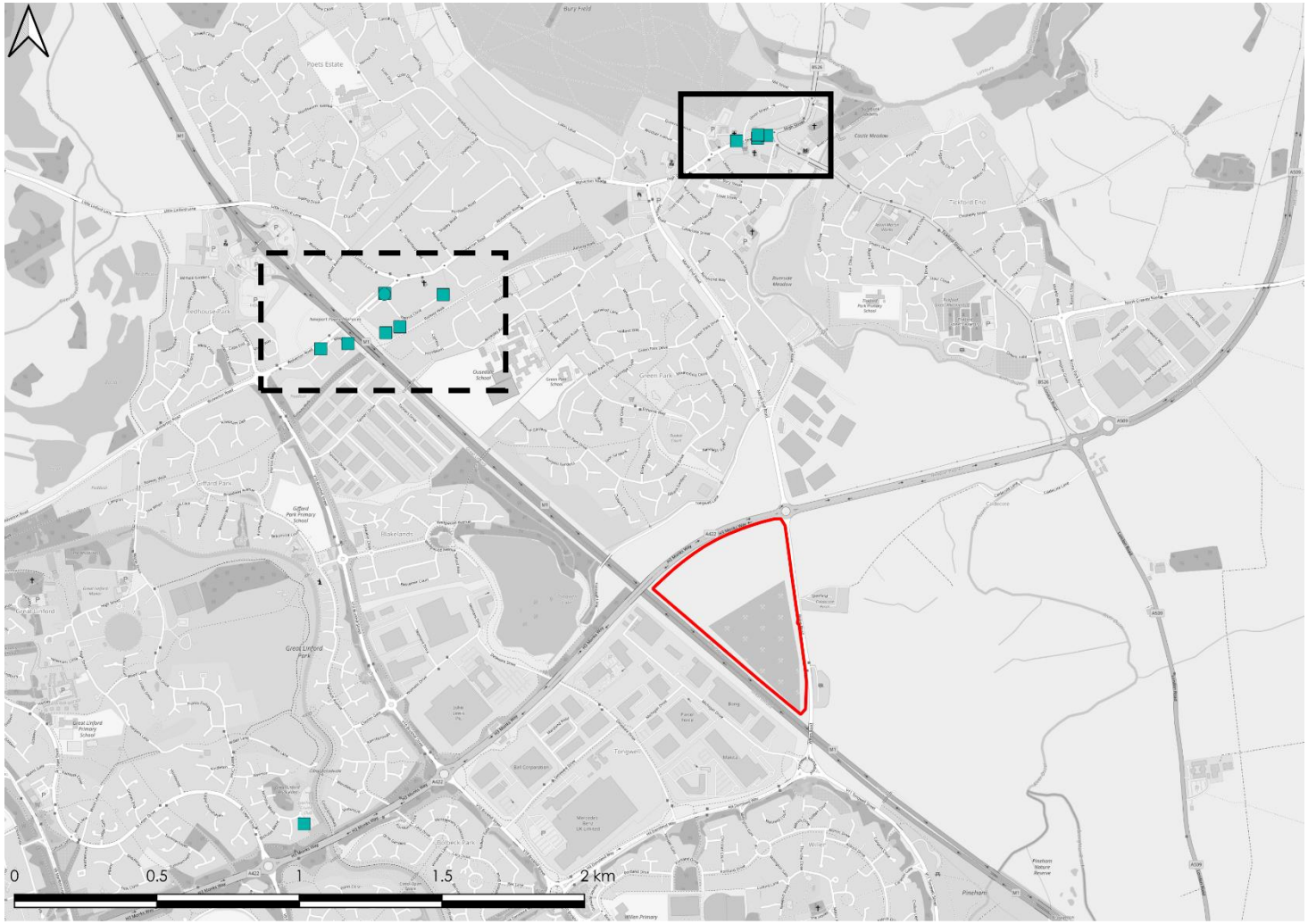


FIGURE 10.3 AUTOMATIC MONITOR LOCATIONS

FIGURE 10.4 DIFFUSION TUBE LOCATIONS




TT1 TT2
J1 J2
I1 I2
H1 H2
High Street
Union Street
North Square
St John's Street
Silver Street
Bury Street
Cedars School
Tickford Bridge
0
50
100
150
200
250 m


S1 S2 S3
M1 M2
L1 L2
K1 K2
EEE1 EEE2
N1 N2
0
100
200
300
400 m