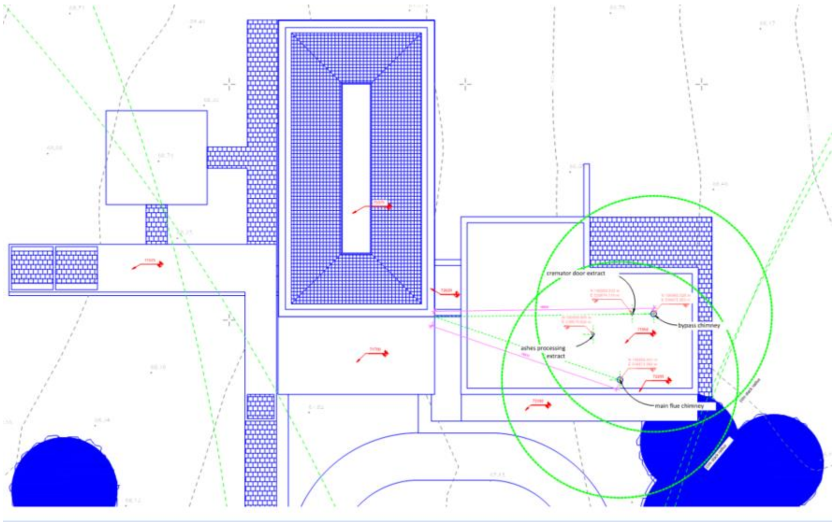
Sewardstone Land Ltd

Netherhouse Farm Crematorium, Waltham Abbey, E4 7RQ

Air Quality Assessment in Support of the Permit Application

12th March 2025



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REVISION HISTORY

Issu	Date	Status	Notes
1	5th March 2020	First Issue (Report reference: A116931)	**In Support of Planning Application**
2	8th April 2020	Second Issue – Updated Traffic (Report reference: A116931)	
3	8th February 2021	Third Issue – inclusive of responses to Ms Claire Jaggard, Environmental Health Officer, Air Quality Epping Forest District Council, comments in respect of the air quality assessment (Report reference: 784-B026744)	
4	26th February 2021	Fourth Issue – Minor Amendments	
5	2nd February 2022	Fifth Issue – Inclusive of responses to Ms Ana Ventura, Air Quality Officer, Epping Forest District Council, comments in respect of the air quality assessment (Report reference: 784-B026744)	
6	12th March 2025	First Issue for the Permit Application (Report reference: 784-B071839)	**In Support of Permit Application**

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
AADT	Annual Average Daily Traffic
ADMS	Advanced Distribution Management System
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AQAL	Air Quality Assessment Level
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
AQS	Air Quality Standards
CHP	Combined Heat and Power
CL	Critical Level
CO	Carbon Monoxide
DEFRA	Department for Environment Food & Rural Affairs
EAL	Environmental Assessment Limits
EC	European Commission
EFT	Emissions Factors Toolkit
EPUK	Environmental Protection UK
EU	European Union
EPAQS	Expert Panel on Air Quality Standards
IAQM	Institute of Air Quality Management
ISC3	Industrial Source Complex
LA	Environmental Assessment Limits
LAQM	Local Air Quality Management
NGR	United Kingdom National Grid Reference
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
PC	Process Contribution
MHCLG	Ministry for Housing, Communities and Local Government
NPPF	National Planning Policy Framework
OS	UK Ordnance Survey
PEC	Predicted Environment Concentration
PPG	Planning Policy Guidance
PPS	Planning Policy Statements
SAC	Special Areas of Conservation
SPA	Special Protection Area
SSSI	Sites of Special Scientific Interest
VOC	Volatile organic compounds
WHO	World Health Organization
UK	United Kingdom

1.0 INTRODUCTION

Sewardstone Land Ltd have commissioned Tetra Tech Limited ("Tetra Tech") [formerly WYG] to prepare an Air Quality Assessment in support of an environmental permit application for the proposed crematorium development at land at Netherhouse Farm, Waltham Abbey, E4 7RQ.

The air quality assessment includes assessment of an in-combination effect from the traffic vehicle emissions and the cremator emissions associated with the proposed crematorium development.

Air Quality Assessment History for Planning Applications

Tetra Tech has undertaken an Air Quality Assessment to support the submission of a planning application for the proposed crematorium development at land at Netherhouse Farm, Waltham Abbey E4 7RJ. A report titled "Revised Air Quality Assessment – EFDC Pre-Application Response" has been produced and the report was dated on 2nd February 2022 with a project number reference of 784- B026744.

Air Quality Assessment History for Permit Applications

The aim of this air quality assessment was to update the existing 2022 air quality report to meet the purpose of the environmental permit application. The report updating includes the accomplishment of following tasks:

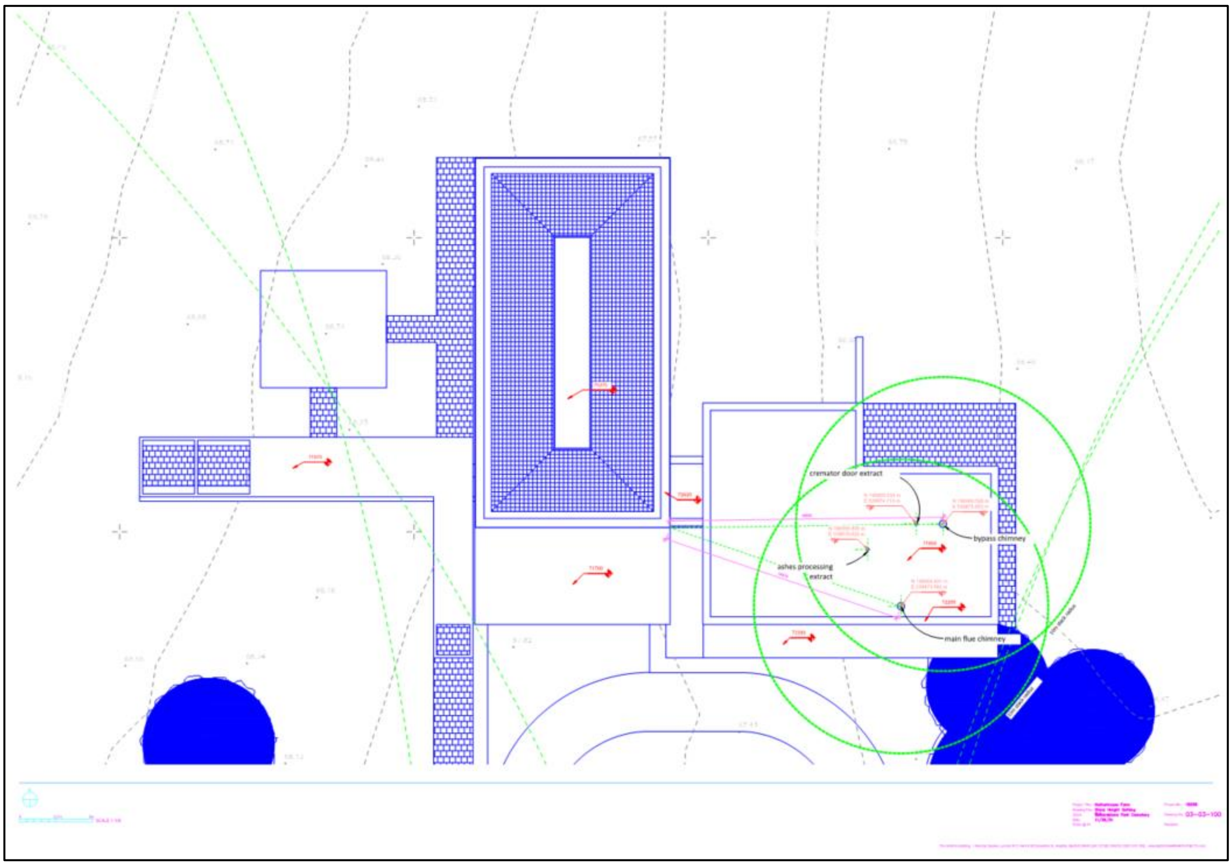
- Liaison with Ms Fay Rushlby, the Environmental Health Officer (EHO), for the permit application;
- Used the new emission testing results within DFW Europe Ltd report - 27Jun2022 provided by the EHO;
- Undertook D1 calculations to determine the required stack height;
- Discussed the D1 input and results with the EHO and had the stack height agreed by the EHO;
- Undertook air quality dispersion modelling using the EHO approved stack emission data; and
- Use the latest available 5-year meteorology data from London City Airport (2019 – 2023 inclusive).

1.1 SITE LOCATION AND CONTEXT

The approximate United Kingdom National Grid Reference (NGR) is approximately 538772, 197196. The Site is bounded by agricultural land. Reference should be made to **Figure 1-1** for a map of the proposed development site and surrounding area and the site layout is presented **in Figure 1-2.**

Figure 1-1. Site location

Figure 1-2. Site Layout



The following assessment stages have been undertaken as part of this assessment:

- Baseline evaluation;
- Identification of receptors, including ecological receptors;
- Assessment of potential traffic air quality impacts during the operational phase in support of planning application. It should be noted that the predicted pollutant concentrations from the traffic air quality assessment have been used as “background” data/information for air quality impact assessment from the electric cremator for permit application;
- Identification of mitigation measures (as required after traffic air quality impact assessment) for the planning application. This section has been kept in this update report for completeness;
- D1 calculations to determine the required stack height for permit applications;
- Assessment of potential air quality impacts from the operation of the electric cremator for permit application; and
- Using traffic air quality modelling results as a baseline concentration to produce a cumulative impact assessment (a combination assessment of traffic emissions and electric cremator emissions).

The construction phase assessment, as a part of the planning application document, considers the potential effects of dust and particulate emissions from site activities and materials movement based on a qualitative risk assessment method based on the Institute of Air Quality Management’s (IAQM) ‘Guidance on the Assessment of Dust from Demolition and Construction’ document, published in 2014.

The assessment of the potential traffic air quality impacts that are associated with the operational phase has focused on the predicted impact of changes in ambient nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10μm (PM_{10}) and less than 2.5μm ($PM_{2.5}$) as a result of the development at key local receptor locations. The changes have been referenced to EU air quality limits and UK air quality objectives and the magnitude and impact description of the changes have been referenced to non-statutory guidance issued by the IAQM and Environmental Protection UK (EPUK).

The objective of the air quality assessment, both for the planning application and the permit application, is to determine whether the impacts from operation emissions meet the required air quality standards (AQSs), AQOs, or air quality environmental assessment limits (EALs) for the protection of human health and for the protection of vegetation and ecosystems.

1.2 REPORT REVISION HISTORY – FOR PLANNING APPLICATIONS

1.2.1 The First and Second Issues of the Report for the Planning Application

WYG Environment Planning Transport (WYG), WYG has now been rebranded as Tetra Teck, has produced two versions of the air quality assessment report: the first issue dated on 5th March 2020, report reference A116931 and the second issue date on 8th April 2020, report reference A116931.

The first and the second issues of the reports are produced based on following information:

"The traffic vehicle flows of the proposed development assessment are less than the vehicle trips numbers for the existing approved cemetery planning application (the planning reference number: EPF/0526/17).

There is a statement from the existing approved/consented cemetery planning application (the planning reference number: EPF/0526/17) as below:

"*The proposed cemetery will accommodate 7-10 burials per week, equating to an average of either one or two on any given day. Each burial will attract an average of 20 vehicles to the peak traffic generation would be 40 vehicle trips, outside the highway peak hours. In most circumstances the cemetery would have one burial per day which would generate 20 arrivals in one hour, and 20 departures in the next*."

It is estimated that the consented traffic vehicle flows/trips would be approximately 20,800 trips per year and the vehicle trips numbers for the proposed development are no more than this number."

1.2.2 The Third Issue of the Report for the Planning Application

After reviewing the second issue of the report (dated on 8th April 2020, report reference A116931), Ms Claire Jaggard, Environmental Health Officer, Air quality Epping Forest District Council, wrote a letter on 25 July 2019, Letter titled: " RE: EPf/0599/19 - Netherhouse Farm", in respect of Air Quality for this application. Ms Jaggard's comments are copied in *italic* texts as follows:

- *I still have concerns with regards to the operating hours / number of cremations stated in the documentation. The documentation is not clear and there are a contradictions within it. I do not consider that allowing 1.5 hours for a cremation is conservative. Cremations typically last between 1 and 3 hours. The developer has advised that there may be up to 1200 cremations per year, and assuming a truly conservative time for cremations, this would not be achieved within the working hours stated. As the developer has advised that there may be up to 1200 cremations per year, I would like to see the modelling reworked taking into account a conservative length of time for this number of cremations. It may be that this is not completed within the working hours that are currently proposed however the likelihood that the working day would be extended in the event that cremations take longer than the current 1.5 hours assumed in the calculations is thought to be the likely option in this scenario.*
- *The initial report assumed a different emissions concentration for oxides of nitrogen than is now being assuming in the Addendum Report. I would seek further clarification as to how this alteration has been achieved and justified. If indeed the higher standard of 200 mg Nm3 NOx is to be achieved, this must be set by condition in the event that the proposal is given consent.]*
- *I would like to see further assessment of traffic using the site. Assuming 1200 cremations a year, plus burials, there will be a significant number of visitors to the site and I do not feel that this has been appropriately assessed to date.*
- *I note that the D1 calculation sheet states that the building attached to the stack is 0.9 metres above the ground. I would seek clarification as to whether this is correct, and a revised calculation if there are any changes needed. Has a plan of the site been provided which shows the layout and*

building heights across the site (and any other neighbouring properties that would have an impact on the dispersion of gases)?

- *Further opportunity to comment with regards to mitigation during the development phase is required.*

The air quality assessment report has been revised in response to Ms Jaggard's comments and includes the following assessments:

(1) Revised traffic generation – a Multi-Model Trip Assessment
(2) The provisions of the Epping Forest Interim Air Pollution Mitigation Strategy;
(3) Updated construction phase air quality assessment;
(4) Update of traffic air quality modelling and assessment using an increased 1,200 cremations per year;
(5) Updating the cremator stack emission dispersion modelling assessment using:
    - An increased capacity of 1,200 cremations per year (compare to previously 305 cremations per annum);
    - For the cremation time, the actual service offered will last approximately 1 to 1.5 hours and the cremated body will take approximately 100 minutes to cremate. However, Ms Claire Jaggard, EHO, has suggested that "*Cremations typically last between 1 and 3 hours*" . Cremator emission impact assessment in this report has been undertaken using the EHO suggested maximum 3 hours per cremation (compared to 1 hour 58 minutes per cremation previously assessed) to produce a worst-case scenario. It should be noted that the 3-hour cremation time is significantly longer than the actual 100 minute per cremation time.; and
    - An increased emission standard of 200 mg/Nm^3 at 15% oxygen emission rate (compare to previously 167 mg/Nm^3 at 15% oxygen emission rate).
(6) Updating the air quality habitat assessment.

1.2.3 The Fourth Issue of the Report for the Planning Application

The fourth issue of the report was dated on 26th February 2021 with minor amendments to the previous report.

1.2.4 The Fifth Issue of the Report for the Planning Application

Epping Forest District council has produced a document of a pre-application response for the proposed development. The document title is: EFDC Pre-Application Response, Case Ref: EF\2021\ENQ\00744, Alt NO: 009532, Case Officer: Kie Farrell, Date: 27/10/21.

A copy of the EFDC Pre-Application Response document is presented in Appendix D.

The EFDC Pre-Application Response consists of comments from Ms Ana Ventura, Air Quality Officer, Epping Forest District Council and those comments are related to the Fourth issue of the air quality report and solely with regard to air quality in relation to human health.

Ms Ventura's comments states:

"I have the following comments/questions with regards to this assessment:

- *The monitored diffusion tube data in table 4.1 does not match with our own data. All workings associated with this data will need to be revisited.*
- *The diffusion tubes are all some distance from the proposed site. It would be beneficial for the applicant to also conduct their own monitoring closer to site. A minimum of 6 months monitoring is preferable to capture seasonal changes.*
- *Table 4.1 has the same site ID/receptor location as table 6.2 which is for Defra background concentrations. I think I understand what the assessment is doing here but its preferable in table 6.2 to use the Defra coordinates instead of using the same ID name in table 6.2.*
- *Also, a bit confused with regards to table 6.4 which lists EF15-EF20 as local authority monitoring but that the data was obtained by Defra?*
- *Was the increase in capacity from 305 cremations per annum to 1,200 reflected in the traffic emission assessment?*
- *How many total parking spaces are existing and proposed for this site?*
- *For modelling purposes, preference would have been to stick to base year rather than predict improvements. This is shown in appendix C and provides a worst-case scenario which is preferable.*
- *How was model verification performed with regards to* PM_{10} *and* $PM_{2.5}$*?*
- *Will this crematorium have mercury abatement? If so, does it impact on the pollutant dispersion?*
- *Is a traffic assessment required for this application? If so, it should be included as an appendix to the air quality assessment to ensure the vehicle trip assumptions add up.*
- *With regards to EFT, v9 was used instead of v10.1*
- *With regards to table 6.3, can they elaborate on what the other sources are? They contribute a large percentage of* NO_x *according to this table.*
- *With regards to model verification, was an adjustment factor used? If so, the workings of how this factor was derived and applied so be included in the report.*
- *With regards to the cremator emissions, the report used data from a crematorium in Gelleen. It appears that the data is only for one cremation? More data is requested with regards to this to determine if it is appropriate; one cremation would not be sufficient. Did the consultant consider using the emissions set out in the practice guidance note as this would provide a worst-case approach? Alternatively, does the plant come with data on its emission rates?*
- *With regards to the stack height, 6m was used in the assessment. Was a D1 stack height calculation conducted to establish an appropriate height? It should be included in the assessment. Also, is it 6m from roof level or ground level as the plans suggest a very short flue. If the latter, then the 6m input needs to be changed accordingly.*
- *How many crematoria units will be installed on site? Does the emissions modelling reflect this?*

- *Was the MET data listed in section 9.4 also used for the traffic assessment?*
- *The report needs cleaning up as "Section Error! Reference source not found" appears in a few places.*
- *Conditions should they be required will be recommended when we are formally consulted and have had an opportunity to review an updated air quality assessment. As always however, the site will need to comply with the requirements of Defra's Process Guidance Note for crematoria.*

Regards,

Ana Ventura

Air Quality Officer"

The Tetra Tech responses to Ms Ventura's comments are presented in **blue** as follows.

Air Quality Comment (1)

The monitored diffusion tube data in table 4.1 does not match with our own data. All workings associated with this data will need to be revisited.

Tetra Tech (Tt) Response (1):

Tetra Tech have contacted with Ms Ventura and been instructed to use the 2020 ASR monitoring data to update the traffic modelling (Ms Ventura's email dated on 01 December 2021).

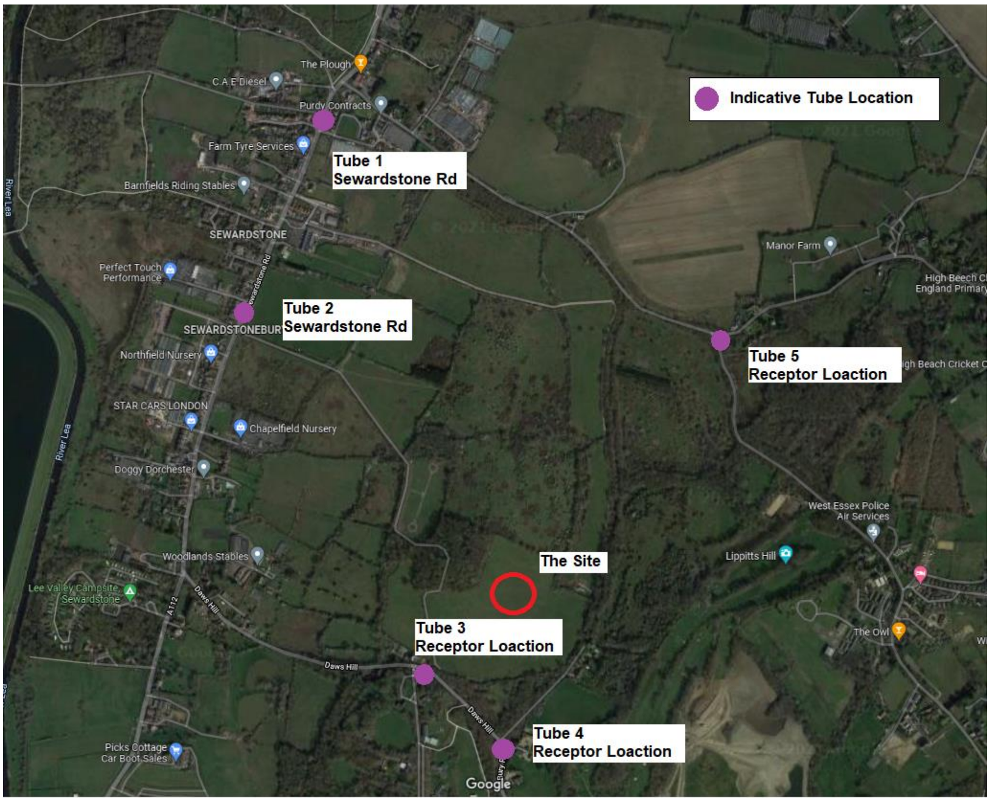
Air Quality Comment (2)

The diffusion tubes are all some distance from the proposed site. It would be beneficial for the applicant to also conduct their own monitoring closer to site. A minimum of 6 months monitoring is preferable to capture seasonal changes.

Tetra Tech (Tt) Response (2):

In response to the Council's requests, baseline NO_2 monitoring has been undertaken at the locations close to the proposed development. A long term (minimum of 6 periods of 4 weeks) (a total of 6 months monitoring period) air quality monitoring/survey has been set up to identify the baseline conditions adjacent to the proposed development site.

A total of 6 diffusion tubes have been positioned during each monitoring period. Two diffusion tubes are located on the Sewardstone Road adjacent to the junction which leads to the site, three further diffusion tubes are located at the residential receptor locations surrounding the site, and one triplicate tube at the Council's existing tube location. The indicative tube locations are illustrated in two Figures below.



The tubes are planned to be deployed for a period of 4 weeks after which they will be collected and analysed by a UKAS accredited lab. A minimum of six monitoring periods (a total of 6 months monitoring period) will be undertaken over the monitoring survey period.

On the completion of the survey the results will be bias corrected based on the equivalent survey period results from the collocation survey and will be seasonally adjusted based on the calculated seasonal correction factor from the previous full year's monitoring data. The results will be used to determine whether any exceedances of the AQO will occur surrounding the proposed development site.

Air Quality Comment (3)

Table 4.1 has the same site ID/receptor location as table 6.2 which is for Defra background concentrations. I think I understand what the assessment is doing here but its preferable in table 6.2 to use the Defra coordinates instead of using the same ID name in table 6.2.

Tetra Tech (Tt) Response (3):

The ID names in both Table 4.1 and Table 6.2 have been updated and additional explanation notes have been added on to make it clearer.

Air Quality Comment (4)

Also, a bit confused with regards to table 6.4 which lists EF15-EF20 as local authority monitoring but that the data was obtained by Defra?

Tetra Tech (Tt) Response (4):

Table 6.4 has been updated and additional explanation notes have been added on to make it clearer.

Air Quality Comment (5)

Was the increase in capacity from 305 cremations per annum to 1,200 reflected in the traffic emission assessment?

Tetra Tech (Tt) Response (5):

Yes. This has been reflected in the traffic emissions assessment.

Section 6.1 of 'Traffic Trip Rate Assessment' of the report dated on 24th February 2021 states: "Applying the data from the above crematorium sites to the Netherhouse Farm cremation site, the estimated trips per service can be applied to the quantum of services predicted. With 5 cremations and 2 burials predicted daily, 189 arrivals and 189 departures to the site are estimated every day, with a total predicted daily quantum of trips of 378. These figures include provision for staff trips. Applying the trips per service estimation to the annual predicted service frequency of 1724, there would be 46,548 arrivals and 46,548 departures would be predicted with a total of 93,096 annual two-way trips."

The annual predicted service frequency of 1724 includes 1231 cremations per annum.

Air Quality Comment (6)

How many total parking spaces are existing and proposed for this site?

Tetra Tech (Tt) Response (6):

The existing (and part implemented) planning permission for a cemetery building that provides for 48 car spaces, including 6 disabled bays. This provision will not change as part of the new application.

Air Quality Comment (7)

For modelling purposes, preference would have been to stick to base year rather than predict improvements. This is shown in appendix C and provides a worst-case scenario which is preferable.

Tetra Tech (Tt) Response (7):

The worst-case scenario in Appendix C (no reduction in UK fleet emissions over time) has been used in the modelling assessment.

Air Quality Comment (8)

How was model verification performed with regards to PM_{10} and $PM_{2.5}$?

Tetra Tech (Tt) Response (8):

It should be noted that TG (16) states that in the absence of any Particulate Matter (PM_{10} and $PM_{2.5}$) monitoring data for verification, it may be appropriate to apply the NO_X-NO_2 adjustment factor to the modelled Particulate Matter.

TG (16) also states that care needs to be taken when applying model adjustment based on one monitoring site only as the adjustment may not be representative of other locations.

As there is no suitable PM_{10} or $PM_{2.5}$ monitoring data within the study area, it is not possible to perform a model verification for these pollutants. As such, the NO_2 adjustment factor has also been applied to the PM_{10} and $PM_{2.5}$ modelled results, in accordance with LAQM.TG(16).

Air Quality Comment (9)

Will this crematorium have mercury abatement? If so, does it impact on the pollutant dispersion?

Tetra Tech (Tt) Response (9):

The crematorium has mercury abatement, and it does not impact on the pollutant dispersion.

Air Quality Comment (10)

Is a traffic assessment required for this application? If so, it should be included as an appendix to the air quality assessment to ensure the vehicle trip assumptions add up.

Tetra Tech (Tt) Response (10):

Section 6.1 of ‘Traffic Trip Rate Assessment’ of the air quality report dated on 24th February 2021 presented the results of the traffic trip rate calculations.

Air Quality Comment (11)

With regards to EFT, v9 was used instead of v10.1

Tetra Tech (Tt) Response (11):

EFT V11.0 (Released: November 2021) has been used within the updated assessment.

Air Quality Comment (12)

With regards to table 6.3, can they elaborate on what the other sources are? They contribute a large percentage of NO_x according to this table.

Tetra Tech (Tt) Response (12):

The background map total concentrations for NO_x are made up of contributing source sectors (https://laqm.defra.gov.uk/documents/2018-based-background-maps-user-guide-v1.0.pdf). The source sectors include transport, industry and commercial. The full list of sectors for each pollutant is presented as below:

Sectors	Description
Motorway_in_19	Motorway in square sources
Motorway_out_19	Motorways out square sources
Trunk_A_Rd_in_19	Trunk A roads in square sources
Trunk_A_Rd_out_19	Trunk A roads out square sources
Primary_A_Rd_in_19	Primary A roads in square sources
Primary_A_Rd_out_19	Primary A roads out square sources
Minor_Rd+Cold_Start_in_19	Minor roads and cold start in square sources
Minor_Rd+Cold_Start_out_19	Minor roads and cold start out square sources
Industry_in_19	Industry area in square sources (combustion in industry, energy production, extraction of fossil fuel and waste)
Industry_out_19	Industry area out square sources (combustion in industry, energy production, extraction of fossil fuel and waste)
Domestic_in_19	Domestic, institutional and commercial space heating in square sources
Domestic_out_19	Domestic, institutional and commercial space heating out square sources
Aircraft_in_19	Aircraft in square sources
Aircraft_out_19	Aircraft out square sources
Rail_in_19	Rail in square sources
Rail_out_19	Rail out square sources
Other_in_19	Other in square sources (ships, off-road and other emissions)
Other_out_19	Other out square sources (ships, off-road and other emissions)
Point_Sources_19	Point sources
Rural_19	Regional rural concentration

The other sources in Table 6.3 contains the sector contributions from “Other_in_19”, “Other_out_19”, “Point_Sources_19” and “Rural_19”. The majority of contribution is derived from “Rural_19”.

Air Quality Comment (13)

With regards to model verification, was an adjustment factor used? If so, the workings of how this factor was derived and applied so be included in the report.

Tetra Tech (Tt) Response (13):

The model verification is presented in Section 6.4 of the report and the final verification model correlation coefficient (representing the model uncertainty) is 1.01. This was achieved by applying a model correction factor of 1.17 to roadside predicted NO_X concentrations before converting to NO_2. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

Air Quality Comment (14)

With regards to the cremator emissions, the report used data from a crematorium in Gelleen. It appears that the data is only for one cremation? More data is requested with regards to this to determine if it is appropriate; one cremation would not be sufficient. Did the consultant consider using the emissions set out in the practice guidance note as this would provide a worst-case approach? Alternatively, does the plant come with data on its emission rates?

Tetra Tech (Tt) Response (14):

This issue has been resolved in the third issue of this report on 8th February 2021, in response to Ms Claire Jaggard, Environmental Health Officer, Air Quality Epping Forest District Council, comments dated on 25th July 2019. The air quality assessment represents a worst-case assessment by using 3 -hour per cremation time and the practice guidance note emission rate of 200 mg/Nm^3 at 15% oxygen emission. Section 1.2.2 of this report has presented following two points:

- For the cremation time, the actual service offered will last approximately 1 to 1.5 hours and the cremated body will take approximately 100 minutes to cremate. However, Ms Claire Jaggard, EHO, has suggested that “Cremations typically last between 1 and 3 hours”. Cremator emission impact assessment in this report has been undertaken using the EHO suggested maximum 3 hours per cremation (compared to 1 hour 58 minutes per cremation previously assessed) to produce a worst-case scenario. It should be noted that the 3-hour cremation time is significantly longer than the actual 100 minute per cremation time; and
- An increased emission standard of 200 mg/Nm^3 at 15% oxygen emission rate (compare to previously 167 mg/Nm^3 at 15% oxygen emission rate).

Air Quality Comment (15)

With regards to the stack height, 6m was used in the assessment. Was a D1 stack height calculation conducted to establish an appropriate height? It should be included in the assessment. Also, is it 6m from roof level or ground level as the plans suggest a very short flue. If the latter, then the 6m input needs to be changed accordingly.

Tetra Tech (Tt) Response (15):

A D1 stack height calculation has been undertaken and detailed in Section 9.10.

Air Quality Comment (16)

How many crematoria units will be installed on site? Does the emissions modelling reflect this?

Tetra Tech (Tt) Response (16):

One crematoria unit will be installed on the site and the emission modelling has reflected this.

Air Quality Comment (17)

Was the MET data listed in section 9.4 also used for the traffic assessment?

Tetra Tech (Tt) Response (17):

The London City 2019 MET data file has been used within the traffic assessment in accordance with the latest available, representative Local Authority monitoring data.

Air Quality Comment (18)

The report needs cleaning up as "Section Error! Reference source not found" appears in a few places.

Tetra Tech (Tt) Response (18):

The Errors have been corrected.

Air Quality Comment (19)

Conditions should they be required will be recommended when we are formally consulted and have had an opportunity to review an updated air quality assessment. As always however, the site will need to comply with the requirements of Defra's Process Guidance Note for crematoria.

Tetra Tech (Tt) Response (19):

Comment is noted.

2.0 POLICY AND LEGISLATIVE CONTEXT

The following assessment has been undertaken in accordance with the legislation and best practice guidance as stated below.

2.1 DOCUMENTS CONSULTED

The following documents were consulted during the undertaking of this assessment:

Legislation and Best Practice Guidance

- National Planning Policy Framework, Ministry for Housing, Communities and Local Government, Revised February 2019;
- Planning Practice Guidance: Air Quality, Ministry for Housing, Communities and Local Government, November 2019;
- The Air Quality Standards Regulations (Amendments), 2016,
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, Defra, 2007;
- The Environment Act, 1995;
- The Environment Act, 2021;
- Local Air Quality Management Technical Guidance LAQM.TG16, Defra, 2018;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1, LA 105 Air quality, Highways England, November 2019
- Land-Use Planning & Development Control: Planning for Air Quality, EPUK & IAQM, 2017;
- Guidance on the Assessment of Dust from Demolition and Construction, IAQM, 2014;
- A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (Version 1.0), IAQM, June 2019.
- Ecological Assessment of Air Quality Impacts, CIEEM, January 2021.

Websites Consulted

- Google maps (maps.google.co.uk);
- The UK National Air Quality Archive (www.airquality.co.uk);
- Department for Transport Matrix (www.dft.go.uk/matrix);
- emapsite.com;
- Multi-Agency Geographic Information for the Countryside (http://magic.defra.gov.uk/);
- Planning Practice Guidance (http://planningguidance.planningportal.gov.uk/); and
- Epping Forest District Council (http://www.eppingforestdc.gov.uk/).

Site Specific Reference Documents

- Epping Forest District Council, Air Quality Annual Status Report 2020;
- Broxbourne Borough Council, Air Quality Annual Status Report 2020;
- Natural England, European Site Conservation Objective: Draft Supplementary Advice on Conserving and Restoring Site Features: Epping Forest SAC (23rd January 2019); and,
- Epping Forest District Council, Local Plan, Submission Version 2017

2.2 AIR QUALITY LEGISLATIVE FRAMEWORK

European Legislation

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 NO_2 and oxides of nitrogen, sulphur dioxide, lead and PM_{10};
- **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.

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.

The European Commission (EC) Directive Limits, outlined above, have been transposed in the UK through the Air Quality Standards Regulations. In the UK responsibility for meeting ambient air quality limit values is devolved to the national administrations in Scotland, Wales and Northern Ireland.

The European Union (Withdrawal) Act 2018 (EUWA) provides a new framework for the continuity of 'retained EU law' in the UK. EU Directives no longer have to be implemented by the UK except to any extent agreed or decided by the UK unilaterally.

EUWA retains the domestic effect of EU Directives to the extent already implemented in UK law, by preserving the relevant domestic implementing legislation enacted in UK law before 'Implementation Period' completion day. Though the EU Directives are not retained, following the UK's departure from the EU, the EUWA converts the current framework of Air Quality targets, however the role that the EU instructions were party to are lost.

UK Legislation

The Air Quality Standards Regulations (Amendments 2016) seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, First, Second and Third Daughter Directives and 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. SI 2010 No. 1001, Part 7 Regulation 31 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.

The UK Air Quality Strategy is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution.

For each nominated pollutant, the Air Quality Strategy sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. Adopted national standards are based on the recommendations of the Expert Panel on Air Quality Standards (EPAQS) and have been translated into a set of Statutory Objectives within the Air Quality (England) Regulations (2000) SI 928, and subsequent amendments. The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 amends the AQO for $PM_{2.5}$ outlined within the Air Quality Standards Regulations (2010 & 2016 Amendments).

The AQOs for pollutants included within the Air Quality Strategy and assessed as part of the scope of this report are presented in **Table 2-1** and **Table 2-2** along with European Commission (EC) Directive Limits and World Health Organisation (WHO) Guidelines. The ecological levels are based on WHO and CLRTAP (Convention on Long-range Transboundary Air Pollution) guidance.

Table 2-1. Air Quality Standards, Objectives, Limit and Target Values.

Pollutant	Applies	Objective	Concentration Measured as[10]	Date to be achieved and maintained thereafter	European Obligations	Date to be achieved and maintained thereafter	New or existing
PM_{10}	UK	50µg/m^3 by end of 2004 (max 35 exceedances a year)	24-hour Mean	1st January 2005	50µg/m^3 by end of 2004 (max 35 exceedances a year)	1st January 2005	Retain Existing
	UK	40µg/m^3 by end of 2004	Annual Mean	1st January 2005	40µg/m^3	1st January 2005	
$PM_{2.5}$	UK	25µg/m^3	Annual Mean	31st December 2010	25µg/m^3	1st January 2010	Retain Existing
$PM_{2.5}$	UK	20µg/m^3	Annual Mean	1st January 2020	-	-	-
NO_2	UK	200µg/m^3 not to be exceeded more than 18 times a year	1-Hour Mean	31st December 2005	200µg/m^3 not to be exceeded more than 18 times a year	1st January 2010	Retain Existing
	UK	40µg/m^3	Annual Mean	31st December 2005	40µg/m^3	1st January 2010	
CO	UK	10mg/m^3	Maximum daily 8 Hour Mean	31st December 2004	10mg/m^3 Maximum daily 8 hour mean	1st January 2005	Retain Existing

Table 2-2. Ecological Air Quality Standards, Objectives, Limit and Target Values

Pollutant	Applies	Objective	Concentration Measured as
NO_X	UK	30µg/m^3	Annual Mean
NO_2	UK	30µg/m^3	Annual Mean
	UK	75µg/m^3	Daily mean
SO_2	UK	10µg/m^3 where lichens or bryophytes are present.	Annual Mean
	UK	20µg/m^3 where they are not present.	Annual Mean
NH_3	UK	1 mg/m^3 where lichens or bryophytes (including mosses, landworts and hornwarts) are present	Annual Mean
	UK	3 mg/m^3 where they are not present.	Annual Mean

Within the context of this assessment, the annual mean objectives are those against which facades of residential receptors will be assessed and the short-term objectives apply to all other receptor locations, where people may be exposed over a short duration, both residential and non-residential such as using gardens, balconies, walking along streets, using playgrounds, footpaths or external areas of employment uses.

Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of jurisdiction under the system of Local Air Quality Management (LAQM). This review and assessment of air quality involves assessing present and likely future air quality against the AQOs. If it is predicted that levels at the façade of buildings where members of the public are regularly present (normally residential properties) are likely to be exceeded, the LA is required to declare an Air Quality Management Area (AQMA).

Environment Act 2021

The Environment Act (2021) introduces a commitment to create a legally binding duty on government to reduce the concentrations of fine particulate matter ($PM_{2.5}$) in ambient air, and to set a long-term target expected to be 10 µg/m^3, a reduction from the current Air Quality objective of 20 µg/m^3 set out within the Air Quality Standards Regulations (Amendment 2016). A draft of a statutory instrument (or drafts of statutory instruments) containing regulations setting the $PM_{2.5}$ air quality target must be laid before Parliament on or before 31st October 2022 and is expected to come into force thereafter.

2.3 PLANNING AND POLICY GUIDANCE

National Policy

The National Planning Policy Framework (NPPF), revised July 2021, principally brings together and summarises the suite of Planning Policy Statements (PPS) and Planning Policy Guidance (PPG) which previously guided planning policy making. The NPPF states that:

Paragraph 174

> *"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."*

Paragraph 186

"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."

<u>Paragraph 188</u>

"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities."

The Planning Practice Guidance (PPG) web-based resource was updated by the Ministry for Housing, Communities and Local Government (MHCLG) on 1st November 2019 to support the National Planning Policy Framework and make it more accessible. A review of PPG: Air Quality identified the following guidance (Paragraph: 001 Reference ID: 32-001-20191101):

"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 (NO_2).

The UK also has national emission reduction commitments for overall UK emissions of 5 damaging air pollutants:

- *fine particulate matter ($PM_{2.5}$);*
- *ammonia (NH_3);*
- *nitrogen oxides (NO_x);*
- *sulphur dioxide (SO_2); and*
- *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 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."

Natural England Policy

The criterion for an assessment is contained within Natural England's "*Approach to advising competent* *authorities on the assessment of road traffic emissions under the Habitats Regulations*" Version: June 2018 and is copied is copied below:

> *"The AADT thresholds do not themselves imply any intrinsic environmental effects and are used solely as a trigger for further investigation. Widely accepted Environmental Benchmarks for imperceptible impacts are set at 1% of the critical load or level, which is considered to be roughly equivalent to the DMRB thresholds for changes in traffic flow of 1000AADT and for HDV 200AADT. This has been confirmed by modelling using the DMRB Screening Tool that used average traffic flow and speed figures from Department of Transport data to calculate whether the NOx outputs could result in a change of > 1% of critical/load level on different road types. A change of >1000 AADT on a road was found to equate to a change in traffic flow which might increase emissions by 1% of the Critical Load or Level and might consequentially result in an environmental effect nearby (e.g. within 10 metres of roadside)."*

Local Policy

Epping Forest District Council (EFDC)'s Local Plan (Submission Version 2017) has been reviewed which outlines the Council's broad planning strategy. Following a review of this policy, the following was identified as being relevant to the proposed development from an Air Quality perspective:

The Epping Forest District Council Core Strategy and Policies for Management of Development has been reviewed and the following policy was deemed relevant:

> *""<u>DM 2 Epping Forest SAC and The Lee Valley SPA;</u>*
>
> *A. The Council will expect all relevant development proposals to assist in the conservation and enhancement of the biodiversity, character, appearance and landscape setting of the Epping Forest Special Area of Conservation (SAC) and the Lee Valley Special Protection Area (SPA).*
>
> *B. New residential development likely to have a significant effect, either alone or in combination with other development in these areas, will be required to demonstrate that adequate measures are put in place to avoid or mitigate any potential adverse effects.*
>
> *C. All outline or detailed planning applications for new homes within the settlements of Loughton, Epping, Waltham Abbey, North Weald Bassett, Theydon Bois, Coopersale, Thornwood, Buckhurst Hill, Chigwell and Chigwell Row will be required to make a financial contribution to access management and monitoring of visitors to the Epping Forest SAC, in accordance with Visitor Survey Information which demonstrates this is needed.*
>
> *D. To mitigate against potential or identified adverse effects of additional development in the District, in particular from strategic developments, on the Epping Forest SAC, and Lee Valley SPA the Council will ensure the provision of a meaningful proportion of Natural Green Space or access to Natural Green Space. This could involve: (i) providing new green spaces; or (ii) improving access to green space; or (iii) improving the naturalness of existing green spaces; or (iv) improving connectivity between green spaces where this would not contribute to a material increase in recreational pressure on designated sites. E. Planning applications on sites within*

400m of the Epping Forest SAC will be required to submit a site level Habitats Regulations Assessment setting out how any urbanisation effects (including from fly The Local Plan should be read as a whole. Proposals will be judged against all relevant policies. Epping Forest District Local Plan Submission Version December 2017 | 83 tipping, the introduction of non-native plant species and incidental arson) will be mitigated against."

"DM22, Air Quality;

The Council will seek to ensure that the District is protected from the impacts of air pollution. Potential air pollution risks will need to be properly considered and adequate mitigation included in the design of new development to ensure neither future, nor existing residents, workers, visitors, or environmental receptors including the Epping Forest SAC are adversely impacted as a result of the development.

b. *Mitigation measures required will be determined by the scale of development, its location, the potential to cause air pollution, and the presence of sensitive receptors in the locality.*

c. *Larger proposals or those that have potential to produce air pollution, will be required to undertake an air quality assessment that identifies the potential impact of the development, together with, where appropriate, contributions towards air quality monitoring. Assessments shall identify mitigation that will address any deterioration in air quality as a result of the development, having taken into account other permitted developments, and these measures shall be incorporated into the development proposals. This will include an assessment of emissions (including from traffic generation) and calculation of the cost of the development to the environment. All assessments for air quality shall be undertaken by competent persons."*

2.4 EPPING FOREST INTERIM AIR POLLUTION MITTGATION STRATEGY

Epping Forest District Council has development a Strategy in Managing the Effects of Air Pollution on the Epping Forest Special Area of Conservation, a final draft of the report was published in December 2020.

1. Large parts of the Epping Forest have been designated as a Special Area of Conservation (SAC) because of the significance of its ecological features (known as 'qualifying features'), specifically its beech forest, wet and dry heaths and population of stag beetle. SACs are international designations and have the highest level of protection afforded to them through UK legislation and Government policy. It is known that much of the Epping Forest SAC is in an unfavourable condition.

2. Under UK legislation Epping Forest District Council (the Council) is a competent authority with a duty to ensure that plans and projects, including the emerging Epping Forest District Local Plan 2011-2033 (the emerging Local Plan) which is at an advanced stage of preparation), have no adverse effect on the integrity of the Epping Forest SAC either alone, or in combination with other plans and projects. This includes not doing anything that would prevent the Epping Forest SAC from achieving the conservation objectives identified for it. As part of that responsibility the Council, as local planning authority, is required to undertake a Habitats Regulations Assessment (HRA) of the emerging Local Plan.

3. This Strategy has been developed to provide a strategic approach to mitigating the effects of development on the integrity of the Epping Forest SAC in relation to atmospheric pollution. It has been developed to support the implementation of policies contained within the emerging Local Plan and specifically policies DM2 and DM22. In doing so it reflects the evidence base (the evidence) developed to support the HRA process. This Strategy will therefore support the conclusion of the Local Plan HRA process and facilitate the determination of individual planning applications which have the potential to have an adverse effect on the integrity of the Epping Forest SAC in relation to atmospheric pollution without mitigation.
4. It is clear from the evidence that without appropriate mitigation development proposed through the emerging Local Plan, in combination with other plans and projects, would have an adverse effect on the integrity of the Epping Forest SAC as a result of atmospheric pollution. A key contributor to that atmospheric pollution arises from vehicles.
5. The Epping Forest SAC is bisected by a number of roads which serve communities in Epping Forest District and beyond. We know, having undertaken detailed traffic modelling, that new development, primarily for housing and employment, will result in increases in traffic on those roads. This traffic modelling has been used to inform air quality modelling, the outputs of which show that over the period of the emerging Local Plan (covering the period up to 2033), if no mitigation measures are introduced, air pollution arising from vehicles will have further harmful effects on the health of the qualifying features within the Epping Forest SAC compared to a situation with no growth. It is important to recognise that whilst vehicles are a contributing factor, there are other activities that are also having an adverse impact on the ecological health of the Epping Forest SAC. Appendix F to this Strategy identifies a number of actions that the Council could take to reduce the contribution that these activities have on the Epping Forest SAC.
6. This Strategy has been developed in response to the findings of the evidence base by setting out a suite of mitigation measures that are needed to address the effects of atmospheric pollution arising primarily from new development proposed to be brought forward within the District. It is therefore an important part of the evidence base that supports the emerging Local Plan. The Strategy also sets out how these mitigation measures will be implemented and how the efficacy of those mitigation measures will be monitored and reviewed.

The Strategy presented following major topic and issues:

- the evidence base in understanding of the likely significant effects of the emerging Local Plan on the Epping Forest SAC bespoke traffic and air quality modelling has been undertaken based on observed data and on-site monitoring;
- The issues of the main pollutants of concern for the Epping Forest SAC;
- The planning policy Framework;
- What we need to achieve by 2033 and how we will get there;

The full copy of the Strategy is presented in Appendix F.

The detailed traffic air quality assessment has been undertaken to study the impacts of the oxides of nitrogen (NO_x), ammonia (NH_3) and sulphur dioxide (SO_2) from proposed development vehicles on the Epping Forest SAC site in accordance with the Epping Forest District Council's Strategy.

3.0 ASSESSMENT METHODOLOGY FOR PERMIT APPLICATION

3.1 ASSESSMENT METHODOLOGY FOR PERMIT APPLICATIONS

Guidance within 'Air emissions risk assessment for your environmental permit', published 1 February 2016 and last updated 21 May 2024, details methodologies for analysing and presenting the detailed modelling results.

3.1.1 How the risk assessment Works

The guidance requires comparison of the impact of emissions to air to the following environment standards:

- Air Quality Standards Regulations 2010 Limit Values and Target Values.
- UK Air Quality Strategy Objectives.
- Environmental Assessment Levels.

3.1.2 Steps to complete the risk assessment

Completion of an air emissions risk assessment involves the following steps:

1. Calculate the environmental concentration of each substance to be released into the air – known as the process contribution (PC).
2. Identify PCs with insignificant environmental impact so that they can be 'screened out' – this means that it is not required to assess them any further.
3. For substances not screened out in step 2, calculate the predicted environmental concentration (PEC) for each substance to be released to air – the PEC is the PC plus the concentration of the substance already present in the environment.
4. Identify emissions that have insignificant environmental impact – these can be screened out.
5. Get 'detailed modelling' (also known as detailed assessment or computer modelling) done for the emissions you cannot screen out.
6. For each substance to be released to air, compare the PC and PEC with the relevant environmental standard and summarise the results.
7. Check if it is required to take further action.
8. Check if it needs to do any other risk assessments.

This assessment presents 'detailed modelling' results.

3.1.3 Assessment of Grouping Air Emissions

For the release of volatile organic compounds into the air, it is required to provide details of all emissions. If all the substances in them cannot be identified, the unknowns should be treated as 100% benzene in the risk assessment. Explanations should be provided if they are treated as something else.

3.1.4 NO_X to NO_2 Conversion

Emissions of nitrogen oxides should be recorded as nitrogen dioxide in the risk assessment (as nitrogen oxide converts to nitrogen dioxide over time) as follows:

- For short-term PCs and PECs, assume only 50% of emissions of oxides of nitrogen convert to nitrogen dioxide in the environment.
- For long-term PCs and PECs, assume 100% of emissions of oxides of nitrogen convert to nitrogen dioxide.

3.1.5 Compare and Summarise Modelling Results

The guidance states that the following should all be included and considered in the results of the assessment:

- The PC.
- The PEC.
- The substances which are screened out.
- The substances that have been included for detailed assessment.
- The relevant environmental standards referred to when evaluating emissions.
- Any additional action required, for example a cost benefit analysis.

3.1.6 Determining Whether Further Action is Required

Pre-application discussions with the Environment Agency may have already shown whether it is required to take further action, such as a cost benefit analysis of your proposals.

When Further Action is Not Required

Further action is not required if the assessment has shown that both of the following apply:

- The proposed emissions comply with BAT associated emission levels (AELs) or the equivalent requirements where there is no BAT AEL; and
- The resulting PECs will not exceed environmental standards.

When Further Action is Required

A cost benefit analysis is required if any of the following apply:

- The PCs could cause a PEC to exceed an environmental standard (unless the PC is very small compared to other contributors – if this is the case contact the Environment Agency).
- The PEC is already exceeding an environmental standard.
- The activity or part of it is not covered by a ‘BAT reference document’ (BREF).
- The proposals do not comply with BAT AELs - in this case you’ll need to make a request for an exception (‘derogation’) that includes a cost benefit analysis of your proposals.
- The EA has asked to do a BAT assessment.

Discussion on Detailed Modelling Results

Guidance within ‘Air emissions risk assessment for your environmental permit’, published 1 February 2016 and last updated 21 May 2024, states the following:

Screen out insignificant PCs

"The assessment should include a discussion of results (what they mean and their significance).

For a detailed modelling assessment PCs are insignificant where they are less than:

- *10% of a short-term environmental standard; and*
- *1% of a long-term environmental standard."*

Screen out PECs from detailed modelling

"In the second stage of screening if you meet both of the following requirements you do not need to do any further assessment of that substance. You'll need to do detailed modelling of emissions that do not meet both of the following requirements:

- the short-term PC is less than 20% of the short-term environmental standards minus twice the long-term background concentration; and
- the long-term PEC is less than 70% of the long-term environmental standards."

When there are SPAs, SACs, Ramsar sites and SSSIs within the specified distance

The guidance states that if emissions that affect SPAs, SACs, Ramsar sites or SSSIs meet both of the following criteria, they are insignificant and you do not need to assess them any further:

- The short-term PC is less than 10% of the short-term environmental standard for protected conservation areas; and,
- the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas.

If you do not meet these requirements you need to calculate the PEC and check the PEC against the standard for protected conservation areas.

You do not need to calculate PEC for short term targets.

If your short-term PC exceeds the screening criteria of 10%, you need to do detailed modelling.

If your long-term PC is greater than 1% and your PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – you do not need to assess them any further.

If your PEC is greater than 70% of the long-term environmental standard, you need to do detailed modelling.

For SPAs, SACs and Ramsar sites, you need to consider the 'in combination' (combined) impact of all permissions, plans or projects that could also affect these sites. Contact the Environment Agency for further guidance on in-combination assessments.

When there are local nature sites within the specified distance

The guidance states that if emissions meet both of the following criteria, they are insignificant and you do not need to assess them any further:

- the short-term PC is less than 100% of the short-term environmental standard for protected conservation areas; and
- the long-term PC is less than 100% of the long-term environmental standard for protected conservation areas'

You do not need to calculate PEC for local nature sites.

If your PC exceeds the screening criteria you need to do detailed modelling.

You cannot use the risk assessment tool to check how significant a PC or PEC is for deposition of nutrient nitrogen or acidity. This is because nutrient nitrogen and acidity targets vary depending on location.

The APIS site-relevant critical load tool will tell you the standard that you need to compare the PC or PEC against.

Record the PCs and PECs and the nitrogen and acidity critical load values you used for your insignificant emissions in your risk assessment.

The potential environmental effects of the operational phase of the proposed development have been identified as proposed vehicle movements. The significance of potential environmental effects is assessed according to the latest guidance produced by EPUK and IAQM in January 2017 '*Land-Use Planning & Development Control: Planning for Air Quality*' and May 2020 '*A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites*'.

The methodology used to determine the potential air quality effects of the construction phase of the proposed development has been derived from the IAQM '*Guidance on the Assessment of the Impacts of Dust from Demolition and Construction'* document and is summarised in Section 5.

3.2 DETERMINING THE IMPACT MAGNITUDE OF THE AIR QUALITY EFFECTS FOR PLANNING APPLICATIONS

The traffic air quality assessment has been undertaken in support of a planning application. For the purpose of this assessment for the permit application, The traffic air quality assessment results have been used as background data for a cumulative impact assessment from the traffic emissions and the cremator emissions

The impact magnitude of the effects during the operational phase of the development is based on the latest guidance produced by EPUK and IAQM in January 2017. The guidance provides a basis for a consistent approach that could be used by all parties associated with the planning process to professionally judge the overall significance of the air quality effects based on severity of air quality impacts.

The following rationale is used in determining the severity of the air quality effects at individual receptors:

1. The change in concentration of air pollutants, air quality effects, are quantified and evaluated in the context of AQOs. The impacts are provided as a percentage of the Air Quality Assessment Level (AQAL), which may be an AQO, EU limit or target value, or a Natural Resources Wales Assessment Level (NRWAL)';
2. The absolute concentrations are also considered in terms of the AQAL and are divided into categories for long term concentration. The categories are based on the sensitivity of the individual receptor in terms of harm potential. The degree of harm potential to change increases as absolute concentrations are close to or above the AQAL;
3. Severity of the effect is described as qualitative descriptors; negligible, slight, moderate or substantial, by taking into account in combination the harm potential and air quality effect. This means that a small

increase at a receptor which is already close to or above the AQAL will have higher severity compared to a relatively large change at a receptor which is significantly below the AQAL;

4. The impacts can be adverse when pollutant concentrations increase or beneficial when concentration decrease as a result of development;
5. The judgement of overall significance of the effects is then based on severity of effects on all the individual receptors considered; and,
6. Where a development is not resulting in any change in emissions itself, the significance of effect is based on the effect of surrounding sources on new residents or users of the development, i.e., will they be exposed to levels above the AQAL.

Table 3-1. Impact Descriptors for Individual Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to AQO			
	1	2 5	6 10	>10
≤75% 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 AQO	Moderate	Substantial	Substantial	Substantial

In accordance with explanation note 2 of Table 6.3 of the EPUK & IAQM guidance, the Table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5%, will be described as Negligible.

4.0 BASELINE CONDITIONS

4.1 AIR QUALITY REVIEW

This section provides a review of the existing air quality in the vicinity of the proposed development site in order to provide a benchmark against which to assess potential air quality impacts of the proposed development. Baseline air quality in the vicinity of the proposed development site has been defined from a number of sources, as described in the following sections.

Local Air Quality Management (LAQM)

As required under section 82 of the Environment Act 1995, Epping Forest District Council (EFDC) has conducted an ongoing exercise to review and assess air quality within its area of jurisdiction.

The assessments have indicated that concentrations of NO_2 are above the relevant AQOs at a number of locations of relevant public exposure within the Council. EFDC has designated one Air Quality Management Area (AQMA) that is described below:

Table 4-1. Local Authority AQMA Details

AQMA	Description	Date Declared	Date Amended	Pollutants Declared
AQMA Epping Forest District Council no2	Bell Vue Cottage, High Road, Epping Ups and Downs, High Road, Epping.	01/08/2010	N/A	Nitrogen Dioxide NO_2

The proposed development is situated 6.74 km south-west of the Epping Forest District Council no2 AQMA. However, AQMAs in adjacent LA's are closer to the proposed development site including the Waltham Forest AQMA, Broxbourne Borough Council AQMA and Enfield AQMA. Therefore, existing receptors within these AQMAs have been included as part of the modelling assessment.

Air Quality Monitoring

Monitoring of air quality within EFDC and Broxbourne Borough Council (BBC) has been undertaken through non-continuous monitoring methods in 2019. These have been reviewed in order to provide an indication of existing air quality in the area surrounding the application site.

<u>Non - Continuous Monitoring</u>

Both EFDC and BCC operate a network of numerous passive diffusion tubes. The closest diffusion tube is diffusion tube DT15, which is located on Waltham Abbey: Hayden Road, approximately 1.2 km south-east of the application site. The most recently available diffusion tube data is from 2019 which is presented in **Table 4-2** and the tube locations are shown in **Figure C-2** in Appendix C.

Table 4-2. Monitored Annual Mean NO_2 Concentrations

Site ID	Location	Site Type	Distance from Kerb of Nearest Road (m)	Inlet Height (m)	2019 NO_2 Annual Mean Concentration (µg/m^3)
DT7	Loughton: 1 Church Hill	Roadside	4.2	2	22
DT8	Loughton: 72 Church Hill	Urban Background	12.7	2	21
DT9	Loughton: 249 Church Hill (Timpson)	Roadside	6.4	2	28
DT10	Loughton: 252 Church Hill (Bojangles)	Roadside	5.7	2	28
DT11	Loughton: Goldings Hill	Roadside	1	2	34
DT16	Waltham Abbey: 13 The Elms	Urban Centre	36.6	2	26
DT17	Waltham Abbey: 15 The Elms	Urban Background	55.8	2	26
DT18	Waltham Abbey: Abbeyview	Urban Background	1.5	2	24
DT19	Waltham Abbey: Hayden Road	Urban Background	12	2	26
DT20	Waltham Abbey: Lodge Lane	Roadside	0.5	2	30
DT21	Waltham Abbey: Roundhills	Urban Background	1	2	28
BB05*	Arlington Crescent Waltham Cross	Roadside	8	1.6	57

*Located within AQMA

As indicated in **Table 4-2**, all diffusion tubes located within the Air Quality Assessment area monitored annual average NO_2 concentrations below the AQO for NO_2 (40 µg/m^3 annual mean) during 2019 excluding BB05 which monitored exactly 57 µg/m^3 during 2019.

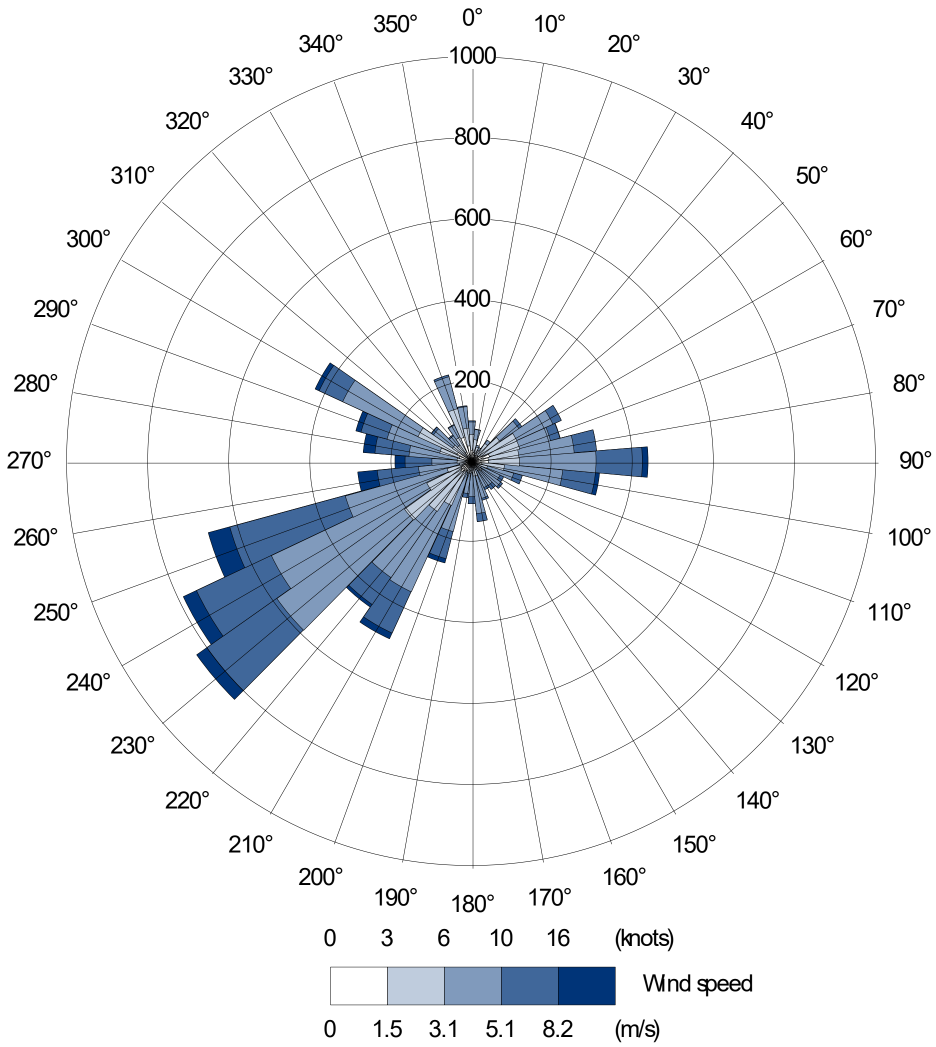
It should be noted that as part of the model verification a review of diffusion tubes locations and monitoring heights was undertaken. As part of this process, the locations and monitoring heights were adjusted following desk-based review using Google Maps.

4.2 METEOROLOGY FOR PLANNING APPLICATIONS

Meteorological conditions have significant influence over air pollutant concentrations and dispersion. Pollutant levels can vary significantly from hour to hour as well as day to day, thus any air quality predictions need to be based on detailed meteorological data. The ADMS (Atmospheric Dispersion Modelling System) model calculates the dispersion of pollutants on an hourly basis using a year of local meteorological data.

The 2019 meteorological data used in the assessment is derived from London City Meteorological Station. This is the nearest meteorological station, which is considered representative of the application site, with all the complete parameters necessary for the ADMS model. Reference should be made to **Figure 4-1** for an illustration of the prevalent wind conditions at London City Meteorological Station site.

Figure 4-1 London City 2019 Wind Rose



4.3 EMISSION SOURCES FOR TRAFFIC AIR QUALITY ASSESSMENT

A desktop assessment has identified that traffic movements and the proposed electric cremator are likely to be the most significant local source of pollutants affecting the site and its surroundings. The principal traffic derived pollutants likely to impact local receptors are NO_2, PM_{10} and $PM_{2.5}$.

The traffic air quality assessment has therefore modelled all roads within the immediate vicinity of the application site which are considered likely to experience significant changes in traffic flow as a result of the proposed development. Reference should be made to **Figure C-1** in Appendix C for a graphical representation of the traffic data utilised within the ADMS Roads 5.0.0.1 model.

It should be noted that the pollutant contribution of minor roads and rail sources that are not included within the dispersion model is considered to be accounted for via the use of background air quality levels.

4.4 SENSITIVE RECEPTORS FOR TRAFFIC ASSESSMENT

Receptors that are considered as part of the air quality assessment are primarily those existing receptors that are situated along routes predicted to experience significant changes in traffic flow as a result of the proposed development.

The existing receptor locations and proposed sensitive receptors are summarised in **Table 4-3** and the spatial locations of all of the receptors are illustrated in **Figure C-1** in Appendix C.

Table 4-3. Modelled Existing Sensitive Receptor Locations

Receptor ID	Discrete Sensitive Receptor	X	Y	Receptor Height (m)
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	535289	202127	1.5
R2*	Albury Farm, Great Cambridge Road, Cheshunt	535287	201687	1.5
R3	Rush Lodge, Theobalds Lane, Waltham Cross	535199	201187	1.5
R4	63 Leven Drive, Waltham Cross	535715	200767	1.5
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	536003	200744	1.5
R6*	963 Hertford Road, Waltham Cross	536083	199929	1.5
R7*	44 Arlington Crescent, Waltham Cross	536116	200030	1.5
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	536213	200614	1.5
R9	Flat 14, Hyde Court, Parkside, Waltham Cross	536180	200108	1.5
R10*	83 Queens Road, Waltham Cross	536363	200424	1.5
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	536729	200393	1.5
R12	79 Fisher Close, Waltham Cross	537302	200460	1.5
R13	20 Grove Court, Waltham Abbey	537727	200551	1.5
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	537870	200589	1.5
R15	91 Crooked Mile, Waltham Abbey	538427	201037	1.5
R16	62a Crooked Mile, Waltham Abbey	538440	200925	1.5
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	538447	200810	1.5
R18	1 Monkswood Avenue, Waltham Abbey	538462	200584	1.5
R19	16a Sewardstone Road, Waltham Abbey	538450	200489	1.5
R20	2 Farm Hill Road, Waltham Abbey	538496	200480	1.5
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	538972	200653	1.5
R22	3 Eastbrook Road, Waltham Abbey	539017	200619	1.5
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	539684	200152	1.5
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	540305	199916	1.5
R25	2 Horseshoe Close, Waltham Abbey	540417	200108	1.5
R26	Inner Lodge, Dowding Way, Waltham Abbey	540309	199474	1.5
R27	The Lodge, Honey Lane, Waltham Abbey	540633	199804	1.5
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	541103	199228	1.5
R29	2 Woodgreen Road, Waltham Abbey	541221	200220	1.5
R31	Fourways, Woodgreen Road, Waltham Abbey	541235	199974	1.5
R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	541211	199741	1.5
R33	Old Keppers Lodge, Woodredon Hill, Epping	541926	199760	1.5

R34*	204 Kings Head Hill, London	542443	199447	1.5
R35*	43 Redwood Gardens, London	537639	194901	1.5
R36	1 Baden Drive	537528	194963	1.5
R37	Dunmain House, Sewardstone Road, London	537788	196091	1.5
R38	Amesbury Mead Farm, Sewardstone Road, London	537716	196258	1.5
R39	Maycroft, Sewardstone Road, London	538046	197117	1.5
R40	Chestnuts, Avey Lane, Waltham Abbey	538379	198263	1.5
R41	1-18 Burrows Close, Waltham Abbey	538674	199025	1.5
R42	30 Beechfield Walk, Waltham Abbey	538570	199505	1.5
R43	1 Beechfield Walk, Waltham Abbey	538669	199766	1.5
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	538687	199854	1.5
R45	14 Roman Way, Waltham Abbey	538530	200147	1.5
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	537771	199594	1.5
R47	6 Godwin Close, Sewardstone Road, London	538099	199572	1.5
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	538273	197956	1.5
R49	2 Hamlet Gate, Sewardstone Road, London	538302	197920	1.5
R50	Hideaway, Green Lane, Bury Road, London	538322	198011	1.5
R51	Woodsprite, Green Lane, Bury Road, London	539050	196883	1.5
R52	Parsons Croft, Gilwell Park, London	539098	196939	1.5
AERMOD Discrete Sensitive Receptors				
D1	Woodsprite, Green Lane, Bury Road	539099	196937	1.5
D2	Silver Timbers, Green Lane, Bury Road	539080	196915	1.5
D3	Hideaway, Green Lane, Bury Road	539056	196890	1.5
D4	Carrolls Farm, Bury Road	538933	196733	1.5
D5	Parsons Croft, Gilwell Park	538677	196864	1.5
D6	Oliver’s, Daws Hill	538651	196919	1.5
D7	Woodlands Bungalow, Sewardstone Road	538139	197133	1.5
D8	White House, Sewardstone Road	538163	197320	1.5
D9	1 The Beeches, Sewardstone Road	538178	197399	1.5
D10	Chapelfield Nursery	538293	197460	1.5
D11	Hillview, Sewardstone Road	538182	197727	1.5
D12	Netherhouse Farm	538426	197978	1.5
D13	Liran, Mott Street	538648	198143	1.5
D14	Cottage 2, Golden Row, Mott Street	538999	197990	1.5
D15	Lipitt's End, Mott Street	539453	197699	1.5
D16	Pin-Hi, Lippitts Hill	539739	197169	1.5
D17	1 Owl Park, Lippitts Hill	539862	197033	1.5
*Located within AQMA				

4.5 SENSITIVE ECOLOGICAL RECEPTORS FOR TRAFFIC ASSESSMENT

Air quality impacts associated with the proposed development have the potential to impact on receptors of ecological sensitivity within the vicinity of the site. The IAQM guidance on ‘Air Quality Impacts on Designated Nature Conservation Sites’ (2019) document outlines the types of designated nature sites within 2 km of the proposed development which require air quality assessment.

The ‘Approach to Advising Competent Authorities on the Assessment of Road Traffic Emission under the Habitats Regulations (2018), produced by Natural England has been used for the completion of this assessment. This document covers the screening stage of the process based on road traffic emissions that may affect Special Areas of Conservation (SACs), candidate SACs, Special Protection Areas (SPAs), Sites of Community Importance (SCIs), potential SPAs, possible SACs, listed or proposed Ramsar sites and sites identified, or required, as compensatory measures for adverse effects on these European sites.

The guidance covers the identification of the risk of possible significant adverse effects on the above sites which could result in the failure to achieve its conservation objectives and would therefore require a further detailed assessment. If the risks which might result in the failure a sites conservation objective can be scoped out, a proposal will likely have no significant effects and a further assessment not required.

4.5.1 Screening Requirements

There are four stages at the screening stage of the Habitat Risk Assessment (HRA) to identify as to whether the road traffic emission associated with the proposed development are likely to have a significant effect on the sites mentioned above.

1. Is the proposed development likely to produce emissions that might pose a risk to the sites above?
   - All emission from road traffic sources associated with the proposed development and the distance to the sites above will be considered.
   - If the site does not fall within the distance criteria of 200m from road source, no further steps of the assessment are required.
2. Are the qualifying features of sites within 200m of a road and sensitive to air pollution?
   - Qualifying features of a site have been identified by reference to Natural England's formal advice on their Conservation Objectives, this includes a list of legally qualifying features. The qualifying sites have also been identified using (https://designatedsites.naturalengland.org.uk/)
   - Natural England and Highways England are in agreement that protected sites falling within 200 meters of the edge of a road affected by a proposed development with be considered further.
   - Where no qualifying features of a site are considered to be sensitive to a pollutant then no further assessment is required.
   - Where at least one of a site's features is known to be sensitive, further screening will be undertaken.
3. Will the identified sensitive qualifying site be exposed to emissions?
   - Qualifying sites are identified through APIS and Natural England's formal advice on their conservation objectives.
   - Natural England's Designated Sites System Viewer ((https://designatedsites.naturalengland.org.uk/) will be used to determine the spatial location of individual features.
4. Where there is potential for emissions from road traffic associated with the proposed development to impact the identified sensitive feature, then the following will be required;
   - The predicted increase in traffic flows associated with the proposed development, or the predicted process contribution of the pollution benchmark.
   - An in-combination with emissions from surrounding road traffic proposed development,
   - An in-combination with emissions from surrounding non-road traffic proposed development,

The thresholds that determine whether a change as a result of the proposed development is likely to be significant are a change in AADT of 1,000 or more (200 or more HGV) or 1% of the critical load for emissions.

4.5.2 Epping Forest SAC

All Epping Forest SAC ecological sites have been assessed in line with receptor locations agreed with EFDC and Natural England. Transects of ecological receptors have been included within the model, wherein receptor locations have been identified at 10m intervals, starting from the nearest point of the designated habitat to the road source, up to 200m, in accordance with the Design for Manual Roads and Bridges guidance.

Transect receptor locations are labelled for their Transect ID and the distance from the relevant road source. An example is presented below:

A1 – 1m: A1 Transect ID code, and 1m displays the distance in meters from the road source.

The worst-case Epping Forest SAC ecological receptor locations have been identified following detailed Air Quality modelling, where the impact of road vehicle movements associated with the proposed development have the greatest impact, these locations are presented in **Table 4-4**. Results for these worst-case locations are presented in Section7.0. The full list of identified transect ecological receptor locations for Epping Forest SAC are presented in Appendix B.

Table 4-4 Ecological Receptors for Traffic Air Quality Assessment

Site ID	Site	Designation	UK NGR (m)	
			X	Y
E1	Epping Forest SSSI & SAC	SSSI & SAC	540795	198856
E2	Epping Forest SSSI & SAC	SSSI & SAC	541173	199701
E3	Epping Forest SSSI & SAC	SSSI & SAC	541406	199724
E4	Epping Forest SSSI & SAC	SSSI & SAC	542152	199419
E5	Epping Forest SSSI & SAC	SSSI & SAC	542359	199388
E6	Epping Forest SSSI & SAC	SSSI & SAC	542617	199414
E7	Epping Forest SSSI & SAC	SSSI & SAC	542742	199399
E8	Epping Forest SSSI & SAC	SSSI & SAC	542740	199368
E9	Epping Forest SSSI & SAC	SSSI & SAC	542700	199347
E10	Epping Forest SSSI & SAC	SSSI & SAC	543143	199623
E11	Epping Forest SSSI & SAC	SSSI & SAC	543317	199788
E12	Epping Forest SSSI & SAC	SSSI & SAC	543485	199899
E13	Epping Forest SSSI & SAC	SSSI & SAC	544054	199431
E14	Epping Forest SSSI & SAC	SSSI & SAC	544665	199227
E15	Epping Forest SSSI & SAC	SSSI & SAC	543190	198831
E16	Epping Forest SSSI & SAC	SSSI & SAC	543053	198679
E17	Epping Forest SSSI & SAC	SSSI & SAC	542784	198811
E18	Epping Forest SSSI & SAC	SSSI & SAC	542703	198923
E19	Epping Forest SSSI & SAC	SSSI & SAC	542638	198910
E20	Epping Forest SSSI & SAC	SSSI & SAC	542633	198796
E21	Epping Forest SSSI & SAC	SSSI & SAC	542258	199249
E22	Epping Forest SSSI & SAC	SSSI & SAC	542241	199223
E23	Epping Forest SSSI & SAC	SSSI & SAC	542049	198862
E24*	Epping Forest SSSI & SAC	SSSI & SAC	538020	194761

E25	Epping Forest SSSI & SAC	SSSI & SAC	537761	196114
E26	Cornmill Stream & Old River Lea SSSI	SSSI	537903	200767
E27	Cornmill Stream & Old River Lea SSSI	SSSI	538187	200942
E28*	Chingford Reservoirs	SSSI	537761	197623
E29*	Chingford Reservoirs	SSSI	537598	196373
E30*	Chingford Reservoirs	SSSI	537543	195583
E31*	Chingford Reservoirs	SSSI	537269	195135
*Located within AQMA				

Table 4-5 Worst-case HRA SAC Ecological Receptors

Site ID	Site	Designation	UK NGR (m)	
			X	Y
A1_4m	HRA SAC Worst Case Receptor	SAC	542876	199590
A2_1m	HRA SAC Worst Case Receptor	SAC	543119	199789
A3_1m	HRA SAC Worst Case Receptor	SAC	544379	200867
B1_1m	HRA SAC Worst Case Receptor	SAC	542932	199394
B2_200m	HRA SAC Worst Case Receptor	SAC	543113	199645
C1_1m	HRA SAC Worst Case Receptor	SAC	542703	199133
C2_1m	HRA SAC Worst Case Receptor	SAC	542771	198948
D1_1m	HRA SAC Worst Case Receptor	SAC	542481	199128
D2_1m	HRA SAC Worst Case Receptor	SAC	542390	199008
E1_1m	HRA SAC Worst Case Receptor	SAC	542236	199404
E2_1m	HRA SAC Worst Case Receptor	SAC	542414	199429
F_200m	HRA SAC Worst Case Receptor	SAC	544675	200384
H_0m	HRA SAC Worst Case Receptor	SAC	541303	197475
I_1m	HRA SAC Worst Case Receptor	SAC	541209	197232
J_150m	HRA SAC Worst Case Receptor	SAC	541497	197047
K_0m	HRA SAC Worst Case Receptor	SAC	541107	196903
L_80m	HRA SAC Worst Case Receptor	SAC	541018	197223
M_0m	HRA SAC Worst Case Receptor	SAC	540994	197855
N_60m	HRA SAC Worst Case Receptor	SAC	540932	197579
O_7.5m	HRA SAC Worst Case Receptor	SAC	541272	199709
P_1m	HRA SAC Worst Case Receptor	SAC	542736	199369

5.0 ASSESSMENT OF AIR QUALITY IMPACTS – CONSTRUCTION PHASE – FOR PLANNING APPLICATION

5.1 POLLUTANT SOURCES

The main emissions during construction are likely to be dust and particulate matter generated during earth moving (particularly during dry months) or from construction materials. The main potential effects of dust and particulate matter are:

- Visual - dust plume, reduced visibility, coating and soiling of surfaces leading to annoyance, loss of amenity, the need to clean surfaces;
- Physical and/or chemical contamination and corrosion of artefacts;
- Coating of vegetation and soil contamination; and,
- Health effects due to inhalation e.g. asthma or irritation of the eyes.

A number of other factors such as the amount of precipitation and other meteorological conditions will also greatly influence the amount of particulate matter generated.

Construction activities can give rise to short-term elevated dust/PM_{10} concentrations in neighbouring areas. This may arise from vehicle movements, soiling of the public highway, demolition or windblown stockpiles.

5.2 PARTICULATE MATTER (PM_{10})

The UK Air Quality Standards seek to control the health implications of respirable PM_{10}. However, the majority of particles released from construction will be greater than this in size.

Construction works on site have the potential to elevate localised PM_{10} concentrations in the area. On this basis, mitigation measures should still be taken to minimise these emissions as part of good site practice.

5.3 DUST

Particles greater than 10μm are likely to settle out relatively quickly and may cause annoyance due to their soiling capability. Although there is no formal standards or criteria for nuisance caused by deposited particles, the IAQM 'Guidance on Monitoring in the Vicinity of Demolition and Construction Sites' (October 2018) and the Environment Agency Technical Guidance Note (TGN) M17 states that dust is usually compared with a 'complaints likely' guideline of 200mg/m^2/day. Therefore, a deposition rate of 200mg/m^2/day is often presented as a threshold for serious nuisance though this is usually only applied to long term exposure as people are generally more tolerant of dust for a short or defined period. Significant nuisance is likely when the dust coverage of surfaces is visible in contrast with adjacent clean areas, especially when it happens regularly. Severe dust nuisance occurs when the dust is perceptible without a clean reference surface.

Construction activities have the potential to suspend dust, which could result in annoyance of residents surrounding the site. Measures will be taken to minimise the emissions of dust as part of good site practice.

Recommended mitigation measures proportionate to the risk associated with the development and based on best practice guidance are discussed in the following sections.

5.4 METHODOLOGY

The construction phase assessment utilises the IAQM Guidance on the Assessment of Dust from Demolition and Construction document published in February 2014.

Four construction processes are considered; these are demolition, earthworks, construction and trackout. For each of these phases, the significance of the potential dust impacts is derived following the determination of a dust emission magnitude and the distance of activities to the nearest sensitive receptor, therefore assessing worst case impacts. A full explanation of the methodology is contained in Appendix A.

5.5 ASSESSMENT RESULTS

Based on the methodology detailed in Appendix A, the scale of the anticipated works has determined the potential dust emission magnitude for each process, as presented in the **Table 5-1** below.

Table 5-1. Potential Dust Emission Magnitude

Construction Process	Site Criteria	Dust Emission Magnitude
Demolition	No demolition required	N/A
Earthworks	Total Site Area: >10,000 m^2	Large
Construction	Total Building Volume: 25,000 - 100,000 m^3	Medium
Trackout	Assumed 10 - 50 HDV outward movements in any one day	Medium

The sensitivity of the surrounding area to each construction process has been determined following stage 2B of the IAQM guidance. The assessment has determined the area sensitivities as shown in the **Table 5-2**.
The sensitivity of the ecological receptors is considered not applicable within the construction phase assessment due to the distance from the application site which is greater than 500m. This is in accordance with Table 4 of the IAQM Guidance.

Table 5-2. Sensitivity of the Area

Source	Area Sensitivity					
	Dust Soiling	Site Sensitivity Criteria	Health Effects of PM_{10}	Site Sensitivity Criteria	Ecological	Site Sensitivity Criteria
Demolition	N/A	No demolition required	N/A	No demolition required	N/A	No demolition required
Earthworks	Medium	10-100 Highly Sensitive Receptors within 50m	Low	Annual Mean of <24 ug/m^3 for PM_{10} 10-100 Highly Sensitive Receptors within 50m	N/A	>50 m from site boundary
Construction	Medium		Low		N/A	
Trackout	Medium	10-100 Highly Sensitive Receptors within 50m of roads within 500m of site	Low	Annual Mean of <24 ug/m^3 for PM_{10} 10-100 Highly Sensitive Receptors within 50m of roads within 500m of site	N/A	>50 m from roads within 500 m from site boundary

The dust emission magnitude determined in **Table 5-1** has been combined with the sensitivity of the area determined in **Table 5-2** to determine the risk of impacts prior to the implementation of appropriate mitigation measures. The potential impact significance of dust emissions associated with the construction phase, without mitigation, is presented overleaf.

Table 5-3. Impact Significance of Construction Activities without Mitigation

Source	Summary Risk of Impacts Prior to Mitigation		
	Dust Soiling	Health Effects of PM_{10}	Ecological
Demolition	N/A	N/A	N/A
Earthworks	Medium	Low	N/A
Construction	Medium	Low	N/A
Trackout	Low	Low	N/A

6.0 ASSESSMENT OF TRAFFIC AIR QUALITY IMPACTS FOR PLANNING APPLICATION - OPERATIONAL PHASE

In the context of the proposed development, road traffic is identified as the dominant emission source that is likely to cause potential risk of exposure of air pollutants at receptors.

The operational phase assessment therefore consists of the quantified predictions of the change in NO_2, PM_{10} and $PM_{2.5}$ for the operational phase of the development due to changes in traffic movement. Predictions of air quality at the site have been undertaken for the operational phase of the development using ADMS Roads.

In accordance with the provided traffic data, the operational phase assessment has been undertaken with an assumed operational opening year of 2022. The assessment scenarios are therefore:

- 2019 Baseline = Existing Baseline Conditions (2019);
- 2022 "Do Minimum" = Baseline Conditions + Committed Development Flows (through local growth factor); and,
  2022 "Do Something" = Baseline Conditions + Committed Development (through local growth factor) + Proposed Development.

6.1 TRAFFIC TRIP RATE ASSESSMENT

Existing public transport service availability

There is limited access to public transport within proximity of the proposed crematorium at Netherhouse Farm.

Bus Services

Bus stops for northbound and southbound travel are located just north of the proposed access to the crematorium and are linked via a footway on the eastern side of the carriageway. The 505 bus serves these stops, providing a link to Harlow and Chingford (including Chingford Rail Station), however only six services are operated on Saturdays only. To access more regular weekday services from the proposed site, a bus stop for the 215 bus can be located 800m south of the site at the Lee Valley Campsite. This route typically provides a three an hour service to Walthamstow Bus Station. Furthermore, the 379 bus can be caught at a bus stop on Sewardstone Road, 1.8km south of the site. This bus runs to Chingford Station and provides a four an hour service on weekdays.

Rail Stations

The nearest rail stations to the proposed Crematorium site are Chingford Station (4km) and Ponders End Station (4.8km). It should be noted that some trips to the proposed crematorium could be undertaken by public transport, however those accessing the nearest rail stations will need a lift, bus or taxi to get there.

Review of Transport Assessments for other Crematorium Sites

A trip rate assessment is typically derived using data from the TRICS database. This nationally recognised tool uses survey data from a similar site to inform the predicted trip generations of a new site. Crematoria or cemetery sites are not included in the TRICS database. To inform this assessment, survey data from two other similar site applications have been used to inform the trip generations for Netherhouse Farm. It was not possible to source a similar site within London,

Proposed Crematorium and Cemetery in Hemel Hempstead

As part of a consented Transport Assessment (20/01355/MFA) for a proposed crematorium and cemetery in Hemel Hempstead, an operating crematorium in Watford was surveyed in February 2020. This is a similar site to that of the proposed, with two chapels and 140 car parking spaces. The site operated 14 services on the day of survey with trips in and out recorded during a 12-hour period between 07:00-19:00. There was a total of 437 arrivals and 433 departures during the 12-hour period, bringing about a total of 870 trips. Applying these figures to create an estimation of trips per service, it is considered that there would be 31 arrivals and 31 departures per service, meaning 62 two-way trips. It should be noted that this is a worst-case scenario and there should be a consideration that a small proportion of these trips will be for crematorium staff, particularly at the start and the end of the day. The hourly profile data sourced from the Watford survey shows that the peak hour is between 14:00 – 15:00 with 168 two-way trips. Trips predicted during the network peak hours were low, with just 12 trips recorded on the AM peak (08:00 – 09:00) and no trips recorded in the PM peak (17:00 – 18:00).

Proposed Crematorium at Badgers Mount, Sevenoaks

The Transport Assessment for a proposed Crematorium in Badgers Mount, Sevenoaks (19/02317/FUL), used a sample set of five operating crematoria to derive an average 'vehicles per service' figure. The sites surveyed were located in Emstrey, Bristol, Maidstone, Chichester and Guildford and 66 services were surveyed. Out of those 66 services, there was an average rate of 25.54 vehicles per service. The Transport Assessment concluded that due to staff trips and various other visits to the premises in addition, the total average number of trips should be 27 per service (or **54** two-way trips).

Trip rates for Netherhouse Farm

Applying the data from the above crematorium sites to the Netherhouse Farm cremation site, the estimated trips per service can be applied to the quantum of services predicted. With 5 cremations and 2 burials predicted daily, 189 arrivals and 189 departures to the site are estimated every day, with a total predicted daily quantum of trips of 378. These figures include provision for staff trips. Applying the trips per service estimation to the annual predicted service frequency of 1724, there would be 46,548 arrivals and 46,548 departures would be predicted with a total of 93,096 annual two-way trips.

6.2 TRAFFIC DATA USED IN THE ASSESSMENT

Baseline 2019 data and projected 2022 'do minimum' and 'do something' traffic data has been obtained for the operational phase assessment in the form of Annual Average Daily Traffic figures (AADT).

Additional vehicle flows for Monarchs Way, Winston Churchill Way and the A10 north, have been sourced from the Department for Transport (DfT) road source database. To correspond with the predicted opening year of 2022, a TEMPro Factor of 1.0219 was applied to the vehicle flows sourced from the DfT database to 2019 baseline data. Additionally, for the 2022 'do something' scenario, the proposed development flows have been added on to the 2022 'do minimum' flows.

It is assumed the average vehicle speeds on the local road network in an opening year of 2022 will be broadly the same as the ones in 2019 as well.

Emission factors for the 2019 baseline and 2022 projected 'do minimum' and 'do something' scenarios have been calculated using the EFT (Version 10.1) (August 2020).

A 50m 20km/hr slow down phase is included on each link at every junction and roundabout within the assessment. All of the roads within the dispersion model are illustrated in **Figure C-1** and **Figure C-2** in Appendix C. Detailed traffic figures are also provided in Appendix C.

Table 6-1. Traffic Data

Link	Speed (km/h)	2019		2022			
				Do Minimum		Do Something	
		AADT	HGV%	AADT	HGV%	AADT	HGV%
Dowding Way (West)	96	19,818	8.17	20,261	8.17	20,315	8.15
Dowding Way (East)	96	19,818	8.17	20,261	8.17	20,315	8.15
A121 Honey Lane	64	27,949	3.01	28,565	3.01	28,582	3.01
Woodgreen Road	64	3,889	3.90	3,974	3.90	3,974	3.90
Woodridden Hill (West)	64	27,949	3.01	28,565	3.01	28,582	3.01
Honey Lane (east)	98	27,302	7.00	27,903	7.00	27,921	6.99
Honey Lane (west)	64	27,302	7.00	27,900	7.00	27,900	7.00
Farm Hill Road	32	27,302	7.00	27,900	7.00	27,900	7.00
Sewardstone Road (South)	48	23,054	1.31	23,568	1.31	23,622	1.31
Sewardstone Road (North)	48	23,054	1.31	23,568	1.31	23,622	1.31
A112 (North)	64	27,737	2.34	28,401	2.33	28,722	2.30
A112 (South)	48	27,737	2.34	28,372	2.33	28,533	2.32
A121 (West)	64	15,707	8.87	16,060	8.86	16,114	8.83
Meridian Way	64	14,987	4.75	15,324	4.74	15,378	4.73
Fleming Road	20	2,531	37.39	2,587	37.39	2,587	37.39
Abbeyview	112	15,684	3.07	16,032	3.07	16,059	3.06
B194	64	17,839	4.95	18,230	4.95	18,230	4.95
Crooked Mile (North)	48	23,639	2.16	24,166	2.16	24,220	2.15
B194 Crooked Mile	48	21,830	2.69	22,313	2.69	22,340	2.69
Crooked Mile (South)	48	23,639	2.16	24,157	2.16	24,157	2.16
M25 (Clockwise)	112	73,238	13.57	74,845	13.57	74,862	13.57
M25 (Anti-clockwise)	112	73,238	13.57	74,845	13.57	74,862	13.57
M25 (Anti-clockwise) Slip	20	10,255	5.56	10,482	5.56	10,500	5.55
M25 (Anti-clockwise) Slip	20	9,505	10.29	9,713	10.29	9,713	10.29
M25 (Clockwise) Slip	20	24,455	7.17	24,991	7.17	24,991	7.17
Woodredon Farm Lane	64	175	3.60	179	3.60	179	3.60

Woodridden Hill (East)	64	20,905	4.70	21,366	4.70	21,384	4.70
B1393 Epping Road	64	18,644	2.70	19,053	2.70	19,057	2.70
B172	64	8,906	3.00	9,101	3.00	9,106	3.00
A104 Epping New Road	64	6,802	0.80	6,951	0.80	6,951	0.80
Forest Side	64	3,791	0.30	3,874	0.30	3,874	0.30
Unnamed Road	48	26,826	4.72	27,419	4.72	27,446	4.71
A121 Station Road	64	479	0.00	494	0.00	521	0.00
Beaulieu Drive	64	426	0.00	435	0.00	435	0.00
Waltham Abbey Gardens	20	14,035	2.70	14,342	2.70	14,342	2.70
Parklands	64	3,592	3.41	3,670	3.41	3,670	3.41
Old Shire Land	48	15,068	5.30	15,407	5.30	15,461	5.28
A112 (S)	48	17,842	5.10	18,242	5.10	18,295	5.08
A110 Lee Valley Road	64	15,613	4.60	15,964	4.60	16,018	4.58
Kings Head Hill	48	6,802	0.80	6,951	0.80	6,951	0.80
Monarch's Way	48	29,103	3.59	29,740	3.59	29,740	3.59
Winston Churchill Way	64	21,126	5.16	21,589	5.16	21,589	5.16
A10 North	96	43,748	6.09	44,706	6.09	44,706	6.09
Monarch's Way (South of Roundabout)	48	29,018	2.33	29,653	2.33	29,653	2.33
Rectory Lane	48	15,580	2.26	15,921	2.26	15,921	2.26
Theydon Road	48	8,635	1.33	8,824	1.33	8,824	1.33
Unnamed Road	48	519	1.35	530	1.35	530	1.35
Site Access Road	32	0	0	57	0	378	0

6.3 BACKGROUND CONCENTRATIONS FOR TRAFFIC AIR QUALITY ASSESSMENT

The use of background concentrations within the modelling process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants include industrial, domestic and rail emissions within the vicinity of the study site. Several sources have been used to obtain representative background levels as discussed below.

The background concentrations used within the assessment have been determined with reference to the IAQM Guidance and TG (16).

The IAQM Guidance states:

> "*A matter of judgement should take into account the background and future background air quality and whether it is likely to approach or exceed the value of the AQO.*"

Additionally, TG (16) states:

> *"Typically, only the process contributions from local sources are represented within and output by the dispersion model. In these circumstances, it is necessary to add an appropriate background concentration(s) to the modelled source contributions to derive the total pollutant concentrations."*

Defra Published Background Concentrations for 2019

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the development site. In May 2019, Defra issued revised 2018 based background maps for nitrogen oxide (NO_X), NO_2, PM_{10} and $PM_{2.5}$.

Table 6-2. Published Background Air Quality Levels (μg/m^3)

Receptor Location	2019			
	NO_2	NO_x	PM_{10}	$PM_{2.5}$
Local Authority Monitoring Locations				
DT7	24.28	17.28	16.08	10.89
DT8	24.28	17.28	16.08	10.89
DT9	24.28	17.28	16.08	10.89
DT10	24.28	17.28	16.08	10.89
DT11	22.38	16.15	16.01	10.79
DT16	28.29	19.98	17.63	11.19
DT17	28.29	19.98	17.63	11.19
DT18	25.04	17.83	16.56	10.99
DT19	31.46	21.78	17.90	11.54
DT20	31.46	21.78	17.90	11.54
DT21	31.46	21.78	17.90	11.54
BB05*	28.24	19.82	17.51	11.58
Existing Sensitive Receptors				
R1*	23.59	16.97	16.56	11.10
R2*	24.09	17.30	16.85	11.11
R3	24.09	17.30	16.85	11.11
R4	34.93	23.85	17.87	11.77
R5*	28.24	19.82	17.51	11.58
R6*	32.85	22.50	18.08	11.83
R7*	28.24	19.82	17.51	11.58
R8	28.24	19.82	17.51	11.58
R9*	28.24	19.82	17.51	11.58
R10*	28.24	19.82	17.51	11.58
R11	28.24	19.82	17.51	11.58
R12	25.04	17.83	16.56	10.99
R13	25.04	17.83	16.56	10.99
R14	25.04	17.83	16.56	10.99
R15	19.61	14.37	15.84	10.39
R16	26.43	18.59	16.41	11.02
R17	26.43	18.59	16.41	11.02
R18	26.43	18.59	16.41	11.02
R19	26.43	18.59	16.41	11.02

R20	26.43	18.59	16.41	11.02
R21	26.43	18.59	16.41	11.02
R22	22.96	16.52	17.05	11.09
R23	22.96	16.52	17.05	11.09
R24	32.47	22.47	17.76	11.38
R25	21.58	15.67	16.57	10.74
R26	32.47	22.47	17.76	11.38
R27	32.47	22.47	17.76	11.38
R28	24.62	17.66	17.56	11.18
R29	28.29	19.98	17.63	11.19
R30	24.62	17.66	17.56	11.18
R31	24.62	17.66	17.56	11.18
R32	24.62	17.66	17.56	11.18
R33	21.62	15.73	16.86	10.65
R34*	27.64	19.30	17.64	11.49
R35*	27.64	19.30	17.64	11.49
R36	25.27	17.82	16.01	10.73
R37	25.27	17.82	16.01	10.73
R38	23.79	16.98	16.25	10.72
R39	24.24	17.30	16.78	10.91
R40	31.46	21.78	17.90	11.54
R41	31.46	21.78	17.90	11.54
R42	31.46	21.78	17.90	11.54
R43	31.46	21.78	17.90	11.54
R44	26.43	18.59	16.41	11.02
R45	31.93	22.03	17.48	11.47
R46	31.46	21.78	17.90	11.54
R47	23.79	16.98	16.25	10.72
R48	23.79	16.98	16.25	10.72
R49	24.24	17.30	16.78	10.91
R50	22.05	15.90	15.79	10.50
R51	22.05	15.90	15.79	10.50
R52	23.55	16.83	16.01	10.66
AERMOD Discrete Sensitive Receptors				
D1 – D3	22.05	15.90	15.79	10.50
D4 – D6	23.55	16.83	16.01	10.66
D7 – D12	23.79	16.98	16.25	10.72
D13	24.24	17.30	16.78	10.91
D14	23.79	16.98	16.25	10.72
D15 – D17	21.54	15.59	15.88	10.48
Ecological Sensitive Receptors				
E1	-	23.65	APIS Background Concentrations	
E2 – E3	-	27.71		
E4 – E9	-	24.32		
E10 – E12	-	20.61		
E13 – E14	-	20.36		
E15 – E16	-	20.68		
E17 – E20	-	21.63		
E21 – E22	-	24.32		

E23	-	21.63	
E24*	-	30.89	
E25	-	28.32	
E26	-	28.55	
E27	-	29.63	
E28*	-	27.76	
E29*	-	28.32	
E30*- E31*	-	30.01	
*Located within AQMA			

An analysis of the Defra background concentrations for 2018 show that the background levels are predicted to be below the relevant AQO across the wider site area.

A breakdown of the background source apportionment of NO_x concentrations at each monitoring location and receptor is shown in ***Table 6-3***. The breakdown of background source appointment NO_x concentrations is derived from Defra 'Background Mapping data for local authorities – 2018'.

Table 6-3. Pollutant Source Apportionment of NO_X (μg/m^3)

Tube Location/Receptor Location	2019						
	Total NO_x	% of NO_x from Road Sources	% of NO_x from Industrial Sources	% of NO_x from Domestic Sources	% of NO_x from Aircraft Sources	% of NO_x from Rail Sources	% of NO_x from Other Sources
Local Authority Monitoring Locations							
DT7	24.28	36.73	6.11	16.55	0.04	0.37	40.21
DT8	24.28	36.73	6.11	16.55	0.04	0.37	40.21
DT9	24.28	36.73	6.11	16.55	0.04	0.37	40.21
DT10	24.28	36.73	6.11	16.55	0.04	0.37	40.21
DT11	22.38	39.72	5.70	13.34	0.00	0.30	40.94
DT16	28.29	57.23	4.25	6.80	0.00	0.26	31.47
DT17	28.29	57.23	4.25	6.80	0.00	0.26	31.47
DT18	25.04	44.25	6.11	11.55	0.00	0.45	37.65
DT19	31.46	56.28	5.04	8.10	0.00	0.35	30.24
DT20	31.46	56.28	5.04	8.10	0.00	0.35	30.24
DT21	31.46	56.28	5.04	8.10	0.00	0.35	30.24
BB05*	28.24	50.70	5.03	10.65	0.00	0.46	33.15
Existing Sensitive Receptors							
R1*	23.59	46.12	5.15	11.39	0.00	0.41	36.93
R2*	24.09	48.63	5.13	9.51	0.00	0.49	36.25
R3	24.09	48.63	5.13	9.51	0.00	0.49	36.25
R4	34.93	62.15	3.68	7.16	0.00	0.38	26.63
R5*	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R6*	32.85	53.96	7.65	9.36	0.00	0.44	28.59
R7*	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R8	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R9*	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R10*	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R11	28.24	50.70	5.03	10.65	0.00	0.46	33.15
R12	25.04	44.25	6.11	11.55	0.00	0.45	37.65
R13	25.04	44.25	6.11	11.55	0.00	0.45	37.65

R14	25.04	44.25	6.11	11.55	0.00	0.45	37.65
R15	19.61	35.58	7.50	11.21	0.00	0.43	45.28
R16	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R17	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R18	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R19	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R20	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R21	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R22	22.96	40.50	6.70	13.24	0.00	0.36	39.20
R23	22.96	40.50	6.70	13.24	0.00	0.36	39.20
R24	32.47	60.32	4.12	6.70	0.00	0.30	28.56
R25	21.58	41.34	5.96	10.89	0.00	0.34	41.47
R26	32.47	60.32	4.12	6.70	0.00	0.30	28.56
R27	32.47	60.32	4.12	6.70	0.00	0.30	28.56
R28	24.62	49.20	4.96	8.43	0.00	0.34	37.07
R29	28.29	57.23	4.25	6.80	0.00	0.26	31.47
R30	24.62	49.20	4.96	8.43	0.00	0.34	37.07
R31	24.62	49.20	4.96	8.43	0.00	0.34	37.07
R32	24.62	49.20	4.96	8.43	0.00	0.34	37.07
R33	21.62	44.17	5.33	8.45	0.00	0.36	41.70
R34*	27.64	39.63	7.62	15.14	0.05	0.83	36.72
R35*	27.64	39.63	7.62	15.14	0.05	0.83	36.72
R36	25.27	32.71	7.96	12.48	0.04	0.77	46.04
R37	25.27	32.71	7.96	12.48	0.04	0.77	46.04
R38	23.79	35.24	7.43	13.07	0.00	0.77	43.48
R39	24.24	39.12	7.10	12.07	0.00	0.64	41.06
R40	31.46	56.28	5.04	8.10	0.00	0.35	30.24
R41	31.46	56.28	5.04	8.10	0.00	0.35	30.24
R42	31.46	56.28	5.04	8.10	0.00	0.35	30.24
R43	31.46	56.28	5.04	8.10	0.00	0.35	30.24
R44	26.43	39.09	8.66	16.17	0.00	0.38	35.69
R45	31.93	56.51	5.20	7.86	0.00	0.39	30.04
R46	31.46	56.28	5.04	8.10	0.00	0.35	30.24
R47	23.79	35.24	7.43	13.07	0.00	0.77	43.48
R48	23.79	35.24	7.43	13.07	0.00	0.77	43.48
R49	24.24	39.12	7.10	12.07	0.00	0.64	41.06
R50	22.05	33.81	7.69	14.39	0.06	0.75	43.30
R51	22.05	33.81	7.69	14.39	0.06	0.75	43.30
R52	23.55	34.62	7.83	14.32	0.06	0.83	42.33
AERMOD Discrete Sensitive Receptors							
D1	23.55	34.62	7.83	14.32	0.06	0.83	42.33
D2	23.55	34.62	7.83	14.32	0.06	0.83	42.33
D3	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D4	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D5	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D6	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D7	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D8	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D9	24.24	39.12	7.10	12.07	0.00	0.64	41.06

D10	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D11	21.54	34.06	7.45	13.12	0.00	0.71	44.65
D12	21.54	34.06	7.45	13.12	0.00	0.71	44.65
D13	21.54	34.06	7.45	13.12	0.00	0.71	44.65
D14	23.55	34.62	7.83	14.32	0.06	0.83	42.33
D15	23.55	34.62	7.83	14.32	0.06	0.83	42.33
D16	23.79	35.24	7.43	13.07	0.00	0.77	43.48
D17	23.79	35.24	7.43	13.07	0.00	0.77	43.48
*Located within AQMA							

Table 6-4 shows that the major background source of NO_x at the monitoring and sensitive receptor locations, where sources have been identified is comprised of 'road sources'.

Table 6-4. Background Concentrations Used in Traffic Air Quality Modelling (µg/m³)

Tube Location/Receptor Location	2019		
	NO_2	NO_x	Source
Local Authority Monitoring Locations			
DT7	24.28	17.28	Defra
DT8	24.28	17.28	
DT9	24.28	17.28	
DT10	24.28	17.28	
DT11	22.38	16.15	
DT16	28.29	19.98	
DT17	28.29	19.98	
DT18	25.04	17.83	
DT19	31.46	21.78	
DT20	31.46	21.78	
DT21	31.46	21.78	
BB05*	28.24	19.82	
Existing Sensitive Receptors			
R1*	23.59	16.97	Defra
R2*	24.09	17.30	
R3	24.09	17.30	
R4	34.93	23.85	
R5*	28.24	19.82	
R6*	32.85	22.50	
R7*	28.24	19.82	
R8	28.24	19.82	
R9*	28.24	19.82	
R10*	28.24	19.82	
R11	28.24	19.82	
R12	25.04	17.83	
R13	25.04	17.83	
R14	25.04	17.83	
R15	19.61	14.37	
R16	26.43	18.59	
R17	26.43	18.59	
R18	26.43	18.59	
R19	26.43	18.59	

R20	26.43	18.59	
R21	26.43	18.59	
R22	22.96	16.52	
R23	22.96	16.52	
R24	32.47	22.47	
R25	21.58	15.67	
R26	32.47	22.47	
R27	32.47	22.47	
R28	24.62	17.66	
R29	28.29	19.98	
R30	24.62	17.66	
R31	24.62	17.66	
R32	24.62	17.66	
R33	21.62	15.73	
R34*	27.64	19.30	
R35*	27.64	19.30	
R36	25.27	17.82	
R37	25.27	17.82	
R38	23.79	16.98	
R39	24.24	17.30	
R40	31.46	21.78	
R41	31.46	21.78	
R42	31.46	21.78	
R43	31.46	21.78	
R44	26.43	18.59	
R45	31.93	22.03	
R46	31.46	21.78	
R47	23.79	16.98	
R48	23.79	16.98	
R49	24.24	17.30	
R50	22.05	15.90	
R51	22.05	15.90	
R52	23.55	16.83	
AERMOD Discrete Sensitive Receptors			
D1 – D3	22.05	15.90	Defra
D4 – D6	23.55	16.83	
D7 – D12	23.79	16.98	
D13	24.24	17.30	
D14	23.79	16.98	
D15 – D17	21.54	15.59	
Ecological Sensitive Receptors			
E1	-	23.65	Air Pollution Information System (APIS) Background Concentrations
E2 – E3	-	27.71	
E4 – E9	-	24.32	
E10 – E12	-	20.61	
E13 – E14	-	20.36	
E15 – E16	-	20.68	
E17 – E20	-	21.63	
E21 – E22	-	24.32	

E23	-	21.63	
E24*	-	30.89	
E25	-	28.32	
E26	-	28.55	
E27	-	29.63	
E28*	-	27.76	
E29*	-	28.32	
E30*- E31*	-	30.01	
*Located within AQMA			

6.4 MODEL VERIFICATION FOR TRAFFIC AIR QUALITY ASSESSMENT

Model verification involves the comparison of modelled data to monitored data in order to gain the best possible representation of current pollutant concentrations for the assessment years. The verification process is in general accordance with that contained in Section 7 of the TG16 guidance note and uses the most recently available diffusion tube monitoring data to best represent this.

The verification process consists of using the monitoring data and the published background air quality data in the UK National Air Quality Information Archive to calculate the road traffic contribution of NO_X at the monitoring locations. Outputs from the ADMS Roads model are provided as predicted road traffic contribution NO_X emissions. These are converted into predicted roadside contribution NO_2 exposure at the relevant receptor locations based on the updated approach to deriving NO_2 from NO_X for road traffic sources published in Local Air Quality Management TG16. The calculation was derived using the NO_x to NO_2 worksheet in the online LAQM tools website hosted by Defra. **Table 6-5** summarises the final model/monitored data correlation following the application of the model correction factor.

The monitored NO_2 value has been obtained from the Epping Forest District Council Air Quality Annual Status Report 2020.

Table 6-5. Comparison of Roadside Modelling & Monitoring Results for NO_2

Monitoring Site	NO_2 µg/m^3		
	Monitored NO_2	Modelled NO_2	Difference (%)
DT7	22.00	24.11	9.57
DT8	21.00	23.16	10.28
DT9	28.00	22.97	-17.98
DT10	28.00	22.50	-19.63
DT11	34.00	26.37	-22.45
DT16	26.00	28.92	11.25
DT17	26.00	27.24	4.77
DT18	24.00	22.60	-5.84
DT19	26.00	25.56	-1.69
DT20	30.00	33.44	11.48
DT21	28.00	27.48	-1.87
BB05*	57.00	58.15	2.02
*Located within AQMA			

The final model produced data at the monitoring locations to within 25% of the monitoring results at all of the verification points, as required by TG16 guidance.

The final verification model correlation coefficient (representing the model uncertainty) is 1.01. This was achieved by applying a model correction factor of 1.17 to roadside predicted NO_X concentrations before converting to NO_2. This figure demonstrates that the model predictions were in line with the road traffic emissions at the monitoring locations.

As there is no suitable PM_{10} or $PM_{2.5}$ monitoring data within the study area, it is not possible to perform a model verification for these pollutants. As such, the NO_2 adjustment factor has also been applied to the PM_{10} and $PM_{2.5}$ modelled results, in accordance with LAQM.TG(16).

Summary of Model Inputs

Table 6-6. Summary of ADMS Roads Model Inputs

Parameter	Description	Input Value
Surface Roughness	A setting to define the surface roughness of the model area based upon its location.	**1m** representing a typical surface roughness for **Cities and Woodlands** was used for the Site Data. With **1.5m** representing a typical surface roughness for **Large Urban Areas** was used for the Met. Measurement Site
Latitude	Allows the location of the model area to be set	United Kingdom = **51.5**
Monin-Obukhov Length	This allows a measure of the stability of the atmosphere within the model area to be specified depending upon its character.	Cities and Large Towns = **30m** was used for both the Site Data and Met. Measurement Site.
Elevation of Road	Allows the height of the road link above ground level to be specified.	All road links were set at ground level = **0m**.
Road Width	Allows the width of the road link to be specified.	Road width used depended on data obtained from OS map data for the specific road link
Topography	This enables complex terrain data to be included within the model in order to account for turbulence and plume spread effects of topography	No topographical information used
Time Varied Emissions	This enables daily, weekly or monthly variations in emissions to be applied to road sources	No time varied emissions used
Road Type	Allows the effect of different types of roads to be assessed.	**Urban (Not London)** settings were used for the relevant links
Road Speeds	Enables individual road speeds to be added for each road link	Based on national speed limits
Canyon Height	Allows the model to take account turbulent flow patterns occurring inside a street with relatively tall buildings on both sides, known as a “street canyon”.	No canyons used within the model
Road Source Emissions	Road source emission rates are calculated from traffic flow data using the in-built EFT database of traffic emission factors.	The **EFT** Version **10.1 (2020)** dataset was used.
Year	Predicted EFT emissions rates depend on the year of emission.	**2019** data for verification and baseline operational phase assessment **2022** data for the operational phase assessment.
Site Plans	**Source:** Cemetery Development Services	**Drawing Title:** Site and Building Location Plan | **Drawing No.** CDS_RCT_NHC_52 | **Date:** May 2019

6.5 ADMS MODELLING RESULTS FOR PLANNING APPLICATIONS

6.5.1 Traffic Assessment

The ADMS Model has predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at relevant receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

6.5.2 Assessment Scenarios

For the operational year of 2022, assessment of the effects of emissions from the proposed traffic associated with the scheme, has been undertaken using the Emissions Factor Toolkit (EFT) 2022 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors:

- 2019 Baseline = Existing baseline conditions;
- 2022 'Do Minimum' = 2022 Baseline Scenario + Committed Developments; and,
- 2022 'Do Something' = 2022 Baseline Scenario + Committed Developments + Proposed Development Flows.

Nitrogen Dioxide

Table 6-7 presents a summary of the predicted change in NO_2 concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6-7. Predicted Annual Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	20.49	19.56	19.56	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	20.22	19.45	19.45	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	22.71	21.26	21.26	<0.01
R4	63 Leven Drive, Waltham Cross	26.49	25.79	25.79	<0.01
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	28.72	26.44	26.44	<0.01
R6*	963 Hertford Road, Waltham Cross	27.40	26.03	26.03	<0.01
R7*	44 Arlington Crescent, Waltham Cross	36.07	31.67	31.67	<0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	21.42	20.99	20.99	<0.01
R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	25.68	24.10	24.10	<0.01
R10*	83 Queens Road, Waltham Cross	30.86	27.94	27.94	<0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	28.50	26.17	26.17	<0.01

R12	79 Fisher Close, Waltham Cross	22.84	21.52	21.53	0.01
R13	20 Grove Court, Waltham Abbey	23.57	22.02	22.03	0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	25.80	23.64	23.65	0.01
R15	91 Crooked Mile, Waltham Abbey	19.24	18.01	18.02	0.01
R16	62a Crooked Mile, Waltham Abbey	26.76	24.70	24.71	0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	24.95	23.36	23.37	0.01
R18	1 Monkswood Avenue, Waltham Abbey	24.98	23.40	23.41	0.01
R19	16a Sewardstone Road, Waltham Abbey	25.96	24.08	24.08	<0.01
R20	2 Farm Hill Road, Waltham Abbey	27.29	24.93	24.93	<0.01
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	23.04	21.80	21.80	<0.01
R22	3 Eastbrook Road, Waltham Abbey	24.40	22.25	22.25	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	19.98	19.02	19.02	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	30.16	27.98	27.98	<0.01
R25	2 Horseshoe Close, Waltham Abbey	18.76	17.90	17.90	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	26.55	25.40	25.40	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	36.24	32.43	32.43	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	19.08	18.68	18.68	<0.01
R29	2 Woodgreen Road, Waltham Abbey	24.31	23.09	23.09	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	26.12	23.75	23.76	0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	22.80	21.44	21.44	<0.01
R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	19.14	18.72	18.72	<0.01
R33	Old Keppers Lodge, Woodredon Hill, Epping	18.87	18.04	18.05	0.01
R34*	204 Kings Head Hill, London	25.79	24.06	24.07	0.01
R35*	43 Redwood Gardens, London	23.80	22.58	22.59	0.01
R36	1 Baden Drive	20.12	19.55	19.56	0.01
R37	Dunmain House, Sewardstone Road, London	21.70	20.77	20.79	0.02
R38	Amesbury Mead Farm, Sewardstone Road, London	18.72	18.29	18.30	0.01
R39	Maycroft, Sewardstone Road, London	19.97	19.32	19.34	0.02
R40	Chestnuts, Avey Lane, Waltham Abbey	28.53	26.92	26.96	0.04
R41	1-18 Burrows Close, Waltham Abbey	27.29	25.81	25.83	0.02
R42	30 Beechfield Walk, Waltham	27.41	25.88	25.88	<0.01

	Abbey				
R43	1 Beechfield Walk, Waltham Abbey	32.50	29.57	29.58	0.01
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	26.21	24.32	24.33	0.01
R45	14 Roman Way, Waltham Abbey	25.97	24.85	24.85	<0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	29.24	27.08	27.09	0.01
R47	6 Godwin Close, Sewardstone Road, London	20.32	19.51	19.55	0.04
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	20.04	19.31	19.38	0.07
R49	2 Hamlet Gate, Sewardstone Road, London	22.21	21.04	21.09	0.05
R50	Hideaway, Green Lane, Bury Road, London	16.23	16.14	16.14	<0.01
R51	Woodsprite, Green Lane, Bury Road, London	16.23	16.14	16.14	<0.01
R52	Parsons Croft, Gilwell Park, London	17.21	17.11	17.11	<0.01
D1	Woodsprite, Green Lane, Bury Road	16.23	16.14	16.14	<0.01
D2	Silver Timbers, Green Lane, Bury Road	16.23	16.14	16.14	<0.01
D3	Hideaway, Green Lane, Bury Road	16.23	16.14	16.14	<0.01
D4	Carrolls Farm, Bury Road	17.16	17.06	17.07	0.01
D5	Parsons Croft, Gilwell Park	17.21	17.11	17.11	<0.01
D6	Oliver's, Daws Hill	17.22	17.12	17.12	<0.01
D7	Woodlands Bungalow, Sewardstone Road	18.55	18.16	18.18	0.02
D8	White House, Sewardstone Road	18.40	18.04	18.05	0.01
D9	1 the Beeches, Sewardstone Road	18.34	18.01	18.02	0.01
D10	Chapelfield Nursery	17.78	17.58	17.58	<0.01
D11	Hillview, Sewardstone Road	19.44	18.84	18.86	0.02
D12	Netherhouse Farm	18.05	17.78	17.79	0.01
D13	Liran, Mott Street	18.07	17.87	17.88	0.01
D14	Cottage 2, Golden Row, Mott Street	17.53	17.38	17.39	0.01
D15	Lipitt's End, Mott Street	16.01	15.90	15.90	<0.01
D16	Pin-Hi, Lippitts Hill	15.92	15.83	15.83	<0.01
D17	1 Owl Park, Lippitts Hill	15.91	15.82	15.82	<0.01
Annual Mean AQO		**40 µg/m3**			
*Located within AQMA					

All modelled existing receptors are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios.

As indicated in **Table 6-7**, the highest predicted increase in the annual average exposure to NO_2 due to changes in traffic movements associated with the development is 0.07 µg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48).

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3.0. The outcomes of the assessment are summarised in **Table 6-8**.

Table 6-8. Significance of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	Change Due to Development (DS DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R5*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	<0.01	<0.01	0%	76-94% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	0.01	0.03	0%	≤75% of AQO	Negligible
R13	0.01	0.03	0%	≤75% of AQO	Negligible
R14	0.01	0.03	0%	≤75% of AQO	Negligible
R15	0.01	0.03	0%	≤75% of AQO	Negligible
R16	0.01	0.03	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	≤75% of AQO	Negligible
R18	0.01	0.03	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	<0.01	<0.01	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	≤75% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	76-94% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	0.01	0.03	0%	≤75% of AQO	Negligible
R31	<0.01	<0.01	0%	≤75% of AQO	Negligible
R32	<0.01	<0.01	0%	≤75% of AQO	Negligible
R33	0.01	0.03	0%	≤75% of AQO	Negligible
R34*	0.01	0.03	0%	≤75% of AQO	Negligible
R35*	0.01	0.03	0%	≤75% of AQO	Negligible
R36	0.01	0.03	0%	≤75% of AQO	Negligible
R37	0.02	0.05	0%	≤75% of AQO	Negligible
R38	0.01	0.03	0%	≤75% of AQO	Negligible
R39	0.02	0.05	0%	≤75% of AQO	Negligible

R40	0.04	0.10	0%	≤75% of AQO	Negligible
R41	0.02	0.05	0%	≤75% of AQO	Negligible
R42	<0.01	<0.01	0%	≤75% of AQO	Negligible
R43	0.01	0.03	0%	≤75% of AQO	Negligible
R44	0.01	0.03	0%	≤75% of AQO	Negligible
R45	<0.01	<0.01	0%	≤75% of AQO	Negligible
R46	0.01	0.03	0%	≤75% of AQO	Negligible
R47	0.04	0.10	0%	≤75% of AQO	Negligible
R48	0.07	0.18	0%	≤75% of AQO	Negligible
R49	0.05	0.13	0%	≤75% of AQO	Negligible
R50	<0.01	<0.01	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	0.01	0.03	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible
D7	0.02	0.05	0%	≤75% of AQO	Negligible
D8	0.01	0.03	0%	≤75% of AQO	Negligible
D9	0.01	0.03	0%	≤75% of AQO	Negligible
D10	<0.01	<0.01	0%	≤75% of AQO	Negligible
D11	0.02	0.05	0%	≤75% of AQO	Negligible
D12	0.01	0.03	0%	≤75% of AQO	Negligible
D13	0.01	0.03	0%	≤75% of AQO	Negligible
D14	0.01	0.03	0%	≤75% of AQO	Negligible
D15	<0.01	<0.01	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible

*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.

*Located within AQMA

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be 'negligible' at all modelled receptors. This is based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Figure 6-1 illustrates the long-term (annual average) nitrogen dioxide (NO_2) process contributions from the proposed development traffic.

Figure 6-2 and **Figure 6-3** illustrate the long-term (annual average) nitrogen dioxide (NO_2) predicted environmental concentrations at the Proposed Development site and surrounding the proposed development site respectively.

Figure 6-1 Long-Term (Annual Average) Nitrogen Dioxide (NO_2) Process Contribution from Proposed Development (µg/m³)

Figure 6-2 Long Term (Annual Average) Nitrogen Dioxide (NO_2) Predicted Environmental Concentration at Proposed Development Site (μg/m³)

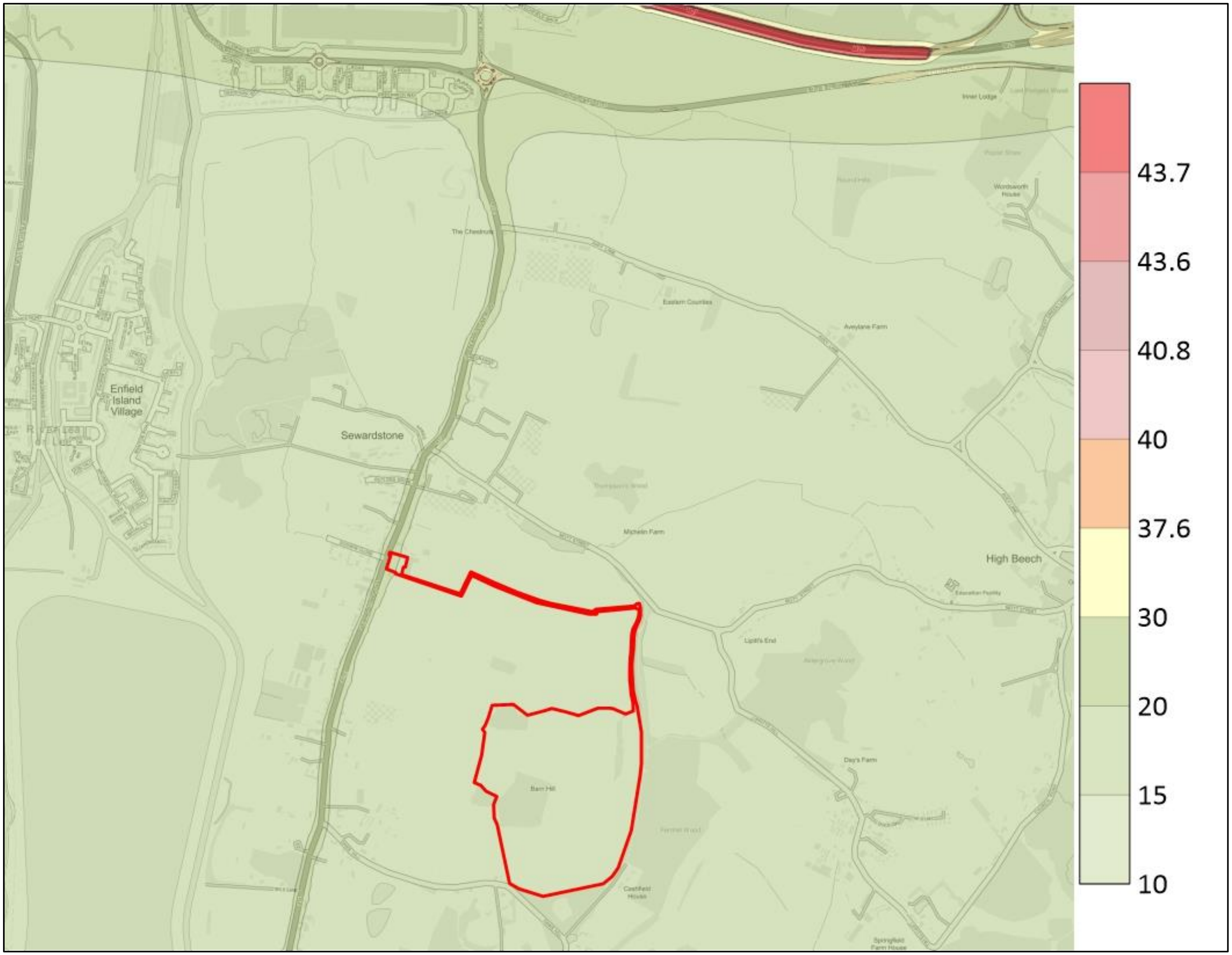
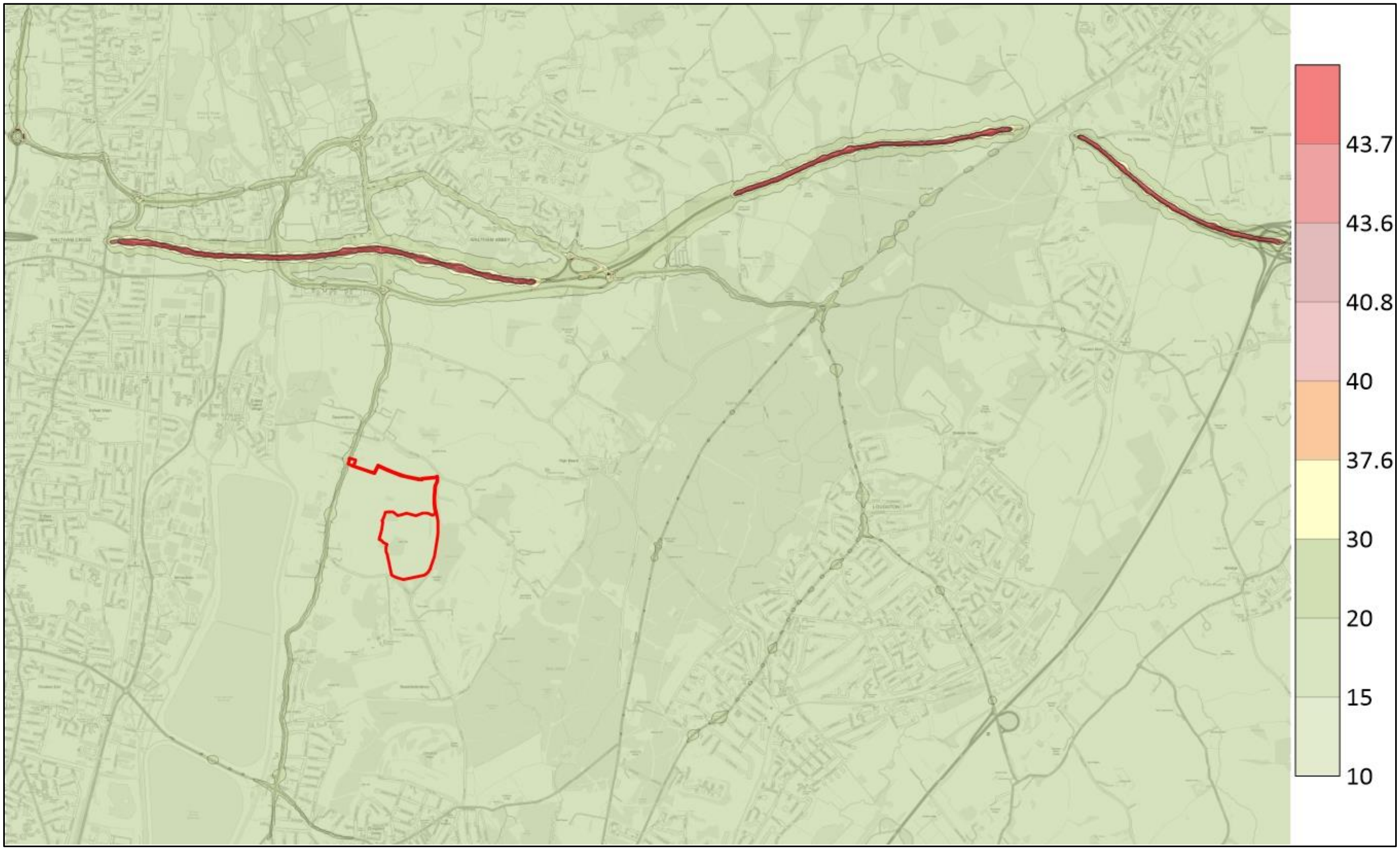


Figure 6-3 Long Term (Annual Average) Nitrogen Dioxide (NO_2) Predicted Environmental Concentration Across the Study Area (µg/m³)



Particulate Matter (PM_{10})

Table 6-9 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6-9. Predicted Annual Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	17.26	17.24	17.24	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	17.42	17.40	17.40	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	17.89	17.86	17.86	<0.01
R4	63 Leven Drive, Waltham Cross	18.40	18.39	18.39	<0.01
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	18.84	18.80	18.80	<0.01
R6*	963 Hertford Road, Waltham Cross	18.64	18.60	18.60	<0.01
R7*	44 Arlington Crescent, Waltham Cross	19.41	19.28	19.28	<0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	17.77	17.76	17.76	<0.01
R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	18.32	18.28	18.28	<0.01
R10*	83 Queens Road, Waltham Cross	19.12	19.07	19.07	<0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	18.74	18.69	18.69	<0.01
R12	79 Fisher Close, Waltham Cross	17.52	17.50	17.50	<0.01
R13	20 Grove Court, Waltham Abbey	17.48	17.45	17.46	<0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	17.70	17.66	17.66	<0.01
R15	91 Crooked Mile, Waltham Abbey	16.66	16.64	16.64	<0.01
R16	62a Crooked Mile, Waltham Abbey	17.64	17.60	17.60	<0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	17.38	17.35	17.35	<0.01
R18	1 Monkswood Avenue, Waltham Abbey	17.60	17.57	17.58	<0.01
R19	16a Sewardstone Road, Waltham Abbey	17.64	17.61	17.61	<0.01
R20	2 Farm Hill Road, Waltham Abbey	17.72	17.68	17.68	<0.01

R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	17.15	17.13	17.13	<0.01
R22	3 Eastbrook Road, Waltham Abbey	18.64	18.61	18.61	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	17.62	17.60	17.60	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	18.82	18.77	18.77	<0.01
R25	2 Horseshoe Close, Waltham Abbey	16.97	16.95	16.95	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	18.28	18.26	18.26	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	19.58	19.49	19.49	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	17.75	17.75	17.75	<0.01
R29	2 Woodgreen Road, Waltham Abbey	18.13	18.10	18.10	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	18.55	18.48	18.48	<0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	18.40	18.37	18.37	<0.01
R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	17.77	17.76	17.76	<0.01
R33	Old Keppers Lodge, Woodredon Hill, Epping	17.47	17.45	17.45	<0.01
R34*	204 Kings Head Hill, London	18.61	18.58	18.59	<0.01
R35*	43 Redwood Gardens, London	18.32	18.30	18.30	<0.01
R36	1 Baden Drive	16.46	16.46	16.46	<0.01
R37	Dunmain House, Sewardstone Road, London	16.80	16.79	16.80	0.01
R38	Amesbury Mead Farm, Sewardstone Road, London	16.61	16.60	16.61	<0.01
R39	Maycroft, Sewardstone Road, London	17.32	17.31	17.32	0.01
R40	Chestnuts, Avey Lane, Waltham Abbey	19.32	19.30	19.32	0.01
R41	1-18 Burrows Close, Waltham Abbey	18.69	18.66	18.66	<0.01
R42	30 Beechfield Walk, Waltham Abbey	18.64	18.61	18.61	<0.01
R43	1 Beechfield Walk, Waltham Abbey	19.21	19.13	19.13	<0.01
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	17.71	17.68	17.68	<0.01
R45	14 Roman Way, Waltham Abbey	18.04	18.02	18.02	<0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	18.90	18.85	18.86	<0.01
R47	6 Godwin Close, Sewardstone Road, London	16.95	16.94	16.95	0.01
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	16.89	16.88	16.90	0.02

R49	2 Hamlet Gate, Sewardstone Road, London	17.82	17.81	17.82	0.01
R50	Hideaway, Green Lane, Bury Road, London	15.84	15.84	15.84	<0.01
R51	Woodsprite, Green Lane, Bury Road, London	15.84	15.84	15.84	<0.01
R52	Parsons Croft, Gilwell Park, London	16.07	16.07	16.07	<0.01
D1	Woodsprite, Green Lane, Bury Road	15.84	15.84	15.84	<0.01
D2	Silver Timbers, Green Lane, Bury Road	15.84	15.84	15.84	<0.01
D3	Hideaway, Green Lane, Bury Road	15.84	15.84	15.84	<0.01
D4	Carrolls Farm, Bury Road	16.06	16.06	16.06	<0.01
D5	Parsons Croft, Gilwell Park	16.07	16.07	16.07	<0.01
D6	Oliver's, Daws Hill	16.07	16.07	16.07	<0.01
D7	Woodlands Bungalow, Sewardstone Road	16.57	16.57	16.57	<0.01
D8	White House, Sewardstone Road	16.53	16.53	16.53	<0.01
D9	1 the Beeches, Sewardstone Road	16.52	16.52	16.52	<0.01
D10	Chapelfield Nursery	16.40	16.40	16.40	<0.01
D11	Hillview, Sewardstone Road	16.76	16.75	16.76	0.01
D12	Netherhouse Farm	16.45	16.45	16.45	<0.01
D13	Liran, Mott Street	16.91	16.90	16.91	<0.01
D14	Cottage 2, Golden Row, Mott Street	16.34	16.33	16.33	<0.01
D15	Lipitt's End, Mott Street	15.94	15.94	15.94	<0.01
D16	Pin-Hi, Lippitts Hill	15.93	15.92	15.92	<0.01
D17	1 Owl Park, Lippitts Hill	15.92	15.92	15.92	<0.01
Annual Mean AQO		**40 µg/m3**			
*Located within AQMA					

All modelled existing receptors are predicted to be below the AQO for PM_{10} in both the 'do minimum' and 'do something' scenarios.

As indicated in **Table 6-9** the highest predicted increase in the annual average exposure to PM_{10} due to changes in traffic movements associated with the development is 0.02 µg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 6-10**.

Table 6-10. Significance of Effects at Key Receptors (PM_{10})

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	Change Due to Development (DS DM) (µg/m³)	Change due to Development (% of AQO)	% Change in Concentration Relative to AQO	% Annual Mean Concentration in Assessment Year	Impact Description
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R5*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	<0.01	0%	≤75% of AQO	Negligible
R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	<0.01	<0.01	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	≤75% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	≤75% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	<0.01	<0.01	0%	≤75% of AQO	Negligible
R31	<0.01	<0.01	0%	≤75% of AQO	Negligible
R32	<0.01	<0.01	0%	≤75% of AQO	Negligible
R33	<0.01	<0.01	0%	≤75% of AQO	Negligible
R34*	<0.01	0.01	0%	≤75% of AQO	Negligible
R35*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R36	<0.01	0.01	0%	≤75% of AQO	Negligible
R37	<0.01	0.01	0%	≤75% of AQO	Negligible
R38	<0.01	0.01	0%	≤75% of AQO	Negligible
R39	0.01	0.01	0%	≤75% of AQO	Negligible
R40	0.01	0.03	0%	≤75% of AQO	Negligible

R41	<0.01	0.01	0%	≤75% of AQO	Negligible
R42	<0.01	<0.01	0%	≤75% of AQO	Negligible
R43	<0.01	<0.01	0%	≤75% of AQO	Negligible
R44	<0.01	0.01	0%	≤75% of AQO	Negligible
R45	<0.01	<0.01	0%	≤75% of AQO	Negligible
R46	<0.01	0.01	0%	≤75% of AQO	Negligible
R47	0.01	0.02	0%	≤75% of AQO	Negligible
R48	0.02	0.04	0%	≤75% of AQO	Negligible
R49	0.01	0.03	0%	≤75% of AQO	Negligible
R50	<0.01	<0.01	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	<0.01	<0.01	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible
D7	<0.01	0.01	0%	≤75% of AQO	Negligible
D8	<0.01	0.01	0%	≤75% of AQO	Negligible
D9	<0.01	0.01	0%	≤75% of AQO	Negligible
D10	<0.01	<0.01	0%	≤75% of AQO	Negligible
D11	0.01	0.01	0%	≤75% of AQO	Negligible
D12	<0.01	0.01	0%	≤75% of AQO	Negligible
D13	<0.01	<0.01	0%	≤75% of AQO	Negligible
D14	<0.01	<0.01	0%	≤75% of AQO	Negligible
D15	<0.01	<0.01	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within AQMA					

The significance of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in Section 3.0. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be 'high'.

Particulate Matter ($PM_{2.5}$)

Table 6-11 presents a summary of the predicted change in annual mean $PM_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 6-11. Predicted Annual Average Concentrations of $PM_{2.5}$ at Receptor Locations

Receptor		$PM_{2.5}$ (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	11.51	11.48	11.48	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	11.44	11.42	11.42	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	11.71	11.67	11.67	<0.01
R4	63 Leven Drive, Waltham Cross	12.08	12.06	12.06	<0.01
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	12.37	12.32	12.32	<0.01
R6*	963 Hertford Road, Waltham Cross	12.20	12.16	12.16	<0.01
R7*	44 Arlington Crescent, Waltham Cross	12.84	12.70	12.70	<0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	11.73	11.72	11.72	<0.01
R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	12.08	12.04	12.04	<0.01
R10*	83 Queens Road, Waltham Cross	12.55	12.48	12.48	<0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	12.32	12.27	12.27	<0.01
R12	79 Fisher Close, Waltham Cross	11.55	11.52	11.52	<0.01
R13	20 Grove Court, Waltham Abbey	11.54	11.50	11.50	<0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	11.68	11.63	11.63	<0.01
R15	91 Crooked Mile, Waltham Abbey	10.88	10.85	10.85	<0.01
R16	62a Crooked Mile, Waltham Abbey	11.75	11.71	11.71	<0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	11.60	11.56	11.56	<0.01
R18	1 Monkswood Avenue, Waltham Abbey	11.72	11.68	11.68	<0.01

R19	16a Sewardstone Road, Waltham Abbey	11.75	11.71	11.71	<0.01
R20	2 Farm Hill Road, Waltham Abbey	11.81	11.75	11.75	<0.01
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	11.46	11.43	11.43	<0.01
R22	3 Eastbrook Road, Waltham Abbey	12.01	11.96	11.96	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	11.43	11.41	11.41	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	12.04	11.98	11.98	<0.01
R25	2 Horseshoe Close, Waltham Abbey	10.99	10.97	10.97	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	11.72	11.69	11.69	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	12.53	12.42	12.42	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	11.31	11.30	11.30	<0.01
R29	2 Woodgreen Road, Waltham Abbey	11.53	11.49	11.49	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	11.84	11.77	11.77	<0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	11.69	11.66	11.66	<0.01
R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	11.32	11.31	11.31	<0.01
R33	Old Keppers Lodge, Woodredon Hill, Epping	11.01	10.99	10.99	<0.01
R34*	204 Kings Head Hill, London	12.07	12.03	12.03	<0.01
R35*	43 Redwood Gardens, London	11.89	11.87	11.87	<0.01
R36	1 Baden Drive	10.99	10.98	10.98	<0.01
R37	Dunmain House, Sewardstone Road, London	11.19	11.17	11.17	<0.01
R38	Amesbury Mead Farm, Sewardstone Road, London	10.93	10.92	10.92	<0.01
R39	Maycroft, Sewardstone Road, London	11.22	11.21	11.21	<0.01
R40	Chestnuts, Avey Lane, Waltham Abbey	12.36	12.33	12.34	0.01
R41	1-18 Burrows Close, Waltham Abbey	12.02	11.98	11.99	<0.01
R42	30 Beechfield Walk, Waltham Abbey	12.01	11.97	11.97	<0.01
R43	1 Beechfield Walk, Waltham Abbey	12.40	12.31	12.31	<0.01
R44	12 Nobel Villas, Sewardstone Road,	11.80	11.76	11.76	<0.01

	Waltham Abbey				
R45	14 Roman Way, Waltham Abbey	11.82	11.79	11.79	<0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	12.15	12.10	12.10	<0.01
R47	6 Godwin Close, Sewardstone Road, London	11.12	11.11	11.11	0.01
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	11.09	11.07	11.08	0.01
R49	2 Hamlet Gate, Sewardstone Road, London	11.51	11.49	11.50	0.01
R50	Hideaway, Green Lane, Bury Road, London	10.53	10.52	10.52	<0.01
R51	Woodsprite, Green Lane, Bury Road, London	10.53	10.52	10.52	<0.01
R52	Parsons Croft, Gilwell Park, London	10.69	10.69	10.69	<0.01
D1	Woodsprite, Green Lane, Bury Road	10.53	10.52	10.52	<0.01
D2	Silver Timbers, Green Lane, Bury Road	10.53	10.52	10.52	<0.01
D3	Hideaway, Green Lane, Bury Road	10.53	10.52	10.52	<0.01
D4	Carrolls Farm, Bury Road	10.69	10.69	10.69	<0.01
D5	Parsons Croft, Gilwell Park	10.69	10.69	10.69	<0.01
D6	Oliver's, Daws Hill	10.69	10.69	10.69	<0.01
D7	Woodlands Bungalow, Sewardstone Road	10.90	10.90	10.90	<0.01
D8	White House, Sewardstone Road	10.88	10.88	10.88	<0.01
D9	1 the Beeches, Sewardstone Road	10.88	10.87	10.87	<0.01
D10	Chapelfield Nursery	10.81	10.80	10.80	<0.01
D11	Hillview, Sewardstone Road	11.01	11.00	11.00	<0.01
D12	Netherhouse Farm	10.84	10.83	10.83	<0.01
D13	Liran, Mott Street	10.99	10.98	10.98	<0.01
D14	Cottage 2, Golden Row, Mott Street	10.77	10.77	10.77	<0.01
D15	Lipitt's End, Mott Street	10.52	10.51	10.51	<0.01
D16	Pin-Hi, Lippitts Hill	10.51	10.51	10.51	<0.01
D17	1 Owl Park, Lippitts Hill	10.51	10.51	10.51	<0.01

*Located within AQMA

All modelled existing receptors are predicted to be below the AQO for $PM_{2.5}$ in both the 'do minimum' and 'do something' scenarios.

As indicated in **Table 6-11**, the highest predicted increase the annual average exposure to $PM_{2.5}$ due to changes in traffic movements associated with the development is 0.01 µg/m^3 at any existing receptor.

The impact description of changes in traffic flow associated with the development with respect to annual mean $PM_{2.5}$ exposure has been assessed with reference to the criteria in Section 3.0.The outcomes of the assessment are summarised in **Table 6-12**.

Table 6-12. Significance of Effects at Key Receptors ($PM_{2.5}$)

Impact Description of $PM_{2.5}$ Effects at Key Receptors					
Receptor	**Change Due to Development (DS DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R5*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	<0.01	0%	≤75% of AQO	Negligible
R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	<0.01	<0.01	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	≤75% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	≤75% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	<0.01	<0.01	0%	≤75% of AQO	Negligible
R31	<0.01	<0.01	0%	≤75% of AQO	Negligible
R32	<0.01	<0.01	0%	≤75% of AQO	Negligible
R33	<0.01	<0.01	0%	≤75% of AQO	Negligible
R34*	<0.01	0.01	0%	≤75% of AQO	Negligible
R35*	<0.01	<0.01	0%	≤75% of AQO	Negligible

R36	<0.01	0.01	0%	≤75% of AQO	Negligible
R37	<0.01	0.02	0%	≤75% of AQO	Negligible
R38	<0.01	0.01	0%	≤75% of AQO	Negligible
R39	<0.01	0.01	0%	≤75% of AQO	Negligible
R40	0.01	0.03	0%	≤75% of AQO	Negligible
R41	<0.01	0.01	0%	≤75% of AQO	Negligible
R42	<0.01	<0.01	0%	≤75% of AQO	Negligible
R43	<0.01	<0.01	0%	≤75% of AQO	Negligible
R44	<0.01	<0.01	0%	≤75% of AQO	Negligible
R45	<0.01	<0.01	0%	≤75% of AQO	Negligible
R46	<0.01	0.01	0%	≤75% of AQO	Negligible
R47	0.01	0.03	0%	≤75% of AQO	Negligible
R48	0.01	0.04	0%	≤75% of AQO	Negligible
R49	0.01	0.03	0%	≤75% of AQO	Negligible
R50	<0.01	<0.01	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	<0.01	<0.01	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible
D7	<0.01	<0.01	0%	≤75% of AQO	Negligible
D8	<0.01	<0.01	0%	≤75% of AQO	Negligible
D9	<0.01	<0.01	0%	≤75% of AQO	Negligible
D10	<0.01	<0.01	0%	≤75% of AQO	Negligible
D11	<0.01	<0.01	0%	≤75% of AQO	Negligible
D12	<0.01	<0.01	0%	≤75% of AQO	Negligible
D13	<0.01	<0.01	0%	≤75% of AQO	Negligible
D14	<0.01	<0.01	0%	≤75% of AQO	Negligible
D15	<0.01	<0.01	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within AQMA					

The significance of the effects of changes in traffic as a result of the proposed development, with respect to annual mean $PM_{2.5}$ exposure, for existing receptors, is determined to be ‘negligible’ based on the methodology outlined in Section 3.0. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be ‘high’.

7.0 ASSESSMENT OF TRAFFIC AIR QUALITY IMPACT ON ECOLOGICAL RECEPTORS FOR PLANNING APPLICATION

The 'Approach to Advising Competent Authorities on the Assessment of Road Traffic Emission under the Habitats Regulations (2018), produced by Natural England has been used for the completion of this assessment. This document covers the screening stage of the process based on road traffic emissions that may affect Special Areas of Conservation (SACs), candidate SACs, Special Protection Areas (SPAs), Sites of Community Importance (SCIs), potential SPAs, possible SACs, listed or proposed Ramsar sites and sites identified, or required, as compensatory measures for adverse effects on these European sites.

The guidance covers the identification of the risk of possible significant adverse effects on the above sites which could result in the failure to achieve its conservation objectives and would therefore require a further detailed assessment. If the risks which might result in the failure a sites conservation objective can be scoped out, a proposal will likely have no significant effects and a further assessment not required.

7.1 SCREENING REQUIREMENT

There are four stages at the screening stage of the Habitat Risk Assessment (HRA) to identify as to whether the road traffic emission associated with the proposed development are likely to have a significant effect on the sites mentioned above.

1. Is the proposed development likely to produce emissions that might pose a risk to the sites above?
    - All emission from road traffic sources associated with the proposed development and the distance to the sites above will be considered.
    - If the site does not fall within the distance criteria of 200m from road source, no further steps of the assessment are required.
2. Are the qualifying features of sites within 200m of a road and sensitive to air pollution?
    - Qualifying features of a site have been identified by reference to Natural England's formal advice on their Conservation Objectives, this includes a list of legally qualifying features. The qualifying sites have also been identified using (https://designatedsites.naturalengland.org.uk/)
    - Natural England and Highways England are in agreement that protected sites falling within 200 meters of the edge of a road affected by a proposed development with be considered further.
    - Where no qualifying features of a site are considered to be sensitive to a pollutant then no further assessment is required.
    - Where at least one of a site's features is known to be sensitive, further screening will be undertaken.
3. Will the identified sensitive qualifying site be exposed to emissions?
    - Qualifying sites are identified through APIS and Natural England's formal advice on their conservation objectives.

- Natural England's Designated Sites System Viewer ((https://designatedsites.naturalengland.org.uk/) will be used to determine the spatial location of individual features.

4. Where there is potential for emissions from road traffic associated with the proposed development to impact the identified sensitive feature, then the following will be required;
   - The predicted increase in traffic flows associated with the proposed development, or the predicted process contribution of the pollution benchmark.
   - An in-combination with emissions from surrounding road traffic proposed development,
   - An in-combination with emissions from surrounding non-road traffic proposed development,

The thresholds that determine whether a change as a result of the proposed development is likely to be significant are a change in AADT of 1,000 or more (200 or more HGV) or 1% of the critical load for emissions.

7.2 EPPING FOREST SAC

The screening assessment above has been undertaken although the proposed development is not producing additional traffic flows that are greater than the screening criteria of 1,000 AADT, 200 HGV or 1% of the critical load.

In the case of Epping Forest SAC, the background levels show the site is already exceeding relevant air quality benchmarks and the conservation objectives of the site are to "restore the concentrations and deposition of air pollutants to within benchmarks" Where the conservation objectives are to 'restore the concentrations and deposition of air pollutants to within benchmarks' (i.e. where the relevant benchmarks such as Critical Loads/Levels are already exceeded) they will be undermined by any proposals for which there is credible evidence that further emissions will compromise the ability of other national or local initiatives to reduce background levels.

The ADMS Model has predicted concentrations of NO_X, NH_3 and SO_2 at the identified ecological receptor locations adjacent to roads likely to be affected by the development, as summarised in the following tables. Only receptors close to roads where there is predicted to be a change in emissions have been assessed.

This section of the report presents the results of the modelling assessment at the Ecological Receptors identified within **Table 4-4**.

Assessment Scenarios

For the operational year of 2022, assessment of the effects of emissions from the proposed traffic associated with the scheme has been undertaken using the EFT 2022 emissions rates which take into account of the rate of reduction in emission from road vehicles into the future with the following factors

- 2019 Baseline = Existing Baseline Conditions;
- 2022 "Do Minimum" = Baseline Conditions; and,
- 2022 "Do Something" = Baseline Conditions + Proposed Development Flows.

7.2.1 Nitrogen Oxide (NO_x) – Traffic Air Quality Assessment

Table 7-1 presents a summary of the predicted change in NO_X concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled 'do minimum' and 'do something' scenarios.

Table 7-2. Modelled NO_x Concentrations at Ecologically Sensitive Receptors

Receptor ID	Ecological Receptor	Predicted Maximum Annual Mean Concentration (µg/m^3)			
		Baseline 2019 NO_x	Do Minimum 2022 NO_x	Do Something 2022 NO_x	Development Contribution NO_x
E1	Epping Forest SSSI & SAC	25.10	24.70	24.70	<0.01
E2	Epping Forest SSSI & SAC	40.43	37.16	37.16	0.01
E3	Epping Forest SSSI & SAC	42.80	39.02	39.02	0.01
E4	Epping Forest SSSI & SAC	35.29	32.46	32.47	0.01
E5	Epping Forest SSSI & SAC	27.87	26.93	26.93	<0.01
E6	Epping Forest SSSI & SAC	38.07	34.37	34.37	0.01
E7	Epping Forest SSSI & SAC	45.64	39.95	39.96	0.01
E8	Epping Forest SSSI & SAC	44.21	38.92	38.93	0.01
E9	Epping Forest SSSI & SAC	38.20	34.57	34.58	<0.01
E10	Epping Forest SSSI & SAC	22.47	21.97	21.97	<0.01
E11	Epping Forest SSSI & SAC	22.37	21.89	21.89	<0.01
E12	Epping Forest SSSI & SAC	22.23	21.78	21.78	<0.01
E13	Epping Forest SSSI & SAC	24.04	23.09	23.10	<0.01
E14	Epping Forest SSSI & SAC	23.70	22.85	22.85	<0.01
E15	Epping Forest SSSI & SAC	21.73	21.44	21.44	<0.01
E16	Epping Forest SSSI & SAC	21.90	21.57	21.57	<0.01
E17	Epping Forest SSSI & SAC	23.80	23.24	23.24	<0.01
E18	Epping Forest SSSI & SAC	23.49	23.00	23.00	<0.01
E19	Epping Forest SSSI & SAC	23.17	22.76	22.76	<0.01
E20	Epping Forest SSSI & SAC	22.95	22.60	22.60	<0.01
E21	Epping Forest SSSI & SAC	26.28	25.76	25.76	<0.01
E22	Epping Forest SSSI & SAC	26.15	25.66	25.66	<0.01
E23	Epping Forest SSSI & SAC	23.05	22.67	22.67	<0.01
E24*	Epping Forest SSSI & SAC	31.74	31.51	31.51	<0.01
E25	Epping Forest SSSI & SAC	38.40	35.99	36.03	0.04
E26	Cornmill Stream & Old River Lea SSSI	36.76	34.63	34.64	0.01
E27	Cornmill Stream & Old River Lea SSSI	40.75	37.92	37.94	0.01
E28*	Chingford Reservoirs (SSSI)	28.45	28.26	28.26	<0.01
E29*	Chingford Reservoirs (SSSI)	29.18	28.96	28.97	<0.01
E30*	Chingford Reservoirs (SSSI)	30.95	30.71	30.72	<0.01
E31*	Chingford Reservoirs (SSSI)	31.51	31.11	31.12	<0.01
A1 – 4m	HRA SAC Worst Case Receptor	32.62	30.54	30.54	<0.01
A2 – 1m	HRA SAC Worst Case Receptor	30.71	28.20	28.20	<0.01

A3 – 1m	HRA SAC Worst Case Receptor	36.45	33.39	33.39	<0.01
B1 – 1m	HRA SAC Worst Case Receptor	29.74	28.36	28.36	<0.01
B2 – 200m	HRA SAC Worst Case Receptor	22.64	22.09	22.09	<0.01
C1 – 1m	HRA SAC Worst Case Receptor	39.26	35.57	35.57	<0.01
C2 – 1m	HRA SAC Worst Case Receptor	31.29	28.89	28.90	<0.01
D1 – 200m	HRA SAC Worst Case Receptor	36.01	33.29	33.29	<0.01
D2 – 1m	HRA SAC Worst Case Receptor	32.80	30.80	30.81	<0.01
E1 – 10m	HRA SAC Worst Case Receptor	38.26	34.66	34.67	0.01
E2 – 1m	HRA SAC Worst Case Receptor	41.98	37.44	37.45	0.01
F – 200m	HRA SAC Worst Case Receptor	26.75	26.26	26.26	<0.01
H – 150m	HRA SAC Worst Case Receptor	30.56	28.55	28.55	<0.01
I – 1m	HRA SAC Worst Case Receptor	32.47	29.99	29.99	<0.01
J – 200m	HRA SAC Worst Case Receptor	22.66	22.47	22.47	<0.01
K – 125m	HRA SAC Worst Case Receptor	33.59	31.25	31.25	<0.01
L – 125m	HRA SAC Worst Case Receptor	23.05	22.77	22.77	<0.01
M – 175m	HRA SAC Worst Case Receptor	27.05	26.20	26.21	<0.01
N – 150m	HRA SAC Worst Case Receptor	24.82	24.48	24.48	<0.01
O – 2.5m	HRA SAC Worst Case Receptor	40.37	37.13	37.14	0.01
P – 1m	HRA SAC Worst Case Receptor	54.75	46.67	46.68	0.01
Critical Load					
*Located within AQMA					

As indicated in **Table 7-2**, the highest predicted increase in the annual average exposure to NO_X at any ecological receptor due to changes in traffic movements associated with the development is 0.04 µg/m^3 at Epping Forest SSSI & SAC (E25). This is below the 0.40 µg/m^3 development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020 and as such, the impact at Epping Forest is considered to be negligible.

7.2.2 Sulphur Dioxide (SO_2) – Traffic Air Quality Assessment

The pollutant sources identified as a result of the development from vehicles which are not a high source of Sulphur Dioxide (SO_2) emissions. For completeness, modelling of SO_2 at the identified sensitive ecological receptors has been completed and is included in Table 7.2.

Emissions factors have been based on the National Air Emissions Inventory data. Background concentrations have been sourced from the APIS website.

Table 7-3. Predicted Annual Average Concentrations of SO_2 at Ecological Receptor Locations

Receptor ID	Ecological Receptor	Predicted Maximum Annual Mean Concentration (µg/m^3)			
		Baseline 2019 SO_2	Do Minimum 2022 SO_2	Do Something 2022 SO_2	Development Contribution SO_2
E1	Epping Forest SSSI & SAC	1.130009	1.130009	1.130009	<0.00001
E2	Epping Forest SSSI & SAC	1.130081	1.130083	1.130083	<0.00001
E3	Epping Forest SSSI & SAC	1.130097	1.130100	1.130100	<0.00001
E4	Epping Forest SSSI & SAC	1.130075	1.130076	1.130077	<0.00001
E5	Epping Forest SSSI & SAC	1.130023	1.130024	1.130024	<0.00001
E6	Epping Forest SSSI & SAC	1.130065	1.130067	1.130067	<0.00001
E7	Epping Forest SSSI & SAC	1.130091	1.130093	1.130093	<0.00001
E8	Epping Forest SSSI & SAC	1.130085	1.130087	1.130087	<0.00001
E9	Epping Forest SSSI & SAC	1.130061	1.130062	1.130062	<0.00001
E10	Epping Forest SSSI & SAC	1.130012	1.130012	1.130012	<0.00001
E11	Epping Forest SSSI & SAC	1.130011	1.130012	1.130012	<0.00001
E12	Epping Forest SSSI & SAC	1.130011	1.130011	1.130011	<0.00001
E13	Epping Forest SSSI & SAC	1.130023	1.130023	1.130023	<0.00001
E14	Epping Forest SSSI & SAC	1.130020	1.130021	1.130021	<0.00001
E15	Epping Forest SSSI & SAC	1.130007	1.130007	1.130007	<0.00001
E16	Epping Forest SSSI & SAC	1.130008	1.130008	1.130008	<0.00001
E17	Epping Forest SSSI & SAC	1.130013	1.130014	1.130014	<0.00001
E18	Epping Forest SSSI & SAC	1.130011	1.130012	1.130012	<0.00001
E19	Epping Forest SSSI & SAC	1.130010	1.130010	1.130010	<0.00001
E20	Epping Forest SSSI & SAC	1.130008	1.130008	1.130008	<0.00001
E21	Epping Forest SSSI & SAC	1.130012	1.130013	1.130013	<0.00001
E22	Epping Forest SSSI & SAC	1.130011	1.130012	1.130012	<0.00001
E23	Epping Forest SSSI & SAC	1.130009	1.130009	1.130009	<0.00001
E24*	Epping Forest SSSI & SAC	1.820005	1.820005	1.820005	<0.00001
E25	Epping Forest SSSI & SAC	1.560059	1.560060	1.560060	<0.00001
E26	Cornmill Stream & Old River Lea SSSI	1.100039	1.100040	1.100040	<0.00001
E27	Cornmill Stream & Old River Lea SSSI	1.100052	1.100053	1.100053	<0.00001
E28*	Chingford Reservoirs (SSSI)	1.560004	1.560004	1.560005	<0.00001
E29*	Chingford Reservoirs (SSSI)	1.560005	1.560005	1.560006	<0.00001
E30*	Chingford Reservoirs (SSSI)	1.560006	1.560006	1.560006	<0.00001
E31*	Chingford Reservoirs (SSSI)	1.560010	1.560010	1.560010	<0.00001
A1 – 4m	HRA SAC Worst Case Receptor	1.130049	1.130050	1.130050	<0.00001
A2 – 1m	HRA SAC Worst Case Receptor	1.130060	1.130062	1.130062	<0.00001
A3 – 1m	HRA SAC Worst Case Receptor	1.000074	1.000076	1.000076	<0.00001
B1 – 1m	HRA SAC Worst Case	1.130032	1.130032	1.130032	<0.00001

	Receptor				
B2 – 200m	HRA SAC Worst Case Receptor	1.130013	1.130013	1.130013	<0.00001
C1 – 1m	HRA SAC Worst Case Receptor	1.130089	1.130091	1.130091	<0.00001
C2 – 1m	HRA SAC Worst Case Receptor	1.130058	1.130059	1.130059	<0.00001
D1 – 200m	HRA SAC Worst Case Receptor	1.130066	1.130068	1.130068	<0.00001
D2 – 1m	HRA SAC Worst Case Receptor	1.130048	1.130049	1.130049	<0.00001
E1 – 10m	HRA SAC Worst Case Receptor	1.130095	1.130097	1.130097	<0.00001
E2 – 1m	HRA SAC Worst Case Receptor	1.130120	1.130123	1.130123	<0.00001
F – 200m	HRA SAC Worst Case Receptor	1.000012	1.000012	1.000012	<0.00001
H – 150m	HRA SAC Worst Case Receptor	1.130048	1.130049	1.130049	<0.00001
I – 1m	HRA SAC Worst Case Receptor	1.130045	1.130046	1.130046	<0.00001
J – 200m	HRA SAC Worst Case Receptor	1.130004	1.130004	1.130004	<0.00001
K – 125m	HRA SAC Worst Case Receptor	1.130056	1.130058	1.130058	<0.00001
L – 125m	HRA SAC Worst Case Receptor	1.130006	1.130007	1.130007	<0.00001
M – 175m	HRA SAC Worst Case Receptor	1.130021	1.130022	1.130022	<0.00001
N – 150m	HRA SAC Worst Case Receptor	1.130008	1.130008	1.130008	<0.00001
O – 2.5m	HRA SAC Worst Case Receptor	1.130079	1.130081	1.130081	<0.00001
P – 1m	HRA SAC Worst Case Receptor	1.130128	1.130132	1.130132	<0.00001
Critical Load					
*Located within AQMA					

7.2.3 Ammonia (NH_3) – Traffic Air Quality Assessment

The pollutant sources identified as a result of the development from vehicles which are not a high source of ammonia (NH_3) emissions. For completeness, modelling of NH_3 at the identified sensitive ecological receptors has been completed and is included in Table 7.3.

Emissions factors have been based on the National Air Emissions Inventory data. Background concentrations have been sourced from the APIS website.

Table 7-4. Predicted Annual Average Concentrations of NH_3 at Ecological Receptor Locations

Receptor ID	Ecological Receptor	Predicted Maximum Annual Mean Concentration (µg/m3)			
		Baseline 2019 NH_3	Do Minimum 2022 NH_3	Do Something 2022 NH_3	Development Contribution NH_3
E1	Epping Forest SSSI & SAC	1.610033	1.6100333	1.6100334	<0.000001
E2	Epping Forest SSSI & SAC	1.610339	1.610346	1.610347	<0.000001
E3	Epping Forest SSSI & SAC	1.610422	1.610432	1.610432	<0.000001
E4	Epping Forest SSSI & SAC	1.610311	1.610319	1.610319	<0.000001
E5	Epping Forest SSSI & SAC	1.610094	1.610096	1.610096	<0.000001
E6	Epping Forest SSSI & SAC	1.610273	1.610279	1.610279	<0.000001
E7	Epping Forest SSSI & SAC	1.610392	1.610401	1.610401	<0.000001
E8	Epping Forest SSSI & SAC	1.610366	1.610375	1.610375	<0.000001
E9	Epping Forest SSSI & SAC	1.610267	1.610273	1.610273	<0.000001
E10	Epping Forest SSSI & SAC	1.610046	1.610047	1.610047	<0.000001
E11	Epping Forest SSSI & SAC	1.610044	1.610045	1.610045	<0.000001
E12	Epping Forest SSSI & SAC	1.61004	1.610041	1.610041	<0.000001
E13	Epping Forest SSSI & SAC	1.610097	1.610099	1.610099	<0.000001
E14	Epping Forest SSSI & SAC	1.610088	1.61009	1.61009	<0.000001
E15	Epping Forest SSSI & SAC	1.610026	1.610026	1.610026	<0.000001
E16	Epping Forest SSSI & SAC	1.61003	1.610031	1.610031	<0.000001
E17	Epping Forest SSSI & SAC	1.610055	1.610057	1.610057	<0.000001
E18	Epping Forest SSSI & SAC	1.610047	1.610048	1.610048	<0.000001
E19	Epping Forest SSSI & SAC	1.610038	1.610039	1.610039	<0.000001
E20	Epping Forest SSSI & SAC	1.610033	1.610033	1.610033	<0.000001
E21	Epping Forest SSSI & SAC	1.610049	1.61005	1.61005	<0.000001
E22	Epping Forest SSSI & SAC	1.610045	1.610046	1.610046	<0.000001
E23	Epping Forest SSSI & SAC	1.610035	1.610035	1.610035	<0.000001
E24*	Epping Forest SSSI & SAC	4.400021	4.400021	4.400021	<0.000001
E25	Epping Forest SSSI & SAC	1.950274	1.950281	1.950282	0.000002
E26	Cornmill Stream & Old River Lea SSSI	1.830167	1.83017	1.830171	<0.000001
E27	Cornmill Stream & Old River Lea SSSI	1.830226	1.830231	1.830232	<0.000001
E28*	Chingford Reservoirs (SSSI)	1.950017	1.950017	1.950017	<0.000001
E29*	Chingford Reservoirs (SSSI)	1.950023	1.950024	1.950024	<0.000001
E30*	Chingford Reservoirs (SSSI)	1.950025	1.950025	1.950025	<0.000001
E31*	Chingford Reservoirs (SSSI)	1.950041	1.950042	1.950042	<0.000001
A1 – 4m	HRA SAC Worst Case Receptor	1.610216	1.610221	1.610221	<0.000001
A2 – 1m	HRA SAC Worst Case Receptor	1.610269	1.610275	1.610275	<0.000001
A3 – 1m	HRA SAC Worst Case Receptor	1.700297	1.700303	1.700303	<0.000001
B1 – 1m	HRA SAC Worst Case Receptor	1.610138	1.610141	1.610141	<0.000001
B2 – 200m	HRA SAC Worst Case Receptor	1.61005	1.610051	1.610051	<0.000001
C1 – 1m	HRA SAC Worst Case	1.610397	1.610407	1.610407	<0.000001

	Receptor				
C2 – 1m	HRA SAC Worst Case Receptor	1.610256	1.610263	1.610263	<0.000001
D1 – 200m	HRA SAC Worst Case Receptor	1.610319	1.610327	1.610327	<0.000001
D2 – 1m	HRA SAC Worst Case Receptor	1.610231	1.610236	1.610236	<0.000001
E1 – 10m	HRA SAC Worst Case Receptor	1.610397	1.610407	1.610407	<0.000001
E2 – 1m	HRA SAC Worst Case Receptor	1.610504	1.610516	1.610517	<0.000001
F – 200m	HRA SAC Worst Case Receptor	1.700042	1.700043	1.700043	<0.000001
H – 150m	HRA SAC Worst Case Receptor	1.610237	1.610242	1.610242	<0.000001
I – 1m	HRA SAC Worst Case Receptor	1.610223	1.610228	1.610228	<0.000001
J – 200m	HRA SAC Worst Case Receptor	1.610018	1.610018	1.610018	<0.000001
K – 125m	HRA SAC Worst Case Receptor	1.610279	1.610285	1.610285	<0.000001
L – 125m	HRA SAC Worst Case Receptor	1.610028	1.610028	1.610028	<0.000001
M – 175m	HRA SAC Worst Case Receptor	1.610103	1.610105	1.610105	<0.000001
N – 150m	HRA SAC Worst Case Receptor	1.610036	1.610037	1.610037	<0.000001
O – 2.5m	HRA SAC Worst Case Receptor	1.610337	1.610344	1.610344	<0.000001
P – 1m	HRA SAC Worst Case Receptor	1.610548	1.610564	1.610564	<0.000001
Critical Load					
*Located within AQMA					

As shown above, for both NOx, NH_3 and SO_2 it can be ascertained that, should the plan or project go ahead, there will be no adverse effect from it on the site's integrity so that the site's conservation objectives will not be undermined.

8.0 MITIGATION AND AIR POLLUTION MITIGATION STRATIGY FOR PLANING APPLICATION

8.1 CONSTRUCTION PHASE

The dust risk categories have been determined in Section 5 for each of the four construction activities. The assessment has determined that the potential impact significance of dust emissions associated with the construction phase of the proposed development is 'medium risk' at the worst affected receptors.

Using the methodology described in Appendix A, appropriate site-specific mitigation measures associated with the determined level of risk can be found in Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction. The mitigation measures have been divided into general measures applicable to all sites and measures applicable specifically to demolition, earthworks, construction and trackout. They are categorised into 'highly recommended' and 'desirable' measures.

The mitigation measures for the proposed development are detailed in Table 8.1 and 8.2 below:

Table 8-1. IAQM Guidance on the Assessment of Dust from Demolition and Construction 'Highly Recommended' Mitigation Measures.

Communications
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust Management
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
Make the complaints log available to the local authority when asked.
Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the logbook.
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.
Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.
Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period
Avoid site runoff of water or mud.
Keep site fencing, barriers and scaffolding clean using wet methods.
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
Cover, seed or fence stockpiles to prevent wind whipping.
Ensure all vehicles switch off engines when stationary - no idling vehicles.
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.

Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
Use enclosed chutes and conveyors and covered skips
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods
Avoid bonfires and burning of waste materials.
Demolition
Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
Avoid explosive blasting, using appropriate manual or mechanical alternatives.
Bag and remove any biological debris or damp down such material before demolition.
Construction
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
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.
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
Record all inspections of haul routes and any subsequent action in a site logbook.
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
Access gates to be located at least 10m from receptors where possible.

Table 8-2. IAQM Guidance on the Assessment of Dust from Demolition and Construction 'Desirable' Mitigation Measures

Construction
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.
Display the head or regional office contact information
Dust Management
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate)
Earthworks

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

8.2 OPERATING PHASE

The policy in Epping Forest Interim Air Pollution Mitigation Strategy requires the provision of electric vehicle charging points in all new developments regardless of their proposed use which include the provision of new parking spaces has two benefits:

- it ensures that developments can support the growth in electric vehicles without the need to retrofit such provision in the future; and
- it provides confidence for people who have not purchased electric vehicles that they can do so because they can access the necessary infrastructure now.

As the development proposals will have new parking spaces, Sewardstone Land Ltd as a developer, are aware that the development will require a number of electric vehicle charging points, and are willing to discuss and agree the appropriate level with the local planning authority.

If any tree, shrub or hedge within the development site is removed, uprooted or destroyed, dies, or becomes severely damaged or diseased during development activities or within 3 years of the completion of the development, another tree, shrub or hedge of the same size and species shall be planted within 3 months at the same place, unless the Local Planning Authority gives its written consent to any variation. If within a period of five years from the date of planting any replacement tree, shrub or hedge is removed, uprooted or destroyed, or dies or becomes seriously damaged or defective another tree, shrub or hedge of the same species and size as that originally planted shall, within 3 months, be planted at the same place. After the completion of the development, trees shown on the site layout plan should be planted accordingly.

9.0 AIR QUALITY ASSESSMENT FROM THE OPERATION OF CREMATORS AND D1 CALCULATIONS FOR PERMIT APPLICATION

The air quality assessment presented in this chapter has been undertaken to determine whether the impacts from the emissions from the operations of an electric cremator meet the required air quality standards (AQSs), AQOs, or air quality environmental assessment limits (EALs) for the protection of human health and for the protection of vegetation and ecosystems.

The major assessment includes:

- Baseline evaluation for cremator emissions;
- Identification of receptors, including ecological receptors;
- Using traffic air quality modelling results as a baseline concentration to produce a cumulative impact assessment;
- D1 – discharge stack heights calculations;
- Assessment of potential air quality impacts from the operation of the electric cremator; and
- Assessment of impact on the ecological receptors using "IAQM's guide to the assessment of air quality impacts on designated nature conservation sites".

9.1 BASELINE CONCENTRATIONS FOR THE ASSESSMENT OF THE ELECTRIC CREMATOR EMISSIONS

"*Tetra Tech Response (2)"* in Section 1.2.4 details additional diffusion tubes which have been installed to monitor the baseline NO_2 concentrations conditions adjacent to the proposed development site. The monitoring for a 6-month period was completed in May 2022 and the results reported to the Council accordingly.

Chapter 4 has discussed Council's continuous and non-continuous monitoring information for NO_2.

Defra Published Background Mapped Data/Concentrations

Background pollutant concentration data on a 1km x 1km spatial resolution is provided by the UK National Air Quality Archive[1] and is routinely used to support LAQM and Air Quality Assessments where local pollutant monitoring has not been undertaken.

Background concentrations as used within the prediction calculations were referenced from the UK National Air Quality Information Archive database based on the National Grid Co-ordinates of 1 x 1 km grid squares nearest to the site. Defra issued revised 2018 based background maps for SO_2, and CO which incorporate updates to the

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1 www.airquality.co.uk.

input data used for modelling. The updated mapped background concentrations adjacent to the site are summarised in **Table 9-1** below.

Table 9-1. Predicted Background Concentrations

UK NGR (m)		2020 Predicted Background Concentration (µg/m³)	
X	Y	SO_2	CO
538500	196500	4.17	174.1

Table 9-1 indicates that there were no background exceedances of the relevant AQOs within the vicinity of the facility during 2020.

9.1.1 Baseline Concentrations of NO_2, PM_{10} and $PM_{2.5}$ Inclusive of Contributions from Traffic Emissions

In the assessment of the air quality impacts from the operations of an electric cremator, the baseline concentrations of NO_2, PM_{10} and $PM_{2.5}$ have been derived from the predicted pollutant levels from the ADMS Roads modelling as discussed in Chapter 6. The background concentrations from a theoretical scenario of assuming "*no reduction in the UK fleet emission over time*" have been used to produce a worst-case assessment and those background concentrations used in this assessment are provided in Appendix C.

9.1.2 Air Quality Monitoring for Mercury and HCl

Heavy Metal - Hg

Monitoring of heavy metals is undertaken by DEFRA at a number of urban and industrial sites throughout the UK. The closest monitoring location to the proposed development is 'London Cromwell Road 2'. The monitoring data from this site for 2013 is included in **Table 9-2**.

Table 9-2. Monitored Background Data for Hg, 2013

Location	Average Value (ng/m³)	Minimum Value (ng/m³)	Maximum Value (ng/m³)	Remarks
London Cromwell Road 2	1.587	8.286	2.904	A total of 13 measurements available in 2013

Acid Gases

Concentrations of HCl are measured throughout the UK as part of the Nitric Acid Monitoring Network. The closest site to the development is 'London Cromwell Road 2'. Monitoring results for 2015, the most recent year with data available, is detailed within **Table 9-3**.

Table 9-3. Monitored Background Data for Hydrogen Chloride (HCl), 2015

Location	Average Value (ng/m^3)	Minimum Value (ng/m^3)	Maximum Value (ng/m^3)	Remarks
London Cromwell Road 2	<0.020	<0.020	<0.020	A total of 1 measurement available in 2015

Sulphur Dioxide

Concentrations of Gaseous sulphur dioxide are measured throughout the UK as part of the Nitric Acid Monitoring Network. The closest site to the development is 'London Cromwell Road 2'. Monitoring results for 2016, the most recent year with data available, is detailed within **Table 9-4**.

Table 9-4. Monitored Background Data for Gaseous Sulphur Dioxide, 2016

Location	Average Value (ng/m^3)	Minimum Value (ng/m^3)	Maximum Value (ng/m^3)	Remarks
London Cromwell Road 2	0.1	0.52	0.243	A total of 1measurement available in 2016

The predicted background data from Background Pollutant Mapping have been used to produce a worst-case assessment.

Benzene Monitoring

Benzene background data was taken from UK Air's 'modelled background pollution data'. The benzene background concentration for 2023 is summarised in **Table 9-5**.

Table 9-5. UK Air Benzene Background Concentration

UK NGR (m)		2023 Modelled Background Concentration for Benzene (µg/m^3)
X	Y	
538368	175500	0.13

Table 9-5 indicates that there were no background exceedances of the relevant AQOs within the vicinity of the proposed development site during 2023.

9.2 DETAILED DISPERSION MODELLING METHODOLOGY FOR PERMIT APPLICATION

In order to consider the air quality impacts of the operations on the local air quality, a quantitative assessment using the third generation Breeze AERMOD dispersion model has been undertaken. AERMOD is a development from the ISC3 dispersion model and incorporates improved dispersion algorithms and pre-processors to integrate the impact of meteorology and topography within the modelling output.

The model uses hourly meteorological data to define conditions for plume rise, transport, diffusion and deposition. It estimates the concentration for each source and receptor combination for each hour of input meteorology and calculates user-selected short-term averages.

9.2.1 Modelling Parameter and Averaging Period

The dispersion modelling has assessed cumulative impact of emissions from the operations taking into consideration of the operation of the proposed installation.

The same averaging period should be used for comparison of emissions against environmental standards. For example, most long-term standards are expressed as an annual mean and many short-term standards as an hourly mean. Note that there are certain exceptions to this which are important when considering compliance with statutory EQS. The averaging period associated with the relevant modelled pollution are detailed in **Table 9-6**.

Table 9-6. Modelling Parameter and Averaging Period

Parameter	Modelled As	
	Short Term	Long Term
NO_2	99.79th percentile (%ile) 1-hour mean	Annual Mean
PM_{10}	90.41th percentile (%ile) 24-hour mean	Annual Mean
$PM_{2.5}$	-	Annual Mean
CO	8-hour running mean	-
SO_2	99.18th percentile (%ile) 24-hour mean 99.73th percentile (%ile) 1-hour mean 99.90th percentile (%ile) 15-min mean	Ecological Receptor Only
HCl	1-hour mean	-
Mercury (Hg)	1-hour mean	Annual Mean
Benzene	-	Annual Mean

NO_2 and PM_{10} background concentrations are taken from ADMS Road modelling results, which includes the contribution from the traffic emissions.

For short term averaging periods, the following UK Defra methodology, for example, has been followed:

For 1-hour NO_2 concentrations:

- 99.79th percentile(%ile) 1-hour Process Contribution NO_2 + 2 x (annual mean background contribution NO_2).

9.2.2 Emission Sources from the Operation of Electric Cremator

After consultation with Ms Fay Rushby, Director & Environmental Health Officer, the emissions from the electric cremator have been calculated using the emission measurement data presented in the “Stack Emissions Testing

Report" by DFW Europe Ltd report - 27June 2022. The emission testing was undertaken at Hambleton Crematorium Maple Park, Skipton Bridge, Thirsk, YO7 4SA, between 30the May and 1st June 2022.

Following emission data have been approved by Ms Rushby and presented in **Table 9-7**.

Table 9-7. Emission Data for Permit

Release	Current Limit (mg/m^3) At 273K, 101.3kPa, dry gas, 11% oxygen	Notes
Particulate Matter	20	Current emission limit
Hydrogen Chloride	30	Current emission limit
Mercury	0.05	Current emission limit
VOC	20	Current emission limit
Carbon Monoxide	100	Current emission limit
Nitrogen Dioxide	334	DFW Europe Ltd report - 27Jun2022 - the machine produces without abatement
Sulphur Dioxide	50	Commonly used value

The pollutant mass emission rates used within AERMOD and stack gas parameters are presented in **Table 9-8**.

Table 9-8. Electric Cremator Stack Emissions and Stack Parameters

Parameter	Electric Cremator (Each Cremator)	Unit	Notes
Volumetric flow rate Actual	1613	m^3/hr	DFW Europe Ltd report - 27Jun2022
Volumetric flow rate 273K, 101.3kPa, dry gas, 11% oxygen.	625	m^3/hr	DFW Europe Ltd report - 27Jun2022
	0.17	m^3/s	DFW Europe Ltd report - 27Jun2022
Oxygen (dry)	15.58	% v/v	DFW Europe Ltd report - 27Jun2022
water vapour	5.2	% v/v	DFW Europe Ltd report - 27Jun2022
Stack gas velocity	9.1	m/s	DFW Europe Ltd report - 27Jun2022
Stack Gas Temperature	82.8	°C	DFW Europe Ltd report - 27Jun2022
Particulate Matter (PM_{10} / $PM_{1.5}$)	0.0035	g/s	Calculations
Hydrogen Chloride (HCl)	0.0052	g/s	Calculations
Mercury (Hg)	0.0000087	g/s	Calculations

VOC (assessed as Benzene)	0.0035	g/s	Calculations
Carbon Monoxide (CO)	0.0174	g/s	Calculations
Nitrogen Dioxide (NO_2)	0.0580	g/s	Calculations
Sulphur Dioxide (SO_2)	0.0087	g/s	Calculations
Stack diameter	0.25	m	Calculations
Stack velocity	9.1	m/s	Calculations
Stack Height	To be determined by D1 Calculations	m	-
Time Required for Cremation	3	hours	Design Data

The assessment is based on the maximum of five cremations per day for this proposed site.

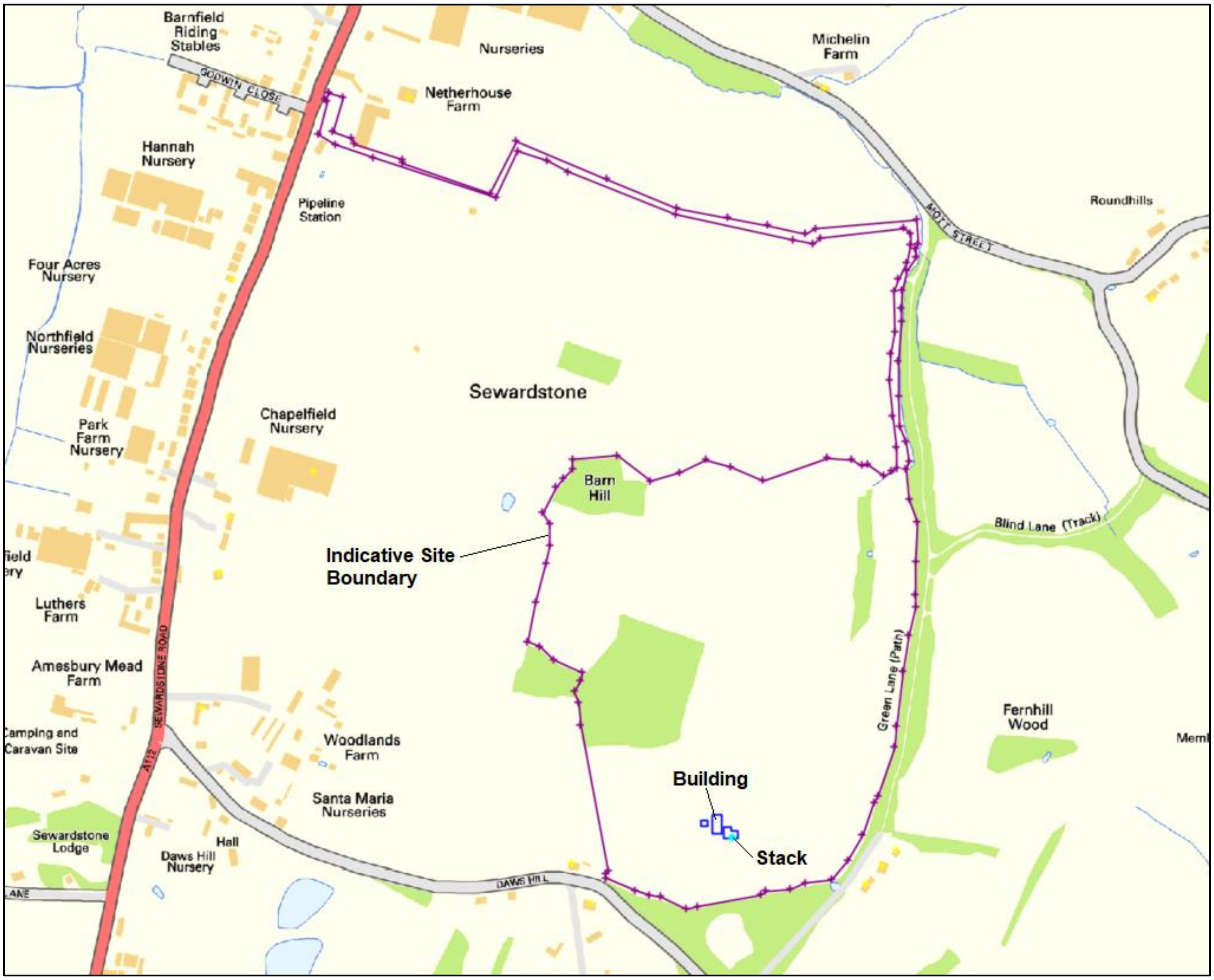
For long-term impact, it is assumed the electric cremator will be running continuously for a year and the impacts were scaled down to the cremator running time. The total annual running time is calculated as 5 (maximum cremations per day) x 365 (days, worst-case assumption) x 3 hours (per cremation) = 5,475 hours per year.

It should be noted that the actual service offered will last approximately 1 to 1.5 hours and the cremated body will take approximately 100 minutes to cremate. However, Ms Claire Jaggard, EHO, has suggested that "*Cremations typically last between 1 and 3 hours*". Cremator emission impact assessment in this report has been undertaken using the EHO suggested maximum 3 hours per cremation (compared to 1 hour 58 minutes per cremations previously assessed) to produce a worst-case scenario. The 3-hour cremation time is significant longer than the typically 100 minute per cremation time

For short-term impact, it is assumed the cremator will be in operation for everyday through out of the year. The presented short-term impacts were the worst possible ones during a year time.

The stack emission location is shown in **Figure 9-1** below.

Figure 9-1. Electric Cremator Emission Point and Buildings



9.3 SENSITIVE RECEPTORS FOR AIR QUALITY ASSESSMENT OF THE ELECTRIC CREMATOR

9.3.1 Discrete (Individual) Receptors

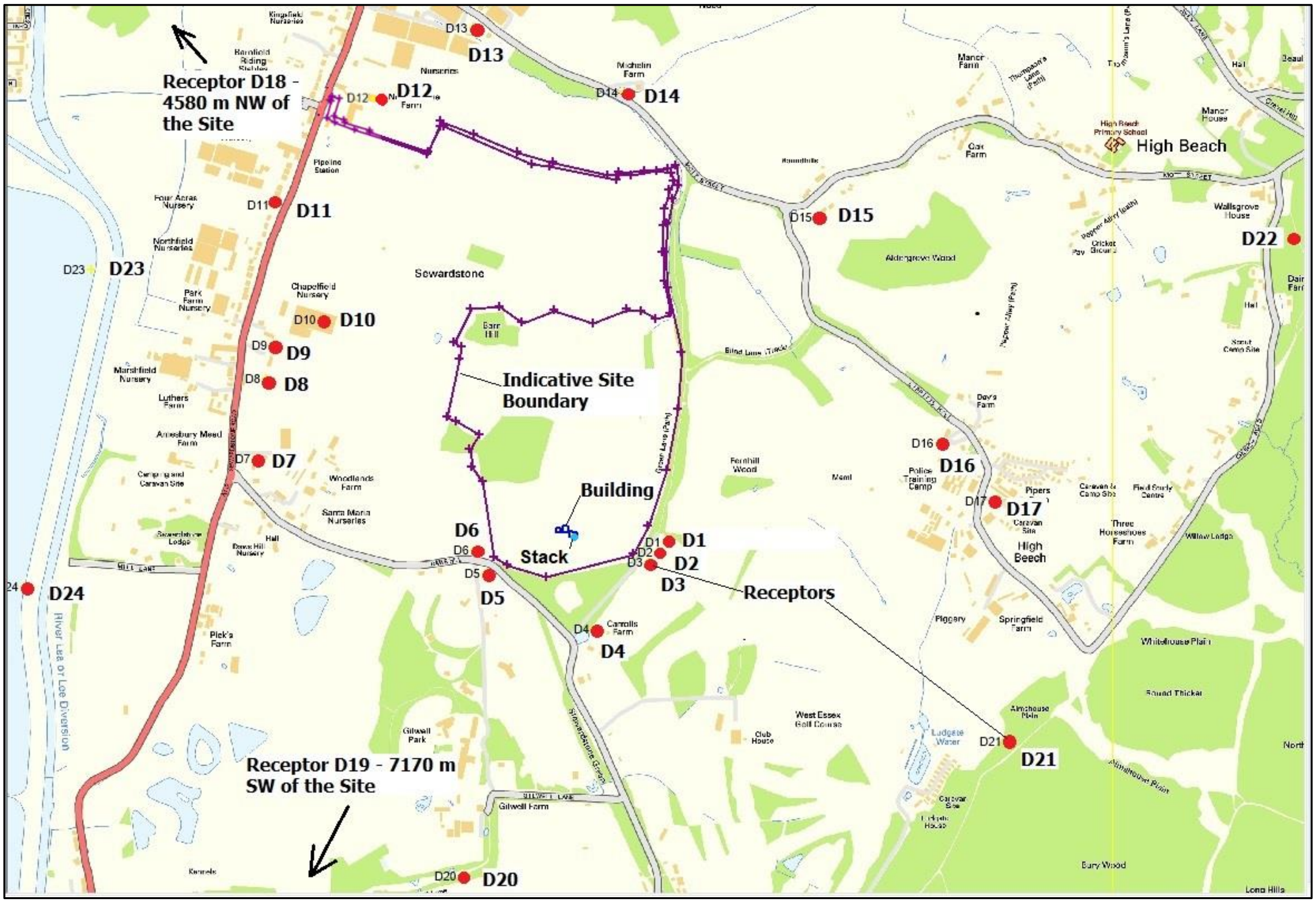
The discrete sensitive receptors identified for the purposes of this air quality assessment are detailed in **Table 9-9** and shown in **Figure 9-2**. The assessment has been undertaken to determine the potential impacts at those selected receptors.

It should be noted that these do not represent an exhaustive list of all receptors within the vicinity of the Site, rather worst-case representative locations within and adjacent to the site.

Table 9-9. Modelled Sensitive Receptors for Industrial Emission Assessment

Site ID	Discrete Sensitive Receptor	UK NGR (m)	
		X	Y
D1	Woodsprite, Green Lane, Bury Road	539099	196937
D2	Silver Timbers, Green Lane, Bury Road	539080	196915
D3	Hideaway, Green Lane, Bury Road	539056	196890
D4	Carrolls Farm, Bury Road	538933	196733
D5	Parsons Croft, Gilwell Park	538677	196864
D6	Oliver’s, Daws Hill	538651	196919
D7	Woodlands Bungalow, Sewardstone Road	538139	197133
D8	White House, Sewardstone Road	538163	197320
D9	1 the Beeches, Sewardstone Road	538178	197399
D10	Chapelfield Nursery	538293	197460
D11	Hillview, Sewardstone Road	538182	197727
D12	Netherhouse Farm	538426	197978
D13	Liran, Mott Street	538648	198143
D14	Cottage 2, Golden Row, Mott Street	538999	197990
D15	Lipitt's End, Mott Street	539453	197699
D16	Pin-Hi, Lippitts Hill	539739	197169
D17	1 Owl Park, Lippitts Hill	539862	197033
D18	Lee Valley (Ramsar and SPA) North	536943	201103
D19	Lee Valley (Ramsar and SPA) South	535573	190608
D20	Epping Forest (SAC and SSSI) 1 South	538623	196155
D21	Epping Forest (SAC and SSSI) 2 East	539895	196470
D22	Epping Forest (SAC and SSSI) 3 NE	540558	197650
D23	Chingford Reservoirs (SSSI) 1 North	537753	197577
D24	Chingford Reservoirs (SSSI) 2 West	537598	196832

Figure 9-2. Receptor Locations for the Assessment of the Operations of Electric Cremator



9.3.2 Cartesian Grid Receptor

A Cartesian receptor grid was used in the model in order to produce the concentration contour lines. The Cartesian receptor grid consists of receptors identified by their x (east-west) and y (north-south) coordinates. The grid was constructed with grid spacing (x, y) of 50m by 50m over an area covering 4000m by 4000m with south-west corner UK NGR (m) of 536900, 195100.

9.3.3 Ecological Receptors for Cremator Emission Assessment

The guidance 'Air emissions risk assessment for your environmental permit' (Defra and Environment Agency, 2 August 2016) states that assessments should consider the impact on the conservation areas by:

Examining if there are any of the following within 10km of your site (or within 15km for coal or oil-fired power stations):

- Special Protection Areas (SPAs);
- Special Areas of Conservation (SACs); and

- Ramsar sites (protected wetlands).

Examining if there are any of the following within 2km of your site:

- Sites of Special Scientific Interest (SSSIs); and
- Local Nature Sites (ancient woods, local wildlife sites and national and local nature reserves).

Some larger (greater than 50 megawatt) emitters may be required to screen to 15km for European sites and to 10km or 15km for SSSIs.

Following a review, three ecological site located close to the site was identified as below.

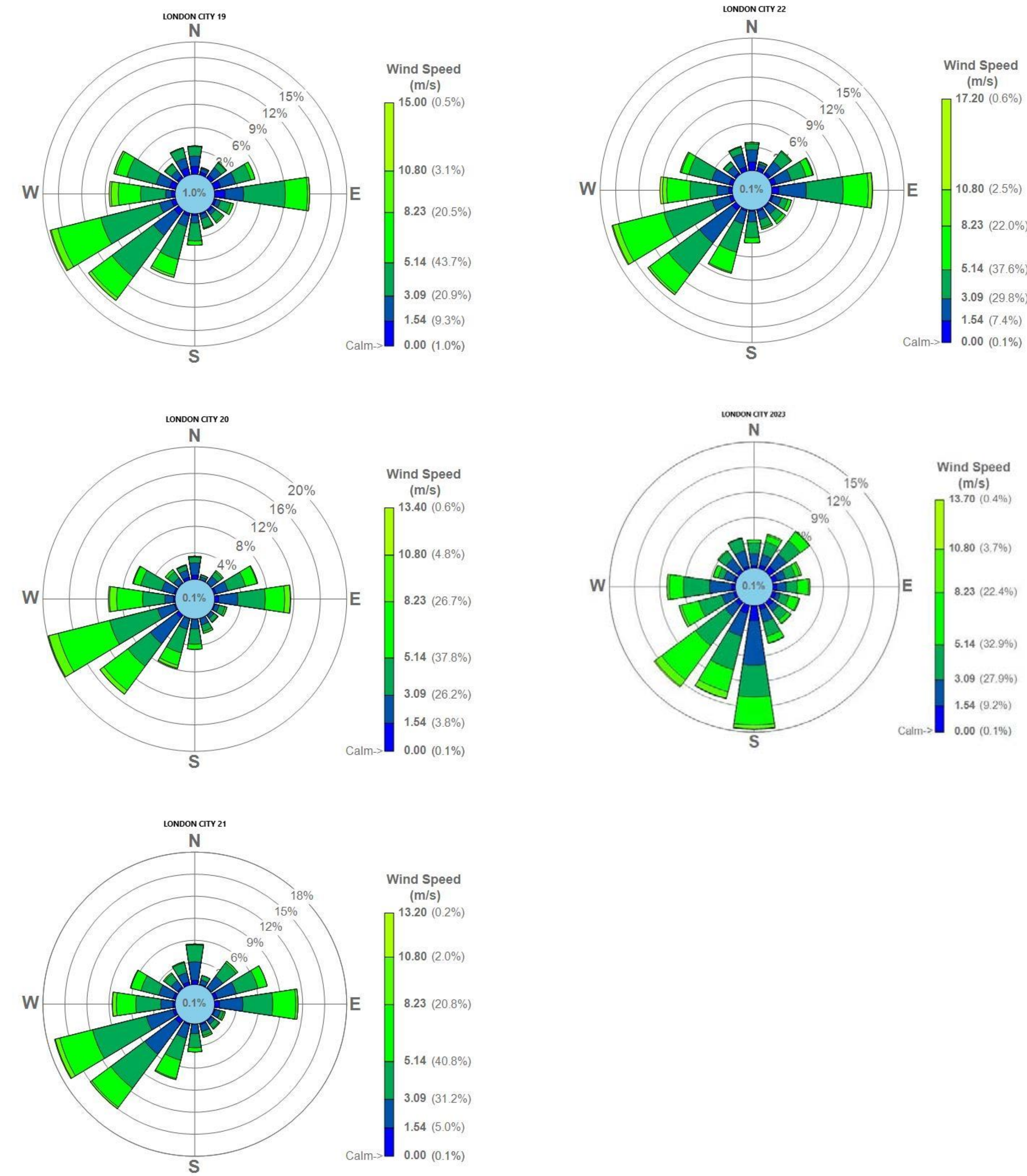
- Lee Valley, Ramsar and SPA – Located to the northwest and southwest of the proposed site, and approximately 900 m to the proposed site at its closest point;
- Epping Forest, SAC and SSSI – Located approximately 1150 m east of the proposed site at its closest point; and
- Chingford Reservoirs, SSSI – Located approximately 1255m west of the proposed site at its closest point.

The identified ecological site has been included as receptor in the assessment.

9.4 METEOROLOGICAL DATA FOR PERMIT APPLICATIONS

The 5-year meteorological data (2019, 2020, 2021, 2022 and 2023) used in the assessment is derived from London City Airport weather station, which is considered representative of conditions within the vicinity of the site, with all the complete parameters necessary for the AERMOD model. Reference should be made to **Figure 9-3** for an illustration of the prevalent wind conditions at the London City Airport weather station.

Figure 9-3. Meteorological Station Windrose



9.5 SURFACE CHARACTERISTICS

The land uses surrounding the Site are mostly described as farmland or grassland. A surface roughness value of 0.3 m for farmland area have been used in the modelling for a worst-case assessment.

9.6 BUILDINGS IN THE MODELLING ASSESSMENT

Buildings nearby or immediately adjacent to the stack/emission source could potentially cause building downwash effects on emission sources and have therefore been modelled for the proposed development. The locations and dimensions of the buildings used in the model are given in **Table 9-10** and illustrated in **Figure 9-1**.

Table 9-10. Locations and Heights of Building Used in the Model

Name		UK NGR (m)		Modelled Building Height (m)
		X	Y	
1	Chapel Building	538857	196960	6.0
2	Cremator Hall	538859	196969	3.9
3	Reception and Meeting	538837	196970	4.8

9.7 TREATMENT OF TERRAIN

The presence of steep terrain can influence the dispersion of emissions and the resulting pollutant concentrations. USEPA guidance indicates that terrain effects should be considered if the gradient exceeds 1:10. Digital terrain files in the UK Ordnance Survey (OS) Landranger format (.NTF) have been used in the assessment.

9.8 MODELLING UNCERTAINTY

Uncertainty in dispersion modelling predictions can be associated with a variety of factors, including:

- Model uncertainty - due to model limitations;
- Data uncertainty - including emissions estimates, background estimates and meteorology; and,
- Variability - randomness of measurements used.

However, potential uncertainties in model results have been minimised as far as practicable and worst-case inputs considered in order to provide a robust assessment. This included the following:

- Choice of model - AERMOD is a commonly used atmospheric dispersion model and results have been verified through a number of studies to ensure predictions are as accurate as possible.
- Facility operating parameters - Operational parameters were provided for the facility.

- Background concentrations - Background pollutant concentrations were obtained from a number of recognised sources in order to consider baseline levels in the vicinity of the site, as detailed within the main report text.
- Variability - All model inputs are as accurate as possible and worst-case conditions have been considered where necessary in order to ensure a robust assessment of potential pollutant concentrations.

9.9 D1 – DISCHARGE STACK HEIGHTS CALCULATIONS

The objective of this D1 calculation is to determine the required heights of the boiler discharge stacks to minimise pollution impacts on the surrounding environment.

9.9.1 D1 Calculation Method

The conventional approach to stack height determination for planning and preliminary permitting applications remains the 1993 HMIP 'D1' methodology. This is a calculation-based approach, using pollutant emission rates, release temperature, stack diameter and information on site building dimensions and applying ground level pollution concentration standards to derive an acceptable release height.

The D1 calculation method has limitations, which are described in the document itself, summarised as follows:

- The methodology is based on an assumed need to limit local ground level pollutant concentrations below an acceptable level, over short periods of time; the 'local' area is around 100x the stack height, beyond which regional effects are not accounted for;
- long-term effects such as deposition of low levels of toxic substances, or nuisance dusts, are not considered;
- the target assessment period is 15-30 minutes, although acceptable effects are described between approximately 5 minutes to an hour;
- assumed dispersion conditions are conservative, and account for around 98% of wind speed and stability conditions normally prevalent in the UK, but extreme conditions are excluded; and
- the method is suitable where topographical effects on dispersion are not significant, typically where the surrounding terrain gradients are less than 1 in 10.

The D1 methodology therefore is a calculation-based tool to derive an indicative stack release height based on acceptable, local, short-term pollutant concentrations in relatively flat terrain.

9.9.2 D1 Calculation Results

The D1 calculations used the background mapping concentrations presented in **Table 6-2** and the emission parameters outlined in **Table 9-8** and **Table 9-8**, to produce a stack height of:

(1) 7 m above the chapel finished floor level (FFL).

The details of the D1 calculations are summarised in Appendix E.

The main stack/chimney has been designed to be 7 m above the chapel finished floor level (FFL), which is also more than 3 m above the roof deck of the cremator hall. This stack height is meet the chimney heigh requirement in accordance with ‘Environmental Protection Act 1990, Technical Guidance Note (Dispersion), D1, Guidelines on Discharge Stack Heights for Polluting Emission, HMIP, June 1993’.

10.0 DETAILED MODELLING ASSESSMENT RESULTS FROM CREMATOR STACK EMISSIONS FOR PERMIT APPLICATION

The detailed computational modelling assessment of process emissions for the proposed development site was undertaken using the input parameters detailed in Section 9.

All predicted concentrations have been compared to the relevant environmental assessment criteria, as detailed in Sections 2 and 3.

10.1 NITROGEN DIOXIDE (NO_2)

Long-Term (annual mean) NO_2

The long-term emissions of NO_2 from the source considered were assessed for all 5 years of meteorological data. The maximum process contributions (PCs) within the modelled receptor locations and their associated predicted environmental concentrations (PECs) are compared against the relevant AQO.

From the meteorological dataset, the year resulting in maximum long-term NO_2 PC concentration was identified as 2021. The predicted maximum PC occurs at the receptor location Parsons Croft, Gilwell Park (D5).

The maximum NO_2 PC in **Table 10-1** is 0.90 µg/m^3 and the associated NO_2 PEC is 18.12 µg/m^3, which is below the relevant long-term AQS of 40 µg/m^3 for the protection of human health.

Table 10-1. Maximum Long-Term (Annual Mean) Concentrations of NO_2

Pollutant	Year	Process Contribution (PC) (µg/m^3)	PC as %age of AQO	Traffic Background (µg/m^3)	PEC (PC + Background) (µg/m^3)	Easting (m)	Northing (m)	Receptor Name
NO_2	2019	0.84	2.10	16.24	17.08	539056	196890	Hideaway, Green Lane, Bury Road
NO_2	2020	0.60	1.50	17.22	17.82	538677	196864	Parsons Croft, Gilwell Park
NO_2	2021	0.90	2.25	17.22	18.12	**538677**	**196864**	Parsons Croft, Gilwell Park
NO_2	2022	0.80	2.01	16.24	17.04	539056	196890	Hideaway, Green Lane, Bury Road
NO_2	2023	0.49	1.23	17.22	17.71	538677	196864	Parsons Croft, Gilwell Park

Table 10-2 presents a summary of the predicted nitrogen dioxide concentrations, both PCs and PECs, at the modelled receptor locations.

The impact description of changes associated with the operations with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 10-2**.

Table 10-2. Long-Term (Annual Mean) Concentrations of NO_2 and Impact Description of Effects at Receptors

Receptors		Predicted Annual Mean Concentration (µg/m³) 2021 Met Data, and NO_2 Impact Description at Receptors						
ID	Name	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Traffic Background (µg/m³)	PEC (PC + Background) (µg/m³)	**PEC as percentage of AQO**	**PEC as percentage of AQO**	**Impact Descriptor**
D1	Woodsprite, Green Lane, Bury Road	0.51	1.27	16.24	16.75	41.9%	≤ 75 of AQO	Negligible
D2	Silver Timbers, Green Lane, Bury Road	0.59	1.48	16.24	16.83	42.1%	≤ 75 of AQO	Negligible
D3	Hideaway, Green Lane, Bury Road	0.68	1.69	16.24	16.92	42.3%	≤ 75 of AQO	Negligible
D4	Carrolls Farm, Bury Road	0.38	0.94	17.17	17.55	43.9%	≤ 75 of AQO	Negligible
D5	Parsons Croft, Gilwell Park	0.90	2.25	17.22	18.12	45.3%	≤ 75 of AQO	Negligible
D6	Oliver's, Daws Hill	0.68	1.69	17.23	17.91	44.8%	≤ 75 of AQO	Negligible
D7	Woodlands Bungalow, Sewardstone Road	0.07	0.16	18.60	18.67	46.7%	≤ 75 of AQO	Negligible
D8	White House, Sewardstone Road	0.03	0.07	18.44	18.47	46.2%	≤ 75 of AQO	Negligible
D9	1 the Beeches, Sewardstone Road	0.02	0.06	18.38	18.40	46.0%	≤ 75 of AQO	Negligible
D10	Chapelfield Nursery	0.03	0.07	17.80	17.83	44.6%	≤ 75 of AQO	Negligible
D11	Hillview, Sewardstone Road	0.02	0.04	19.52	19.54	48.8%	≤ 75 of AQO	Negligible
D12	Netherhouse Farm	0.02	0.05	18.09	18.11	45.3%	≤ 75 of AQO	Negligible
D13	Liran, Mott Street	0.02	0.05	18.10	18.12	45.3%	≤ 75 of AQO	Negligible
D14	Cottage 2, Golden Row, Mott Street	0.02	0.06	17.55	17.57	43.9%	≤ 75 of AQO	Negligible
D15	Lipitt's End, Mott Street	0.12	0.30	16.03	16.15	40.4%	≤ 75 of AQO	Negligible
D16	Pin-Hi, Lippitts Hill	0.07	0.16	15.93	16.00	40.0%	≤ 75 of AQO	Negligible
D17	1 Owl Park, Lippitts Hill	0.04	0.09	15.92	15.96	39.9%	≤ 75 of AQO	Negligible
AQO		40 µg/m³						

The percentage changes in process contribution of NO_2 relative to the AQAL as a result of the facility operations at all receptor locations, with respect to NO_2 exposure, are determined to be 2.25% or less. The impact is determined to be 'negligible', based on the methodology outlined in Section 3. The effect of the facility operations on the local area is considered to be insignificant.

The predicted long-term NO_2 concentrations from the facility operations are considered acceptable for the protection of human health.

Short-Term (1-Hour Mean) NO_2

The short-term emissions of NO_2 from the source considered were assessed for all 5 years of meteorological data. The maximum PCs within the modelled receptor locations and their associated PECs are compared against the relevant AQS, in **Table 10-3**.

From the meteorological dataset, the year resulting in maximum short-term NO_2 PC concentration was identified during 2019. The predicted maximum short-term PC occurs at the receptor location of Parsons Croft, Gilwell Park (D5).

The highest short-term NO_2 PC in **Table 10-3** is 15.11 µg/m^3 and the associated short-term NO_2 PEC is 40.00 µg/m^3, which is below the relevant short-term AQO of 200 µg/m^3 for the protection of human health.

Table 10-3. Maximum Short-Term (1-Hour Mean, 99.79th Percentile) Concentrations of NO_2

Pollutant	Year	Process Contribution (PC) (µg/m^3)	PC as %age of AQO	Traffic Background (µg/m^3)	PEC (PC + Background) (µg/m^3)	Easting (m)	Northing (m)	Receptor Name
NO_2	2019	15.11	7.55	34.46	49.57	538677	196864	Parsons Croft, Gilwell Park
NO_2	2020	8.08	4.04	34.44	42.52	538677	196864	Parsons Croft, Gilwell Park
NO_2	2021	10.92	5.46	34.44	45.36	538677	196864	Parsons Croft, Gilwell Park
NO_2	2022	11.09	5.54	34.44	45.53	538677	196864	Parsons Croft, Gilwell Park
NO_2	2023	9.65	4.83	34.44	44.09	538677	196864	Parsons Croft, Gilwell Park

The short-term NO_2 PEC concentrations have been calculated at each of the discrete receptors listed for the worst meteorological year of 2019 and these results are detailed in **Table 10-4**.

Table 10-4. Maximum Short-Term (1-Hour Mean, 99.79th Percentile) Concentrations of NO_2 at Receptors

Receptors		Predicted 1 hour Mean (99.79th Percentile) Concentration (µg/m³) 2019 Met Data				
ID	Name	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Traffic Background (µg/m³)	PEC [a] (PC + Background) (µg/m³)	PEC as percentage of AQO
D1	Woodsprite, Green Lane, Bury Road	7.95	3.97	32.48	40.43	20.21
D2	Silver Timbers, Green Lane, Bury Road	9.61	4.81	32.48	42.09	21.05
D3	Hideaway, Green Lane, Bury Road	12.66	6.33	32.48	45.14	22.57
D4	Carrolls Farm, Bury Road	7.42	3.71	34.34	41.76	20.88
D5	Parsons Croft, Gilwell Park	15.11	7.55	34.44	49.55	24.77
D6	Oliver's, Daws Hill	12.69	6.35	34.46	47.15	23.58
D7	Woodlands Bungalow, Sewardstone Road	1.75	0.87	37.20	38.95	19.47
D8	White House, Sewardstone Road	1.37	0.69	36.88	38.25	19.13
D9	1 the Beeches, Sewardstone Road	1.30	0.65	36.76	38.06	19.03
D10	Chapelfield Nursery	1.42	0.71	35.60	37.02	18.51
D11	Hillview, Sewardstone Road	1.10	0.55	39.04	40.14	20.07
D12	Netherhouse Farm	1.31	0.66	36.18	37.49	18.75
D13	Liran, Mott Street	1.57	0.79	36.20	37.77	18.89
D14	Cottage 2, Golden Row, Mott Street	0.77	0.38	35.10	35.87	17.93
D15	Lipitt's End, Mott Street	2.28	1.14	32.06	34.34	17.17
D16	Pin-Hi, Lippitts Hill	1.34	0.67	31.86	33.20	16.60
D17	1 Owl Park, Lippitts Hill	0.84	0.42	31.84	32.68	16.34
AQOs	200					

Note:

(a) Inclusive of Background concentrations from the traffic assessment.

As shown in **Table 10-4**, there are no exceedances of the short-term NO_2 AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 200 µg/m³.

Therefore, the predicted short-term NO_2 concentrations from the facility operations are considered acceptable for the protection of human health.

The contour plots of the predicted long-term and short-term ground level PCs of NO_2 for all receptors, including discrete and grid receptors are presented in **Figure 10-1** and **Figure 10-2**. The contour plots show that the predicted maximum concentrations occur adjacent to the emission sources, with a predicted decrease in concentration with the increased distance from the stacks.

Figure 10-1. Predicted Long-Term NO_2 Concentrations (PC) from the Operation of Cremator (2021 Met Data)

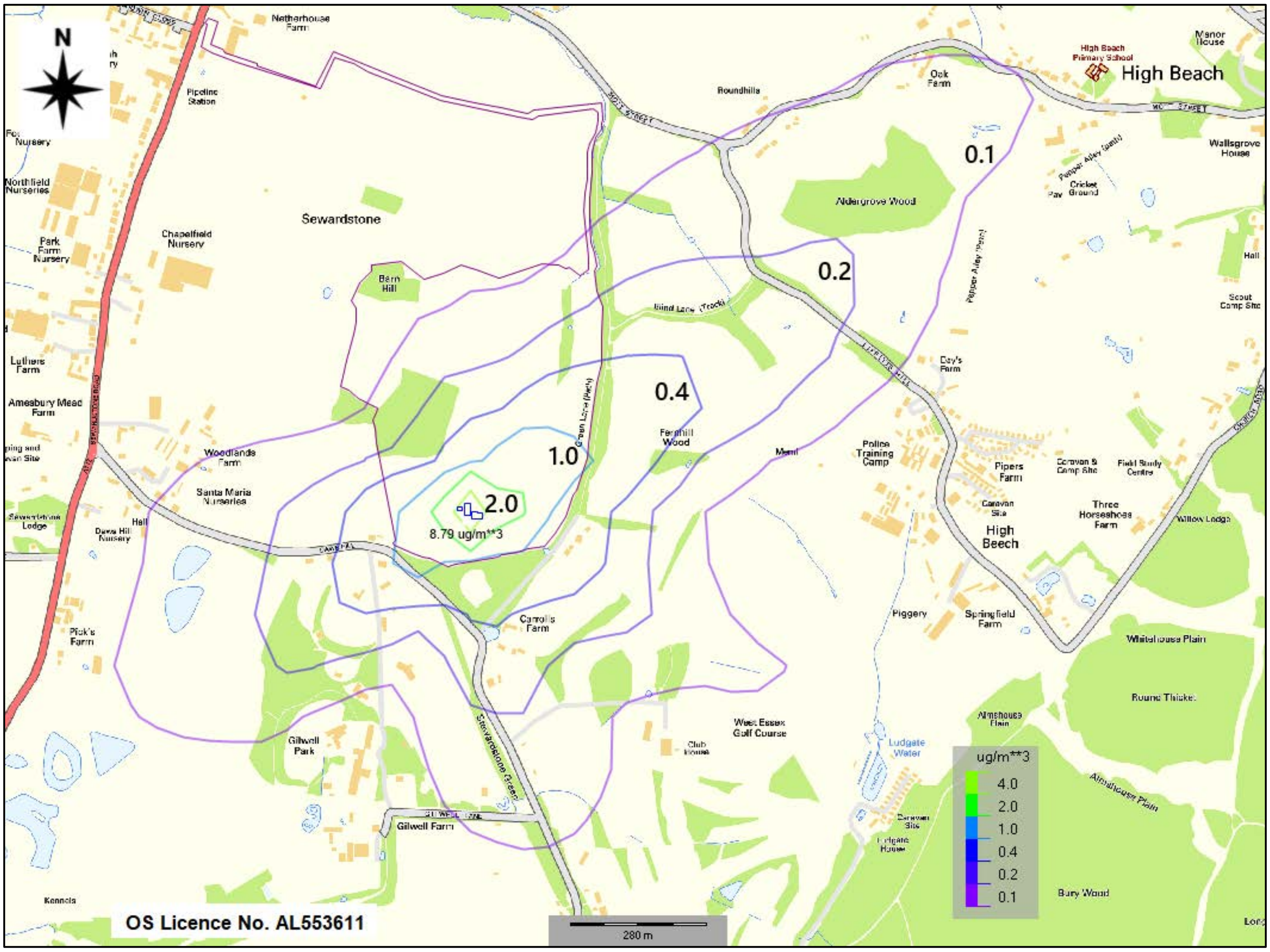
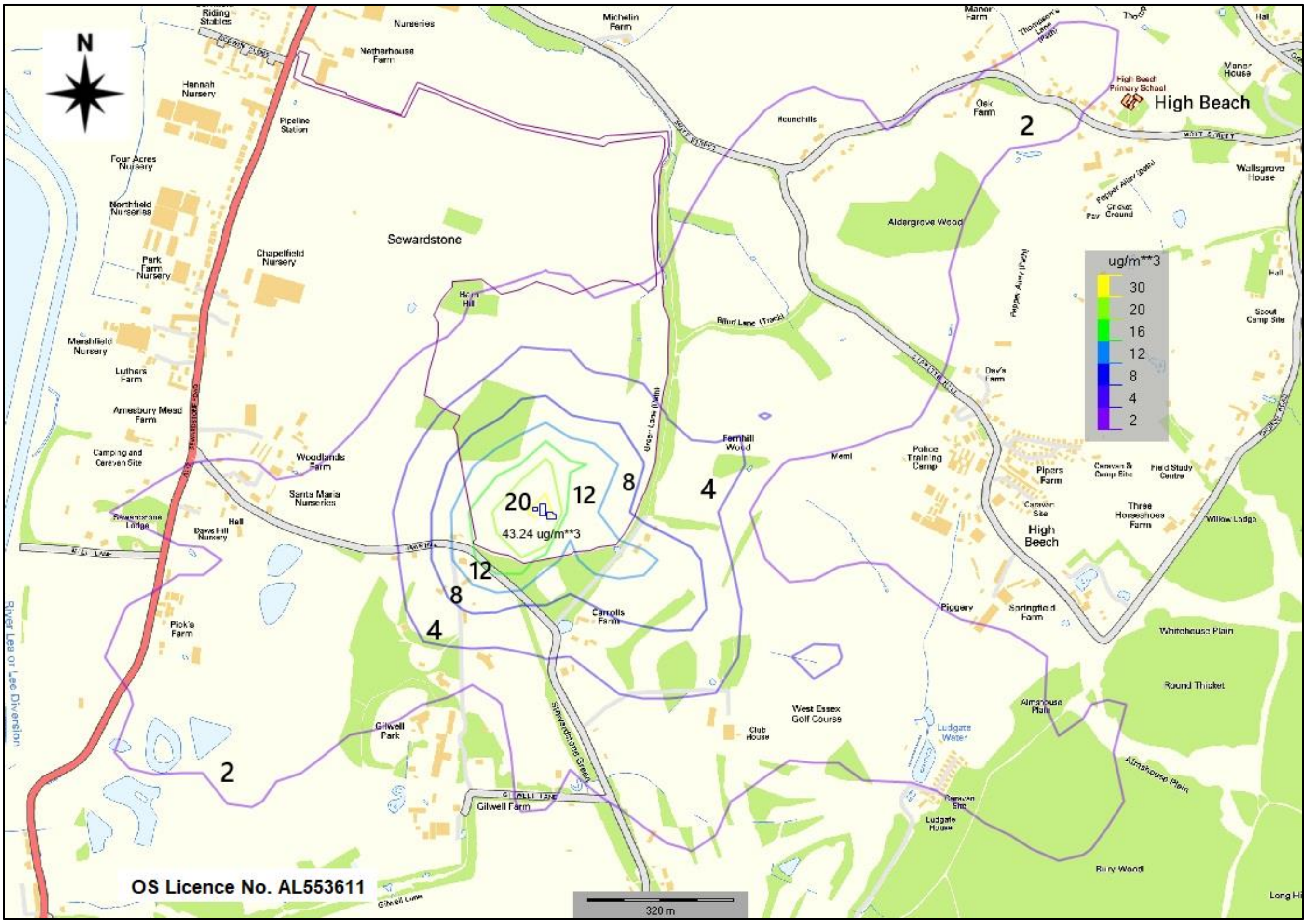


Figure 10-2. Predicted Short-Term NO_2 Concentrations (PC, 1-Hour Mean, 99.79th Percentile) from the Operation of Cremator (2019 Met Data)



10.2 PARTICULATE MATTER (PM_{10})

Long-Term (Annual Mean) PM_{10}

The predicted long-term PCs and PECs from 2021 meteorological data, the year resulting in maximum long-term NO_2 PC concentration, at receptor locations are compared against the relevant AQS, in **Table 10-5**.

Table 10-5. The Long-Term (Annual Mean) Concentrations of PM_{10} and Significance of Effects at Key Receptors

Receptor	Predicted Annual Mean Concentration (µg/m³) 2021 Met Data, and PM_{10} Significance Impacts at Receptors						
	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Traffic Background (µg/m³)	PEC [a] (PC + Background) (µg/m³)	PEC as %age of AQO	PEC as %age of AQO	Significance
D1	3.07E-02	7.68E-02	15.85	15.881	39.7%	<75% of AQAL	Insignificant
D2	3.56E-02	8.90E-02	15.85	15.886	39.7%	<75% of AQAL	Insignificant
D3	4.08E-02	1.02E-01	15.85	15.891	39.7%	<75% of AQAL	Insignificant
D4	2.26E-02	5.66E-02	16.06	16.083	40.2%	<75% of AQAL	Insignificant
D5	5.43E-02	1.36E-01	16.07	16.124	40.3%	<75% of AQAL	Insignificant
D6	4.08E-02	1.02E-01	16.07	16.111	40.3%	<75% of AQAL	Insignificant
D7	3.94E-03	9.84E-03	16.58	16.584	41.5%	<75% of AQAL	Insignificant
D8	1.76E-03	4.39E-03	16.54	16.542	41.4%	<75% of AQAL	Insignificant
D9	1.44E-03	3.61E-03	16.53	16.531	41.3%	<75% of AQAL	Insignificant
D10	1.61E-03	4.03E-03	16.40	16.402	41.0%	<75% of AQAL	Insignificant
D11	1.09E-03	2.71E-03	16.78	16.781	42.0%	<75% of AQAL	Insignificant
D12	1.33E-03	3.32E-03	16.46	16.461	41.2%	<75% of AQAL	Insignificant
D13	1.18E-03	2.95E-03	16.91	16.911	42.3%	<75% of AQAL	Insignificant
D14	1.43E-03	3.56E-03	16.34	16.341	40.9%	<75% of AQAL	Insignificant
D15	7.25E-03	1.81E-02	15.94	15.947	39.9%	<75% of AQAL	Insignificant
D16	3.98E-03	9.95E-03	15.93	15.934	39.8%	<75% of AQAL	Insignificant
D17	2.13E-03	5.33E-03	15.93	15.932	39.8%	<75% of AQAL	Insignificant
AQOs	40						

Note:

(a) Inclusive of Background concentrations from the traffic assessment.

As shown in **Table 10-5**, there are no exceedances of the long-term NO_2 AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 40 µg/m³.

The percentage change in process concentrations relative to the AQAL as a result of the operations at all receptor locations, with respect to PM_{10} exposure, are determined to be 1.36^{-1} % or less. The significance is determined to be 'Insignificant', based on the methodology outlined in Section 3.

Therefore, the predicted long-term PM_{10} concentrations from the Site are considered acceptable for the protection of human health.

Short-Term (24-Hour Mean) PM_{10}

The predicted short-term PCs and PECs from 2019 meteorological data, the year resulting in maximum short-term PM_{10} PC concentration at receptor locations are compared against the relevant AQS, in **Table 10-6**.

Table 10-6. The Short-Term (24-Hour Mean) Concentrations of PM_{10} at Key Receptors

Receptor	Predicted 24 Hour Mean (90.41th Percentile) Concentration (µg/m^3) 2019 Met Data at Receptors				
	Process Contribution (PC) (µg/m^3)	PC as %age of AQO	PEC (a) (PC + Background) (µg/m^3)	PEC[(a)] (PC +Background)	PEC as %age of AQO
D1	2.04E-01	4.07E-01	15.85	16.05	32.1%
D2	3.68E-01	7.37E-01	15.85	16.22	32.4%
D3	5.11E-01	1.02E+00	15.85	16.36	32.7%
D4	5.18E-01	1.04E+00	16.06	16.58	33.2%
D5	4.79E-01	9.59E-01	16.07	16.55	33.1%
D6	3.97E-01	7.93E-01	16.07	16.47	32.9%
D7	4.89E-02	9.78E-02	16.58	16.63	33.3%
D8	3.26E-02	6.52E-02	16.54	16.57	33.1%
D9	2.87E-02	5.75E-02	16.53	16.56	33.1%
D10	2.99E-02	5.99E-02	16.40	16.43	32.9%
D11	2.05E-02	4.11E-02	16.78	16.80	33.6%
D12	2.00E-02	3.99E-02	16.46	16.48	33.0%
D13	3.16E-02	6.31E-02	16.91	16.94	33.9%
D14	1.73E-02	3.46E-02	16.34	16.36	32.7%
D15	5.31E-02	1.06E-01	15.94	15.99	32.0%
D16	2.99E-02	5.98E-02	15.93	15.96	31.9%
D17	2.44E-02	4.89E-02	15.93	15.95	31.9%
AQOs	50				

Note:

[(a)] *Inclusive of Background concentrations from the traffic assessment*

As shown in **Table 10-6**, there are no exceedances of the short-term PM_{10} AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 50 µg/m^3.

Therefore, the predicted short-term PM_{10} concentrations from the operations are considered acceptable for the protection of human health.

As the long-term PCs are significantly below 1% of the relevant AQO and the short-term PCs are significantly below 10% of the relevant AQO, the contour plots of PM_{10} have not presented.

10.3 PARTICULATE MATTER ($PM_{2.5}$)

A worst-case scenario assumption of 100% of PM_{10} to be $PM_{2.5}$ has been made in the assessment. The predicted long-term PCs of $PM_{2.5}$ and the significance of changes associated with the operations with respect to annual mean $PM_{2.5}$ exposure has been presented and assessed in **Table 10-7**.

Table 10-7. The Long-Term (Annual Mean) Concentrations of $PM_{2.5}$ and Significance of Effects at Key Receptors

Receptor	Predicted Annual Mean Concentration (µg/m^3) 2018 Met Data, and $PM_{2.5}$ Significance Impacts at Receptors						
	Process Contribution (PC) (µg/m^3)	PC as %age of AQO	Traffic Background (µg/m^3)	PEC [a] (PC + Background) (µg/m^3)	PEC as %age of AQO	PEC as %age of AQO	Significance
D1	3.07E-02	1.54E-01	15.85	15.88	79.4%	76-94% of AQO	Insignificant
D2	3.56E-02	1.78E-01	15.85	15.89	79.4%	76-94% of AQO	Insignificant
D3	4.08E-02	2.04E-01	15.85	15.89	79.5%	76-94% of AQO	Insignificant
D4	2.26E-02	1.13E-01	16.06	16.08	80.4%	76-94% of AQO	Insignificant
D5	5.43E-02	2.71E-01	16.07	16.12	80.6%	76-94% of AQO	Insignificant
D6	4.08E-02	2.04E-01	16.07	16.11	80.6%	76-94% of AQO	Insignificant
D7	3.94E-03	1.97E-02	16.58	16.58	82.9%	76-94% of AQO	Insignificant
D8	1.76E-03	8.78E-03	16.54	16.54	82.7%	76-94% of AQO	Insignificant
D9	1.44E-03	7.22E-03	16.53	16.53	82.7%	76-94% of AQO	Insignificant
D10	1.61E-03	8.05E-03	16.40	16.40	82.0%	76-94% of AQO	Insignificant
D11	1.09E-03	5.43E-03	16.78	16.78	83.9%	76-94% of AQO	Insignificant
D12	1.33E-03	6.63E-03	16.46	16.46	82.3%	76-94% of AQO	Insignificant
D13	1.18E-03	5.91E-03	16.91	16.91	84.6%	76-94% of AQO	Insignificant
D14	1.43E-03	7.13E-03	16.34	16.34	81.7%	76-94% of AQO	Insignificant
D15	7.25E-03	3.62E-02	15.94	15.95	79.7%	76-94% of AQO	Insignificant
D16	3.98E-03	1.99E-02	15.93	15.93	79.7%	76-94% of AQO	Insignificant
D17	2.13E-03	1.07E-02	15.93	15.93	79.7%	76-94% of AQO	Insignificant
AQOs	20						

Note:

(a) Inclusive of Background concentrations from the traffic assessment.

As shown in **Table 10-7**, there are no exceedances of the short-term NO_2 AQO at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 20 µg/m^3.

The percentage change in process concentrations relative to the AQAL as a result of the operations at all receptor locations, with respect to $PM_{2.5}$ exposure, are determined to be 0.27 % or less. The significance is determined to be 'Insignificant', based on the methodology outlined in Section 3.

Therefore, the predicted long-term $PM_{2.5}$ concentrations from the Site are considered acceptable for the protection of human health.

10.4 CARBON MONOXIDE (CO)

Predicted ground level short-term (8-hour running mean) CO concentrations were assessed against the relevant AQO using 2019 met data (the year resulting in maximum short-term PC concentration). The results of the model predictions at each discrete receptor, inclusive of background, are summarised in **Table 10-8**.

Table 10-8. Summary of Predicted CO Concentrations

Receptors		Predicted 8 hour Mean Concentration (µg/m³) 2019 Met Data			
ID	Name	Process Contribution (PC) (µg/m³)	PC as %age of AQO	PEC (a) (PC + Background) (µg/m³)	PEC as %age of AQO
D1	Woodsprite, Green Lane, Bury Road	2.46	0.0246	176.56	1.77
D2	Silver Timbers, Green Lane, Bury Road	3.54	0.0354	177.64	1.78
D3	Hideaway, Green Lane, Bury Road	4.11	0.0411	178.21	1.78
D4	Carrolls Farm, Bury Road	3.10	0.0310	177.20	1.77
D5	Parsons Croft, Gilwell Park	5.11	0.0511	179.21	1.79
D6	Oliver's, Daws Hill	3.53	0.0353	177.63	1.78
D7	Woodlands Bungalow, Sewardstone Road	0.59	0.0059	174.69	1.75
D8	White House, Sewardstone Road	0.43	0.0043	174.53	1.75
D9	1 the Beeches, Sewardstone Road	0.32	0.0032	174.42	1.74
D10	Chapelfield Nursery	0.36	0.0036	174.46	1.74
D11	Hillview, Sewardstone Road	0.26	0.0026	174.36	1.74
D12	Netherhouse Farm	0.28	0.0028	174.38	1.74
D13	Liran, Mott Street	0.44	0.0044	174.54	1.75
D14	Cottage 2, Golden Row, Mott Street	0.22	0.0022	174.32	1.74
D15	Lipitt's End, Mott Street	0.69	0.0069	174.79	1.75
D16	Pin-Hi, Lippitts Hill	0.52	0.0052	174.62	1.75
D17	1 Owl Park, Lippitts Hill	2.46	0.0246	174.51	1.75
AQOs	10000				

Note:

(a) *Inclusive of Background concentration of 174.1µg/m³*

As indicated in **Table 10-8**, the maximum predicted cumulative 8-hour running mean CO process contributions (PC) at receptors is 5.11 µg/m^3 when using 2019 met data. The predicted cumulative 8-hour running mean PCs of CO at the modelled discrete receptors are well below 0.05% of the short-term AQO, which are considered insignificant.

The maximum cumulative PEC of 8-hour running mean CO emissions is 179.2 µg/m^3, which does not exceed the relevant short-term AQS of 10000 µg/m^3. Therefore, the cumulative short-term PECs of CO at all receptors are below the relevant short-term AQS of 10000 µg/m^3 for the protection of human health.

10.5 SULPHUR DIOXIDE (SO_2)

Predicted ground level short-term SO_2 concentrations were assessed against the relevant AQOs using 2019 met data (the year resulting in maximum short-term PC concentration). The results of the model predictions at each discrete receptor, inclusive of background, are summarised **Table 10-9**.

Table 10-9. Summary of Predicted SO_2 Concentrations

Receptor	Predicted SO_2 Concentration (µg/m^3)					
	24 hour Mean (99.18th Percentile) [(a)]		1 hour Mean (99.73rd Percentile) [(b)]		15 minute Mean (99.9th Percentile) [(c)]	
	Process Contrib'tn (PC)	PEC (PC +Background)	Process Contrib'tn (PC)	PEC (PC +Background)	Process Contrib'tn (PC)	PEC (PC +Background)
D1	0.466	5.387	2.298	10.638	3.73	14.908
D2	0.702	5.623	2.723	11.063	4.40	15.579
D3	1.126	6.046	3.727	12.067	5.84	17.016
D4	0.775	5.696	2.076	10.416	3.27	14.447
D5	1.071	5.992	4.403	12.743	6.28	17.454
D6	0.932	5.852	3.599	11.939	5.62	16.794
D7	0.079	4.999	0.437	8.777	0.88	12.052
D8	0.071	4.991	0.368	8.708	0.89	12.062
D9	0.050	4.970	0.351	8.691	0.75	11.925
D10	0.062	4.982	0.405	8.745	0.87	12.041
D11	0.038	4.958	0.267	8.607	0.56	11.735
D12	0.042	4.963	0.249	8.589	0.67	11.843
D13	0.054	4.974	0.396	8.736	0.76	11.937
D14	0.037	4.957	0.220	8.560	0.56	11.734
D15	0.122	5.043	0.676	9.016	0.95	12.129
D16	0.058	4.979	0.383	8.723	0.76	11.937
D17	0.051	4.971	0.236	8.576	0.63	11.802
AQOs	125		350		266	

Note:

[(a)] *Inclusive of Background concentration of 4.92µg/m^3*
[(b)] *Inclusive of Background concentration of 8.34µg/m^3*
[(c)] *Inclusive of Background concentration of 11.18µg/m^3*

The maximum PEC of 24-hour mean SO_2 emissions is 1.13 µg/m^3 when using 2019 met data (as it gives higher predicted than using 2019 met data), which does not exceed the relevant short-term AQS of 125 µg/m^3. Therefore, the short-term (24-hour) PECs of SO_2 at all receptors are below the relevant short-term AQS of 125 µg/m^3 for the protection of human health.

The maximum PEC of 1-hour mean SO_2 emissions is 440 µg/m^3 when using 2019 met data, which does not exceed the relevant short-term AQS of 350 µg/m^3. Therefore, the short-term (1-hour) PECs of SO_2 at all receptors are below the relevant short-term AQS of 350 µg/m^3 for the protection of human health.

The maximum PEC of 15-minute mean SO^2 emissions is 6.28 µg/m^3 when using 2019 met data, which does not exceed the relevant short-term AQS of 266 µg/m^3. Therefore, the short-term (15-minute) PECs of SO_2 at all receptors are below the relevant short-term AQS of 266 µg/m^3 for the protection of human health.

10.6 HCl

Predicted ground level 1-hour mean HCl concentrations using 2019 met data (the year resulting in maximum short-term PC concentration) were assessed against the relevant EAL. The results of the model predictions at each discrete receptor, inclusive of background, are summarised in **Table 10-10**.

Table 10-10. Summary of Predicted HCl Concentrations

Receptor	Predicted 1 hour Mean Concentration HCl(µg/m^3)			
	Process Contrib'tn (PC)	PC as %age of AQO	PEC[(a)] (PC +Background)	PEC as %age of AQO
D1	2.21	0.29	2.25	0.30%
D2	2.91	0.39	2.95	0.39%
D3	3.65	0.49	3.69	0.49%
D4	1.79	0.24	1.83	0.24%
D5	2.97	0.40	3.01	0.40%
D6	2.69	0.36	2.73	0.36%
D7	0.46	0.06	0.50	0.07%
D8	0.46	0.06	0.50	0.07%
D9	0.42	0.06	0.46	0.06%
D10	0.47	0.06	0.51	0.07%
D11	0.39	0.05	0.43	0.06%
D12	0.40	0.05	0.44	0.06%
D13	0.39	0.05	0.43	0.06%
D14	0.39	0.05	0.43	0.06%
D15	0.44	0.06	0.48	0.06%
D16	0.51	0.07	0.55	0.07%
D17	0.67	0.09	0.71	0.09%
AQO	750			

Note:

[(a)] *Inclusive of Background concentration of 0.04 µg/m^3*

As indicated in **Table 10-10**, there were no predicted exceedances of the relevant criteria for HCl at any discrete receptor location when using 2019 met data (the year resulting in maximum short-term PC concentration).

10.7 VOC (ASSESSED AS BENZENE)

The predicted long-term PCs and PECs of benzene from 2021 meteorological data, the year resulting in maximum long-term PC concentration, at receptor locations are compared against the relevant AQS in **Table 10-11**.

Table 10-11. Summary of Predicted Long-Term Benzene Concentrations

Receptor	Predicted Annual Mean Concentration (µg/m³) 2021 Met Data, and Benzene Significance Impacts at Receptors						
	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Background (µg/m³)	PEC [a] (PC + Background) (µg/m³)	PEC as %age of AQO	PEC as %age of AQO	Significance
D1	0.0307	0.61	0.13	0.16	3.2%	<75% of AQAL	Insignificant
D2	0.0356	0.71	0.13	0.17	3.3%	<75% of AQAL	Insignificant
D3	0.0408	0.82	0.13	0.17	3.4%	<75% of AQAL	Insignificant
D4	0.0226	0.45	0.13	0.15	3.1%	<75% of AQAL	Insignificant
D5	0.0543	1.09	0.13	0.18	3.7%	<75% of AQAL	Insignificant
D6	0.0408	0.82	0.13	0.17	3.4%	<75% of AQAL	Insignificant
D7	0.0039	0.08	0.13	0.13	2.7%	<75% of AQAL	Insignificant
D8	0.0018	0.04	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D9	0.0014	0.03	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D10	0.0016	0.03	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D11	0.0011	0.02	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D12	0.0013	0.03	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D13	0.0012	0.02	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D14	0.0014	0.03	0.13	0.13	2.6%	<75% of AQAL	Insignificant
D15	0.0072	0.14	0.13	0.14	2.7%	<75% of AQAL	Insignificant
D16	0.0040	0.08	0.13	0.13	2.7%	<75% of AQAL	Insignificant
D17	0.0021	0.04	0.13	0.13	2.6%	<75% of AQAL	Insignificant
AQOs	5						

Note: [(a)] *Inclusive of Background concentration of 0.13 µg/m³*

As illustrated in **Table 10-11**, there are no exceedances of the long-term VOC (as benzene) at any of the identified sensitive receptors. The predicted impacts are significantly below the AQO of 5 µg/m³.

The percentage change in process concentrations relative to the AQAL as a result of the operations at all receptor locations, with respect to benzene exposure, are determined to be 0.18 % or less. The significance is determined to be 'Insignificant'.

10.8 MERCURY (HG)

The assessment of predicted mercury as a heavy metal concentration is based on Environment Agency guidance relating specifically to the assessment of Group 3 metals stack releases. As such the screening method detailed in the ‘Guidance to Applicants on the Impact Assessment for Group 3 Metals Stack Releases – V.2 June 2011’ has been applied to the model outputs.

Long-term Hg

Table 10-12. Summary of Predicted Long-Term Hg Concentrations – Step 1 Screening

Receptor	Predicted Annual Mean Concentration Hg (µg/m³)			
	Process Contrib'tn (PC)	PC as %age of AQO	PEC[(a)] (PC +Background)	PEC as %age of AQO
D1	7.64E-05	3.06E-02	0.003	1.19
D2	8.85E-05	3.54E-02	0.003	1.20
D3	1.01E-04	4.05E-02	0.003	1.20
D4	5.63E-05	2.25E-02	0.003	1.18
D5	1.35E-04	5.40E-02	0.003	1.22
D6	1.02E-04	4.06E-02	0.003	1.20
D7	9.78E-06	3.91E-03	0.003	1.17
D8	4.36E-06	1.75E-03	0.003	1.16
D9	3.59E-06	1.44E-03	0.003	1.16
D10	4.00E-06	1.60E-03	0.003	1.16
D11	2.70E-06	1.08E-03	0.003	1.16
D12	3.30E-06	1.32E-03	0.003	1.16
D13	2.94E-06	1.18E-03	0.003	1.16
D14	3.54E-06	1.42E-03	0.003	1.16
D15	1.80E-05	7.21E-03	0.003	1.17
D16	9.89E-06	3.96E-03	0.003	1.17
D17	5.30E-06	2.12E-03	0.003	1.16
AQO	0.25			

Note:
(a) *Inclusive of background concentration of 2.904ng/m³*

As indicated in **Table 10-12**, there were no predicted long-term PEC exceedances of the relevant EAL for Hg at any discrete receptor location when using 2019 met data (the year resulting in maximum long-term PC concentration).

The maximum long-term Hg predicted PEC is 1.22% of AQO and below 70% of the Step 1 screening criteria. As a result, a Step 2 assessment is not required.

Short-term Hg

Table 10-13. Summary of Predicted Short-Term Hg Concentrations – Step 1 Screening

Receptor	Predicted Short Term Concentration Hg (µg/m³)				
	Process Contrib'tn (PC)	PC as %age of AQO	PEC[(a)] (PC +Background)	Headroom	PC as %age of Headroom
D1	0.0037	0.049	0.010	7.49	0.049
D2	0.0049	0.065	0.011	7.49	0.065
D3	0.0061	0.081	0.012	7.49	0.082
D4	0.0030	0.040	0.009	7.49	0.040
D5	0.0050	0.066	0.011	7.49	0.066
D6	0.0045	0.060	0.010	7.49	0.060
D7	0.0008	0.010	0.007	7.49	0.010
D8	0.0008	0.010	0.007	7.49	0.010
D9	0.0007	0.009	0.007	7.49	0.009
D10	0.0008	0.011	0.007	7.49	0.011
D11	0.0006	0.009	0.006	7.49	0.009
D12	0.0007	0.009	0.006	7.49	0.009
D13	0.0006	0.009	0.006	7.49	0.009
D14	0.0006	0.009	0.006	7.49	0.009
D15	0.0007	0.010	0.007	7.49	0.010
D16	0.0009	0.011	0.007	7.49	0.011
D17	0.0011	0.015	0.007	7.49	0.015
AQO	7.5				

Note:

[(a)] *Inclusive of Background concentration of 5.808ng/m³*

As indicated in **Table 10-13**, there were no predicted exceedances of the relevant short-term criteria for Hg at any discrete receptor location when using 2019 met data (the year resulting in maximum short-term PC concentration).

The predicted maximum short-mean Hg PCs at the modelled discrete receptors is 0.08 % of the headroom when using 2019 met data, which is less than 20% of the headroom. As a result, it can be considered insignificant.

10.9 SENSITIVITY ANALYSIS – INTER-ANNUAL VARIABILITY

The long and short-term NO_2 emissions from the modelled sources have been assessed for the 5 complete years of meteorological data. The model sensitivity to inter-annual variation of meteorological conditions was calculated by using the following equation:

$$\% \text{ Variation} = \frac{[(\text{Maximum mean} - \text{Minimum mean}) \div 2] \times 100}{[(\text{Maximum mean} + \text{Minimum mean}) \div 2]}$$

In the above equation "mean" refers to the true mean for all of the concentrations calculated by the model at all discrete receptors and grid receptors. Results are shown for long and short-term odour PC in **Table 10-14**.

Table 10-14. Sensitivity Analysis

Substance	5 Year of Meteorological Date					% Variation
	2019	2020	2021	2022	2023	
Long-term NO_2 PC ($\mu g/m^3$)	0.054	0.037	0.053	0.054	0.055	19.03
Short-term NO_2 PC ($\mu g/m^3$)	2.93	1.19	2.14	2.53	2.53	42.14

The sensitivity analysis indicates that for the emissions of NO_2 and all 5 years of meteorological data the percentage variations of the predicted concentrations were 19.03% for long-term 42.14% for short-term.

10.10 CUMULATIVE EFECT (INCOMBINATION EFFECT) OF AIR QUALITY ASSESSMET FOR THE TRAFFIC FLOWS AND THE OPERATION OF CREMATOR

It should be noted that the assessment results for the electric cremator presented in previous sections are the cumulative effects on the receptors because the results include the pollution contributions from the air quality background, traffic movement, committed development traffic flows, proposed development traffic flows and electric cremator.

Therefore, the predicted cumulative long-term and short-term pollutant concentrations at the selected receptor locations are all below the relevant AQOs for the protection of human health. The significance of cumulative effects on the emissions on the ground level receptors from the operations with respect to long-term pollutants is determined to be ‘negligible’.

11.0 HABITAT ASSESSMENT – IMPACTS FORM CREMATOR EMISSIONS

The habitat assessment has been undertaken for the following identified nature conservation sites.

- Lee Valley – Ramsar and SPA;
- Epping Forest – SAC and SSSI; and
- Chingford Reservoirs – SSSI.

The long-term traffic generated NO_2 concentrations at those sites has been used for nitrogen deposition and habitat assessment, against relevant critical loads.

The long-term and short-term concentrations among those ecological sites have been calculated for habitat assessment against relevant critical loads, using 2018 and 2019 met data (the year resulting in maximum long-term and short-term PC concentrations respectively).

11.1 PREDICTED NITROGEN OXIDE CONCENTRATIONS

Table 11-1 presents a summary of the predicted nitrogen oxide concentrations using 2018 and 2019 met data (the year resulting in maximum long-term and short-term PC concentrations respectively) at the ecological receptor locations.

Table 11-1. Summary of Cumulative Predicted NO_x Concentrations for Protection of Vegetation and Ecosystems

Ecological Receptor		Predicted Annual Mean Concentration (µg/m³)				Predicted 24 hour Mean Concentration (µg/m³)			
		Process Contribution (PC) (µg/m³)	PC as %age of AQO	Back ground (µg/m³)	PEC [a] (PC + Back ground) (µg/m³)	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Back ground (µg/m³)	PEC [b] (PC + Back ground) (µg/m³)
D18	Lee Valley (Ramsar and SPA) North	0.003	0.008	25.61	25.61	0.79	1.05	30.22	31.01
D19	Lee Valley (Ramsar and SPA) South	0.001	0.003	41.17	41.17	0.54	0.72	48.58	49.12
D20	Epping Forest (SAC and SSSI) 1 South	0.037	0.124	28.99	29.03	3.60	4.80	34.21	37.81
D21	Epping Forest (SAC and SSSI) 2 East	0.053	0.177	26.73	26.78	3.43	4.58	31.54	34.97
D22	Epping Forest (SAC and SSSI) 3 NE	0.034	0.115	24.93	24.96	1.12	1.49	29.42	30.53
D23	Chingford Reservoirs (SSSI) 1 North	0.013	0.043	30.04	30.05	2.61	3.48	35.45	38.06
D24	Chingford Reservoirs (SSSI) 2 West	0.038	0.128	31.32	31.36	2.61	3.48	36.96	39.57
AQO/Critical Level (CL)		30[c]					75[d]		

Note:

[a] Inclusive of Background concentrations. The Background concentration was taken from http://www.apis.ac.uk/.
[b] The Inclusive of Background concentration[s]. The Background concentration was taken from http://www.apis.ac.uk/.
[c] The AQO of 30 µg/m³ is the annual standard for the protection of vegetation and ecosystems; and
[d] The AQO of 75 µg/m³ is the daily standard for the protection of vegetation and ecosystems.

The annual mean NO_x (as NO_2) PEC at the ecological receptor locations are below the annual mean critical level of 30 µg/m³ for the protection of vegetation and Ecosystems.

The NO_x daily (24 hour) predicted environmental concentration at all ecological receptor locations are well below the daily mean critical levels of 75 µg/m³ for the protection of vegetation and Ecosystems. The max short-term PC is 3.06 µg/m³ or 4.80% of the critical level and the impact is negligible.

The significance of changes associated with the operations of the facility with respect to annual mean NO_x (as NO_2) exposure at the ecological receptors has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table 11-2**.

Table 11-2. Long-Term (Annual Mean) Concentrations of NO_2 and Impact Description of Effects at Receptors

Receptors		Predicted Annual Mean Concentration (µg/m³) 2018 Met Data, and NO_2 Impact Description at Receptors						
ID	Name	Process Contribution (PC) (µg/m³)	PC as %age of AQO	Traffic Background (µg/m³)	PEC (PC + Background) (µg/m³)	PEC as percentage of AQO	PEC as percentage of AQO	Impact Descriptor
D19	Lee Valley (Ramsar and SPA) South	0.003	0.008	25.61	25.61	85.38	76-94% of AQO	Insignificant
D20	Epping Forest (SAC and SSSI) 1 South	0.001	0.003	41.17	41.17	137.24	≥110 of AQO	Insignificant
D21	Epping Forest (SAC and SSSI) 2 East	0.037	0.124	28.99	29.03	96.76	95-102% of AQO	Insignificant
D22	Epping Forest (SAC and SSSI) 3 NE	0.053	0.177	26.73	26.78	89.28	76-94% of AQO	Insignificant
D23	Chingford Reservoirs (SSSI) 1 North	0.034	0.115	24.93	24.96	83.21	76-94% of AQO	Insignificant
D24	Chingford Reservoirs (SSSI) 2 West	0.013	0.043	30.04	30.05	100.18	95-102% of AQO	Insignificant

The percentage change in long-term process concentrations relative to the AQAL as a result of the proposed development at all ecological receptor locations, with respect to NO_x (as NO_2) exposure is determined to be 0.18% or less. The significance is deemed to be 'Insignificant' for all ecological receptor locations, based on the methodology outlined in Section 3.

As the percentage change in long-term process concentrations relative to the AQAL is below 0.5% of the relevant critical level for the protection of vegetation and Ecosystems, the long-term process contributions have been screened out against the relevant standard/critical level. The nitrogen deposition assessment has not been undertaken.

Furthermore, Guidance of "A guide to the assessment of air quality impacts on designated nature conservation sites, May 2020, states that:

> *"5.5.2.3 In March 2015. AQTAG (Air quality Technical Advisory Group) clarified to the planning inspectorate that 'for installations other than intensive pig and poultry farms, AQTAG is confident that a process contribution (PC, as predicted by H1 or a detailed dispersion model) <1% of the relevant critical level or load (CL) can be considered inconsequential and does not need to be included in an in-combination assessment".*

Therefore, in-combination habitat assessment (cumulative habitat assessment including other proposed development) does not need to be undertaken.

In summary, the NO_2 impacts from the proposed development on all ecological receptors are insignificant.

12.0 CONCLUSIONS

Tetra Tech have undertaken an Air Quality Assessment in support of a permit application for the proposed crematorium development at land at Netherhouse Farm, Waltham Abbey adjacent to the Epping Forest SAC.

Air Quality Assessment History for Planning Applications

Tetra Tech have undertaken an Air Quality Assessment to support the submission of a planning application for the proposed crematorium development at land at Netherhouse Farm, Waltham Abbey E4 7RJ. A report was produced titled 'Revised Air Quality Assessment – EFDC Pre-Application Response', dated 2nd February 2022 with a project number reference of 784-B026744.

Air Quality Assessment History for Permit Applications

The aim of this air quality assessment was to update the existing 2022 air quality report to meet the purpose of the environmental permit application.

It should be noted that the predicted pollutant concentrations from the traffic air quality assessment have been used as 'background' data/information for the air quality impact assessment from the electric cremator for permit application. A number of air quality assessment sections for the Planning application remain in this updated report for completeness.

The air quality assessment includes an assessment of in-combination effects from the traffic vehicle emissions and the cremator emissions associated with the proposed crematorium development.

Construction Phase (this section was initially produced for Planning applications)

Prior to the implementation of appropriate mitigation measures, the potential impact significance of dust emissions associated with the construction phase of the proposed development has potential as 'low' at some worst affected receptors without mitigation. However, appropriate site-specific mitigation measures have been recommended based on Section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition, Earthworks, Construction and Trackout. It is anticipated that with these appropriate mitigation measures in place, the risk of adverse effects due to emissions from the construction phase will not be significant.

Operational Assessment of Traffic Air Quality (this section was initially produced for Planning applications)

The 2022 assessment of the effect of emissions from traffic associated with the scheme, has determined that the maximum predicted increase in the annual average exposure to NO_2 at any existing receptor is likely to be 0.07 μg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48).

For PM_{10}, the maximum predicted increase in the annual average exposure is likely to be is 0.02 μg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48). For $PM_{2.5}$, the maximum predicted increase in the annual average exposure is likely to 0.01 μg/m^3 at any existing receptor.

The impact description of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2, PM_{10} and $PM_{2.5}$ exposure, is determined to be 'negligible' at all existing receptors.

The maximum predicted increase in the annual average exposure to NO_X at the identified ecological receptor, due to changes in traffic movements associated with the development, is 0.04 µg/m^3 at Epping Forest SSSI & SAC (E25) which is below the 0.40 µg/m^3 development contribution stated within the guidance of '*A Guide to the Assessment of Air Quality Impacts in Designated Nature Conservation Sites*', IAQM 2020. As a result, no further assessment is required and the impact at all ecological receptors is considered to be negligible.

With respect to sulphur dioxide and ammonia concentrations, there is not predicted to be a significant effect at ecological receptors as a result of the proposed development without mitigation.

Mitigations and Epping Forest Air Pollution Mitigation Strategy (this section was initially produced for Planning applications)

The mitigation measures for control the air pollutions during both construction phase and operational phase have been identified in accordance with the policies in Epping Forest Interim Air Pollution Mitigation Strategy.

Air Quality Assessment for the Operation of Electric Cremator for Permit Applications

The predicted long-term and short-term NO_2, PM_{10}, $PM_{2.5}$, CO, SO_2, Mercury, HCl, and VOC (assessed as benzene) at the selected receptor locations from the emissions of the operation of the proposed electric cremator are all below the relevant AQOs for the protection of human health.

The significance of effects of the emissions on ground level receptors from the operations with respect to long-term NO_2, PM_{10}, $PM_{2.5}$, mercury, and VOC is determined to be 'negligible'.

Cumulative Effect (in Combination Effect) of Air Quality Assessment for the Traffic Flows and the Operation of Electric Cremator for Permit Applications

Cumulative effects from the air quality background, traffic movement, committed development traffic flows, proposed development traffic flows and electric cremator operations on the receptors have been assessed.

The predicted cumulative long-term and short-term pollutant concentrations at the selected receptor locations are all below the relevant AQOs for the protection of human health. The significance of cumulative effects of the emissions on the ground level receptors from the operations with respect to long-term pollutants is determined to be 'negligible'.

Habitat Assessment for the Operation of Electric Cremator

The daily (24 hour mean) NO_x PECs at the ecological receptors from the proposed operations are below the relevant critical level for the protection of vegetation and Ecosystems. The percentage change in long-term process concentrations relative to the AQAL is below 1% of the relevant critical level for the protection of vegetation and ecosystem and NO_x impacts from the proposed development on the ecological receptors are insignificant.

APPENDIX A CONSTRUCTION PHASE ASSESSMENT METHODOLOGY

Methodology

The following information sets out the adopted approach to the construction phase impact assessment in accordance with the aforementioned IAQM guidance[2].

Step 1 – Screen the Requirement for a more Detailed Assessment

An assessment is required if there are sensitive receptors within 350m of the site boundary, within 50m of the route(s) used by construction vehicles on the surrounding road network, or within 500m from the site entrance. A detailed assessment is also required if there is an ecological receptor within 50m of the site boundary.

Step 2A – Define the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude for the demolition phase has been determined based on the below criteria:

- *Large*: Total building volume >50 000m^3, potentially dusty construction (e.g. concrete), on-site crushing and screening, demolition activities >20m above ground level;
- *Medium*: Total building volume 20 000m^3 – 50 000m^3, potentially dusty construction material, demolition activities 10-20m above ground level; and,
- *Small*: Total building volume <20 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude for the planned earthworks has been determined based on the below criteria:

- *Large:* Total site area >10 000m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100 000 tonnes;
- *Medium*: Total site area 2 500m^2 – 10 000m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4m-8m in height, total material moved 20 000 tonnes – 100 000 tonnes; and
- *Small:* Total site area <2 500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <10 000 tonnes, earthworks during wetter months.

Construction

The dust emission magnitude for the construction phase has been determined based on the below criteria:

- *Large:* Total building volume >100 000m^3, on site concrete batching; sandblasting;
- *Medium:* Total building volume 25 000m^3 – 100 000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and,
- *Small:* Total building volume <25 000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

The dust emission magnitude for trackout has been determined based on the below criteria:

- *Large:* >50 HGV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- *Medium:* 10-50 HGV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50m – 100m; and,
- *Small:* <10 HGV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B - Defining the Sensitivity of the Area

Sensitivities of People to Dust Soiling Effects

- *High:*
  - Users can reasonably expect an enjoyment of a high level of amenity;
  - The appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably expect to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land; and,
  - Indicative examples include dwellings, museums and other culturally important collections, medium- and long-term car parks and car showrooms.

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[2] Institute of Air Quality Management 2014. *Guidance on the Assessment of dust from demolition and construction.*

- *Medium:*
  - Users can reasonably expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
  - The appearance, aesthetics or value of their property could be diminished by soiling;
  - The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; and,
  - Indicative examples include parks and places of work.
- *Low*
  - The enjoyment of amenity would not reasonably be expected;
  - Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling;
  - There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land; and,
  - Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short term car parks and roads.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A1. Sensitivity of the Area to Dust Soiling Effects on People and Property

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of People to the Health Effects of PM_{10}

- *High:*
  - Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day);
  - Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- *Medium:*
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day); and,
  - Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
- *Low:*
  - Locations where human exposure is transient; and,
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A2 - Sensitivity of the Area to Human Health Impacts

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

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

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Sensitivities of Receptors to Ecological Effects

- *High:*
  - Locations with an international or national designation and the designated features may be affected by dust soiling;
  - Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain; and,
  - Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
- *Medium:*
  - Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown;
  - Locations with a national designation where the features may be affected by dust deposition; and,
  - Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
- *Low:*
  - Locations with a local designation where the features may be affected by dust deposition; and,
  - Indicative example is a local Nature Reserve with dust sensitive features.

The sensitivity of the area should be derived for each of the four activities: demolition, construction, earthworks and trackout, using the following table:

Table A3 - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Note - The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As a general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in step 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

Step 2C - Defining the Risk of Impacts

The risk of impacts with no mitigation is determined by combining the dust emission magnitude determined in Step 2A and the sensitivity of the area determined in Step 2B.

The following tables provide a method of assigning the level of risk for each activity.

Demolition

Table A4 - Risk of Dust Impacts, Demolition

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

Earthworks

Table A5 - Risk of Dust Impacts, Earthworks

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

Construction

Table A6 - Risk of Dust Impacts, Construction

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

Trackout

Table A7 - Risk of Dust Impacts, Trackout

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

Step 3 – Site Specific Mitigation

The dust risk categories for each of the four activities determined in Step 2C should be used to define the appropriate, site-specific mitigation measures to be adopted.

These mitigation measures are contained within section 8.2 of the IAQM Guidance on the Assessment of Dust from Demolition and Construction.

APPENDIX B ALL ASSESSED ECOLOGICAL RECEPTOR LOCATIONS

Site ID	Site	Designation	UK NGR (m)	
			X	Y
E1	Epping Forest SSSI & SAC	SSSI & SAC	540795	198856
E2	Epping Forest SSSI & SAC	SSSI & SAC	541173	199701
E3	Epping Forest SSSI & SAC	SSSI & SAC	541406	199724
E4	Epping Forest SSSI & SAC	SSSI & SAC	542152	199419
E5	Epping Forest SSSI & SAC	SSSI & SAC	542359	199388
E6	Epping Forest SSSI & SAC	SSSI & SAC	542617	199414
E7	Epping Forest SSSI & SAC	SSSI & SAC	542742	199399
E8	Epping Forest SSSI & SAC	SSSI & SAC	542740	199368
E9	Epping Forest SSSI & SAC	SSSI & SAC	542700	199347
E10	Epping Forest SSSI & SAC	SSSI & SAC	543143	199623
E11	Epping Forest SSSI & SAC	SSSI & SAC	543317	199788
E12	Epping Forest SSSI & SAC	SSSI & SAC	543485	199899
E13	Epping Forest SSSI & SAC	SSSI & SAC	544054	199431
E14	Epping Forest SSSI & SAC	SSSI & SAC	544665	199227
E15	Epping Forest SSSI & SAC	SSSI & SAC	543190	198831
E16	Epping Forest SSSI & SAC	SSSI & SAC	543053	198679
E17	Epping Forest SSSI & SAC	SSSI & SAC	542784	198811
E18	Epping Forest SSSI & SAC	SSSI & SAC	542703	198923
E19	Epping Forest SSSI & SAC	SSSI & SAC	542638	198910
E20	Epping Forest SSSI & SAC	SSSI & SAC	542633	198796
E21	Epping Forest SSSI & SAC	SSSI & SAC	542258	199249
E22	Epping Forest SSSI & SAC	SSSI & SAC	542241	199223
E23	Epping Forest SSSI & SAC	SSSI & SAC	542049	198862
E24*	Epping Forest SSSI & SAC	SSSI & SAC	538020	194761
E25	Epping Forest SSSI & SAC	SSSI & SAC	537761	196114
E26	Cornmill Stream & Old River Lea SSSI	SSSI	537903	200767
E27	Cornmill Stream & Old River Lea SSSI	SSSI	538187	200942
E28*	Chingford Reservoirs	SSSI	537761	197623
E29*	Chingford Reservoirs	SSSI	537598	196373
E30*	Chingford Reservoirs	SSSI	537543	195583
E31*	Chingford Reservoirs	SSSI	537269	195135
A1_4m	HRA SAC Transect Receptor Locations	SAC	542876	199590
A1_10m	HRA SAC Transect Receptor Locations	SAC	542871	199593
A1_20m	HRA SAC Transect Receptor Locations	SAC	542864	199600
A1_30m	HRA SAC Transect Receptor Locations	SAC	542856	199606
A1_40m	HRA SAC Transect Receptor Locations	SAC	542848	199613
A1_50m	HRA SAC Transect Receptor Locations	SAC	542841	199619
A1_60m	HRA SAC Transect Receptor Locations	SAC	542833	199626
A1_70m	HRA SAC Transect Receptor Locations	SAC	542825	199632
A1_80m	HRA SAC Transect Receptor Locations	SAC	542818	199638
A1_90m	HRA SAC Transect Receptor Locations	SAC	542810	199645

A1_100m	HRA SAC Transect Receptor Locations	SAC	542802	199651
A1_110m	HRA SAC Transect Receptor Locations	SAC	542795	199658
A1_120m	HRA SAC Transect Receptor Locations	SAC	542787	199664
A1_130m	HRA SAC Transect Receptor Locations	SAC	542779	199671
A1_140m	HRA SAC Transect Receptor Locations	SAC	542772	199677
A1_150m	HRA SAC Transect Receptor Locations	SAC	542764	199683
A1_160m	HRA SAC Transect Receptor Locations	SAC	542756	199690
A1_170m	HRA SAC Transect Receptor Locations	SAC	542749	199696
A1_180m	HRA SAC Transect Receptor Locations	SAC	542741	199703
A1_190m	HRA SAC Transect Receptor Locations	SAC	542734	199709
A1_200m	HRA SAC Transect Receptor Locations	SAC	542726	199716
A2_1m	HRA SAC Transect Receptor Locations	SAC	543119	199789
A2_10m	HRA SAC Transect Receptor Locations	SAC	543126	199784
A2_20m	HRA SAC Transect Receptor Locations	SAC	543134	199779
A2_30m	HRA SAC Transect Receptor Locations	SAC	543143	199773
A2_40m	HRA SAC Transect Receptor Locations	SAC	543151	199767
A2_50m	HRA SAC Transect Receptor Locations	SAC	543159	199761
A2_60m	HRA SAC Transect Receptor Locations	SAC	543167	199756
A2_70m	HRA SAC Transect Receptor Locations	SAC	543175	199750
A2_80m	HRA SAC Transect Receptor Locations	SAC	543184	199744
A2_90m	HRA SAC Transect Receptor Locations	SAC	543192	199738
A2_100m	HRA SAC Transect Receptor Locations	SAC	543200	199733
A2_110m	HRA SAC Transect Receptor Locations	SAC	543208	199727
A2_120m	HRA SAC Transect Receptor Locations	SAC	543216	199721
A2_130m	HRA SAC Transect Receptor Locations	SAC	543225	199715
A2_140m	HRA SAC Transect Receptor Locations	SAC	543233	199710
A2_150m	HRA SAC Transect Receptor Locations	SAC	543241	199704
A2_160m	HRA SAC Transect Receptor Locations	SAC	543249	199698
A2_170m	HRA SAC Transect Receptor Locations	SAC	543257	199693
A2_180m	HRA SAC Transect Receptor Locations	SAC	543265	199687
A2_190m	HRA SAC Transect Receptor Locations	SAC	543274	199681
A2_200m	HRA SAC Transect Receptor Locations	SAC	543282	199675
A3_1m	HRA SAC Transect Receptor Locations	SAC	544379	200867
A3_10m	HRA SAC Transect Receptor Locations	SAC	544385	200861
A3_20m	HRA SAC Transect Receptor Locations	SAC	544392	200854
A3_30m	HRA SAC Transect Receptor Locations	SAC	544399	200847
A3_40m	HRA SAC Transect Receptor Locations	SAC	544406	200840
A3_50m	HRA SAC Transect Receptor Locations	SAC	544413	200833
A3_60m	HRA SAC Transect Receptor Locations	SAC	544420	200826
A3_70m	HRA SAC Transect Receptor Locations	SAC	544428	200819
A3_80m	HRA SAC Transect Receptor Locations	SAC	544435	200811
A3_90m	HRA SAC Transect Receptor Locations	SAC	544442	200804
A3_100m	HRA SAC Transect Receptor Locations	SAC	544449	200797
A3_110m	HRA SAC Transect Receptor Locations	SAC	544456	200790
A3_120m	HRA SAC Transect Receptor Locations	SAC	544463	200783

A3_130m	HRA SAC Transect Receptor Locations	SAC	544470	200776
A3_140m	HRA SAC Transect Receptor Locations	SAC	544477	200769
A3_150m	HRA SAC Transect Receptor Locations	SAC	544484	200762
A3_160m	HRA SAC Transect Receptor Locations	SAC	544491	200755
A3_170m	HRA SAC Transect Receptor Locations	SAC	544498	200748
A3_180m	HRA SAC Transect Receptor Locations	SAC	544505	200741
A3_190m	HRA SAC Transect Receptor Locations	SAC	544512	200734
A3_200m	HRA SAC Transect Receptor Locations	SAC	544519	200727
B1_1m	HRA SAC Transect Receptor Locations	SAC	542932	199394
B1_10m	HRA SAC Transect Receptor Locations	SAC	542932	199385
B1_20m	HRA SAC Transect Receptor Locations	SAC	542932	199375
B1_30m	HRA SAC Transect Receptor Locations	SAC	542932	199365
B1_40m	HRA SAC Transect Receptor Locations	SAC	542932	199355
B1_50m	HRA SAC Transect Receptor Locations	SAC	542932	199345
B1_60m	HRA SAC Transect Receptor Locations	SAC	542932	199335
B1_70m	HRA SAC Transect Receptor Locations	SAC	542932	199325
B1_80m	HRA SAC Transect Receptor Locations	SAC	542932	199315
B1_90m	HRA SAC Transect Receptor Locations	SAC	542932	199305
B1_100m	HRA SAC Transect Receptor Locations	SAC	542932	199295
B1_110m	HRA SAC Transect Receptor Locations	SAC	542932	199285
B1_120m	HRA SAC Transect Receptor Locations	SAC	542932	199275
B1_130m	HRA SAC Transect Receptor Locations	SAC	542932	199265
B1_140m	HRA SAC Transect Receptor Locations	SAC	542932	199255
B1_150m	HRA SAC Transect Receptor Locations	SAC	542932	199245
B1_160m	HRA SAC Transect Receptor Locations	SAC	542932	199235
B1_170m	HRA SAC Transect Receptor Locations	SAC	542932	199225
B1_180m	HRA SAC Transect Receptor Locations	SAC	542932	199215
B1_190m	HRA SAC Transect Receptor Locations	SAC	542932	199205
B1_200m	HRA SAC Transect Receptor Locations	SAC	542932	199195
B2_1m	HRA SAC Transect Receptor Locations	SAC	543181	199458
B2_10m	HRA SAC Transect Receptor Locations	SAC	543178	199466
B2_20m	HRA SAC Transect Receptor Locations	SAC	543174	199476
B2_30m	HRA SAC Transect Receptor Locations	SAC	543171	199485
B2_40m	HRA SAC Transect Receptor Locations	SAC	543167	199495
B2_50m	HRA SAC Transect Receptor Locations	SAC	543164	199504
B2_60m	HRA SAC Transect Receptor Locations	SAC	543161	199513
B2_70m	HRA SAC Transect Receptor Locations	SAC	543157	199523
B2_80m	HRA SAC Transect Receptor Locations	SAC	543154	199532
B2_90m	HRA SAC Transect Receptor Locations	SAC	543150	199542
B2_100m	HRA SAC Transect Receptor Locations	SAC	543147	199551
B2_110m	HRA SAC Transect Receptor Locations	SAC	543143	199560
B2_120m	HRA SAC Transect Receptor Locations	SAC	543140	199570
B2_130m	HRA SAC Transect Receptor Locations	SAC	543137	199579
B2_140m	HRA SAC Transect Receptor Locations	SAC	543133	199589
B2_150m	HRA SAC Transect Receptor Locations	SAC	543130	199598

B2_160m	HRA SAC Transect Receptor Locations	SAC	543126	199607
B2_170m	HRA SAC Transect Receptor Locations	SAC	543123	199617
B2_180m	HRA SAC Transect Receptor Locations	SAC	543119	199626
B2_190m	HRA SAC Transect Receptor Locations	SAC	543116	199636
B2_200m	HRA SAC Transect Receptor Locations	SAC	543113	199645
C1_1m	HRA SAC Transect Receptor Locations	SAC	542703	199133
C1_10m	HRA SAC Transect Receptor Locations	SAC	542712	199135
C1_20m	HRA SAC Transect Receptor Locations	SAC	542722	199137
C1_30m	HRA SAC Transect Receptor Locations	SAC	542732	199138
C1_40m	HRA SAC Transect Receptor Locations	SAC	542741	199140
C1_50m	HRA SAC Transect Receptor Locations	SAC	542751	199142
C1_60m	HRA SAC Transect Receptor Locations	SAC	542761	199143
C1_70m	HRA SAC Transect Receptor Locations	SAC	542771	199145
C1_80m	HRA SAC Transect Receptor Locations	SAC	542781	199147
C1_90m	HRA SAC Transect Receptor Locations	SAC	542791	199149
C1_100m	HRA SAC Transect Receptor Locations	SAC	542801	199150
C1_110m	HRA SAC Transect Receptor Locations	SAC	542810	199152
C1_120m	HRA SAC Transect Receptor Locations	SAC	542820	199154
C1_130m	HRA SAC Transect Receptor Locations	SAC	542830	199156
C1_140m	HRA SAC Transect Receptor Locations	SAC	542840	199157
C1_150m	HRA SAC Transect Receptor Locations	SAC	542850	199159
C1_160m	HRA SAC Transect Receptor Locations	SAC	542860	199161
C1_170m	HRA SAC Transect Receptor Locations	SAC	542869	199163
C1_180m	HRA SAC Transect Receptor Locations	SAC	542879	199164
C1_190m	HRA SAC Transect Receptor Locations	SAC	542889	199166
C1_200m	HRA SAC Transect Receptor Locations	SAC	542899	199168
C2_1m	HRA SAC Transect Receptor Locations	SAC	542771	198948
C2_10m	HRA SAC Transect Receptor Locations	SAC	542764	198943
C2_20m	HRA SAC Transect Receptor Locations	SAC	542757	198936
C2_30m	HRA SAC Transect Receptor Locations	SAC	542749	198930
C2_40m	HRA SAC Transect Receptor Locations	SAC	542741	198923
C2_50m	HRA SAC Transect Receptor Locations	SAC	542734	198917
C2_60m	HRA SAC Transect Receptor Locations	SAC	542726	198910
C2_70m	HRA SAC Transect Receptor Locations	SAC	542718	198904
C2_80m	HRA SAC Transect Receptor Locations	SAC	542711	198898
C2_90m	HRA SAC Transect Receptor Locations	SAC	542703	198891
C2_100m	HRA SAC Transect Receptor Locations	SAC	542695	198885
C2_110m	HRA SAC Transect Receptor Locations	SAC	542688	198878
C2_120m	HRA SAC Transect Receptor Locations	SAC	542680	198872
C2_130m	HRA SAC Transect Receptor Locations	SAC	542672	198865
C2_140m	HRA SAC Transect Receptor Locations	SAC	542665	198859
C2_150m	HRA SAC Transect Receptor Locations	SAC	542657	198853
C2_160m	HRA SAC Transect Receptor Locations	SAC	542649	198846
C2_170m	HRA SAC Transect Receptor Locations	SAC	542642	198840
C2_180m	HRA SAC Transect Receptor Locations	SAC	542634	198833

C2_190m	HRA SAC Transect Receptor Locations	SAC	542627	198827
C2_200m	HRA SAC Transect Receptor Locations	SAC	542619	198820
D1_1m	HRA SAC Transect Receptor Locations	SAC	542481	199128
D1_10m	HRA SAC Transect Receptor Locations	SAC	542475	199134
D1_20m	HRA SAC Transect Receptor Locations	SAC	542468	199141
D1_30m	HRA SAC Transect Receptor Locations	SAC	542461	199148
D1_40m	HRA SAC Transect Receptor Locations	SAC	542454	199155
D1_50m	HRA SAC Transect Receptor Locations	SAC	542447	199162
D1_60m	HRA SAC Transect Receptor Locations	SAC	542440	199169
D1_70m	HRA SAC Transect Receptor Locations	SAC	542433	199177
D1_80m	HRA SAC Transect Receptor Locations	SAC	542425	199184
D1_90m	HRA SAC Transect Receptor Locations	SAC	542418	199191
D1_100m	HRA SAC Transect Receptor Locations	SAC	542411	199198
D1_110m	HRA SAC Transect Receptor Locations	SAC	542404	199205
D1_120m	HRA SAC Transect Receptor Locations	SAC	542397	199212
D1_130m	HRA SAC Transect Receptor Locations	SAC	542390	199219
D1_140m	HRA SAC Transect Receptor Locations	SAC	542383	199226
D1_150m	HRA SAC Transect Receptor Locations	SAC	542376	199233
D1_160m	HRA SAC Transect Receptor Locations	SAC	542369	199240
D1_170m	HRA SAC Transect Receptor Locations	SAC	542362	199247
D1_180m	HRA SAC Transect Receptor Locations	SAC	542355	199254
D1_190m	HRA SAC Transect Receptor Locations	SAC	542348	199261
D1_200m	HRA SAC Transect Receptor Locations	SAC	542341	199268
D2_1m	HRA SAC Transect Receptor Locations	SAC	542390	199008
D2_10m	HRA SAC Transect Receptor Locations	SAC	542396	199002
D2_20m	HRA SAC Transect Receptor Locations	SAC	542403	198995
D2_30m	HRA SAC Transect Receptor Locations	SAC	542410	198988
D2_40m	HRA SAC Transect Receptor Locations	SAC	542417	198981
D2_50m	HRA SAC Transect Receptor Locations	SAC	542424	198974
D2_60m	HRA SAC Transect Receptor Locations	SAC	542431	198967
D2_70m	HRA SAC Transect Receptor Locations	SAC	542439	198960
D2_80m	HRA SAC Transect Receptor Locations	SAC	542446	198952
D2_90m	HRA SAC Transect Receptor Locations	SAC	542453	198945
D2_100m	HRA SAC Transect Receptor Locations	SAC	542460	198938
D2_110m	HRA SAC Transect Receptor Locations	SAC	542467	198931
D2_120m	HRA SAC Transect Receptor Locations	SAC	542474	198924
D2_130m	HRA SAC Transect Receptor Locations	SAC	542481	198917
D2_140m	HRA SAC Transect Receptor Locations	SAC	542488	198910
D2_150m	HRA SAC Transect Receptor Locations	SAC	542495	198903
D2_160m	HRA SAC Transect Receptor Locations	SAC	542502	198896
D2_170m	HRA SAC Transect Receptor Locations	SAC	542509	198889
D2_180m	HRA SAC Transect Receptor Locations	SAC	542516	198882
D2_190m	HRA SAC Transect Receptor Locations	SAC	542523	198875
D2_200m	HRA SAC Transect Receptor Locations	SAC	542530	198868
E1_1m	HRA SAC Transect Receptor Locations	SAC	542236	199404

E1_10m	HRA SAC Transect Receptor Locations	SAC	542236	199395
E1_20m	HRA SAC Transect Receptor Locations	SAC	542236	199385
E1_30m	HRA SAC Transect Receptor Locations	SAC	542236	199375
E1_40m	HRA SAC Transect Receptor Locations	SAC	542236	199365
E1_50m	HRA SAC Transect Receptor Locations	SAC	542236	199355
E1_60m	HRA SAC Transect Receptor Locations	SAC	542236	199345
E1_70m	HRA SAC Transect Receptor Locations	SAC	542236	199335
E1_80m	HRA SAC Transect Receptor Locations	SAC	542236	199325
E1_90m	HRA SAC Transect Receptor Locations	SAC	542236	199315
E1_100m	HRA SAC Transect Receptor Locations	SAC	542236	199305
E1_110m	HRA SAC Transect Receptor Locations	SAC	542236	199295
E1_120m	HRA SAC Transect Receptor Locations	SAC	542236	199285
E1_130m	HRA SAC Transect Receptor Locations	SAC	542236	199275
E1_140m	HRA SAC Transect Receptor Locations	SAC	542236	199265
E1_150m	HRA SAC Transect Receptor Locations	SAC	542236	199255
E1_160m	HRA SAC Transect Receptor Locations	SAC	542236	199245
E1_170m	HRA SAC Transect Receptor Locations	SAC	542236	199235
E1_180m	HRA SAC Transect Receptor Locations	SAC	542236	199225
E1_190m	HRA SAC Transect Receptor Locations	SAC	542236	199215
E1_200m	HRA SAC Transect Receptor Locations	SAC	542236	199205
E2_1m	HRA SAC Transect Receptor Locations	SAC	542414	199429
E2_10m	HRA SAC Transect Receptor Locations	SAC	542414	199438
E2_20m	HRA SAC Transect Receptor Locations	SAC	542414	199448
E2_30m	HRA SAC Transect Receptor Locations	SAC	542414	199458
E2_40m	HRA SAC Transect Receptor Locations	SAC	542414	199468
E2_50m	HRA SAC Transect Receptor Locations	SAC	542414	199478
E2_60m	HRA SAC Transect Receptor Locations	SAC	542414	199488
E2_70m	HRA SAC Transect Receptor Locations	SAC	542414	199498
E2_80m	HRA SAC Transect Receptor Locations	SAC	542414	199508
E2_90m	HRA SAC Transect Receptor Locations	SAC	542414	199518
E2_100m	HRA SAC Transect Receptor Locations	SAC	542414	199528
E2_110m	HRA SAC Transect Receptor Locations	SAC	542414	199538
E2_120m	HRA SAC Transect Receptor Locations	SAC	542414	199548
E2_130m	HRA SAC Transect Receptor Locations	SAC	542414	199558
E2_140m	HRA SAC Transect Receptor Locations	SAC	542414	199568
E2_150m	HRA SAC Transect Receptor Locations	SAC	542414	199578
E2_160m	HRA SAC Transect Receptor Locations	SAC	542414	199588
E2_170m	HRA SAC Transect Receptor Locations	SAC	542414	199598
E2_180m	HRA SAC Transect Receptor Locations	SAC	542414	199608
E2_190m	HRA SAC Transect Receptor Locations	SAC	542414	199618
E2_200m	HRA SAC Transect Receptor Locations	SAC	542414	199628
F_1m	HRA SAC Transect Receptor Locations	SAC	544867	200332
F_10m	HRA SAC Transect Receptor Locations	SAC	544858	200335
F_20m	HRA SAC Transect Receptor Locations	SAC	544849	200337
F_30m	HRA SAC Transect Receptor Locations	SAC	544839	200340

F_40m	HRA SAC Transect Receptor Locations	SAC	544829	200342
F_50m	HRA SAC Transect Receptor Locations	SAC	544820	200345
F_60m	HRA SAC Transect Receptor Locations	SAC	544810	200348
F_70m	HRA SAC Transect Receptor Locations	SAC	544800	200350
F_80m	HRA SAC Transect Receptor Locations	SAC	544791	200353
F_90m	HRA SAC Transect Receptor Locations	SAC	544781	200355
F_100m	HRA SAC Transect Receptor Locations	SAC	544771	200358
F_110m	HRA SAC Transect Receptor Locations	SAC	544762	200360
F_120m	HRA SAC Transect Receptor Locations	SAC	544752	200363
F_130m	HRA SAC Transect Receptor Locations	SAC	544742	200366
F_140m	HRA SAC Transect Receptor Locations	SAC	544733	200368
F_150m	HRA SAC Transect Receptor Locations	SAC	544723	200371
F_160m	HRA SAC Transect Receptor Locations	SAC	544713	200373
F_170m	HRA SAC Transect Receptor Locations	SAC	544704	200376
F_180m	HRA SAC Transect Receptor Locations	SAC	544694	200379
F_190m	HRA SAC Transect Receptor Locations	SAC	544684	200381
F_200m	HRA SAC Transect Receptor Locations	SAC	544675	200384
H_0m	HRA SAC Transect Receptor Locations	SAC	541303	197475
H_5m	HRA SAC Transect Receptor Locations	SAC	541298	197476
H_10m	HRA SAC Transect Receptor Locations	SAC	541293	197477
H_15m	HRA SAC Transect Receptor Locations	SAC	541288	197478
H_20m	HRA SAC Transect Receptor Locations	SAC	541283	197479
H_30m	HRA SAC Transect Receptor Locations	SAC	541274	197481
H_40m	HRA SAC Transect Receptor Locations	SAC	541264	197482
H_50m	HRA SAC Transect Receptor Locations	SAC	541254	197484
H_60m	HRA SAC Transect Receptor Locations	SAC	541244	197486
H_70m	HRA SAC Transect Receptor Locations	SAC	541234	197488
H_80m	HRA SAC Transect Receptor Locations	SAC	541224	197489
H_90m	HRA SAC Transect Receptor Locations	SAC	541214	197491
H_100m	HRA SAC Transect Receptor Locations	SAC	541205	197493
H_125m	HRA SAC Transect Receptor Locations	SAC	541180	197497
H_150m	HRA SAC Transect Receptor Locations	SAC	541155	197501
H_175m	HRA SAC Transect Receptor Locations	SAC	541131	197506
H_200m	HRA SAC Transect Receptor Locations	SAC	541106	197510
I_1m	HRA SAC Transect Receptor Locations	SAC	541209	197232
I_6m	HRA SAC Transect Receptor Locations	SAC	541214	197231
I_11m	HRA SAC Transect Receptor Locations	SAC	541219	197230
I_16m	HRA SAC Transect Receptor Locations	SAC	541224	197229
I_21m	HRA SAC Transect Receptor Locations	SAC	541228	197229
I_31m	HRA SAC Transect Receptor Locations	SAC	541238	197227
I_41m	HRA SAC Transect Receptor Locations	SAC	541248	197225
I_51m	HRA SAC Transect Receptor Locations	SAC	541258	197223
I_61m	HRA SAC Transect Receptor Locations	SAC	541268	197222
I_71m	HRA SAC Transect Receptor Locations	SAC	541278	197220
I_81m	HRA SAC Transect Receptor Locations	SAC	541288	197218

I_91m	HRA SAC Transect Receptor Locations	SAC	541297	197216
I_101m	HRA SAC Transect Receptor Locations	SAC	541307	197215
I_126m	HRA SAC Transect Receptor Locations	SAC	541332	197210
I_151m	HRA SAC Transect Receptor Locations	SAC	541357	197206
I_176m	HRA SAC Transect Receptor Locations	SAC	541381	197202
I_201m	HRA SAC Transect Receptor Locations	SAC	541406	197197
J_0m	HRA SAC Transect Receptor Locations	SAC	541391	196941
J_5m	HRA SAC Transect Receptor Locations	SAC	541395	196945
J_10m	HRA SAC Transect Receptor Locations	SAC	541398	196948
J_15m	HRA SAC Transect Receptor Locations	SAC	541402	196952
J_20m	HRA SAC Transect Receptor Locations	SAC	541405	196955
J_30m	HRA SAC Transect Receptor Locations	SAC	541412	196962
J_40m	HRA SAC Transect Receptor Locations	SAC	541419	196969
J_50m	HRA SAC Transect Receptor Locations	SAC	541426	196976
J_60m	HRA SAC Transect Receptor Locations	SAC	541434	196983
J_70m	HRA SAC Transect Receptor Locations	SAC	541441	196990
J_80m	HRA SAC Transect Receptor Locations	SAC	541448	196998
J_90m	HRA SAC Transect Receptor Locations	SAC	541455	197005
J_100m	HRA SAC Transect Receptor Locations	SAC	541462	197012
J_125m	HRA SAC Transect Receptor Locations	SAC	541480	197029
J_150m	HRA SAC Transect Receptor Locations	SAC	541497	197047
J_175m	HRA SAC Transect Receptor Locations	SAC	541515	197065
J_200m	HRA SAC Transect Receptor Locations	SAC	541533	197082
K_0m	HRA SAC Transect Receptor Locations	SAC	541107	196903
K_5m	HRA SAC Transect Receptor Locations	SAC	541102	196903
K_10m	HRA SAC Transect Receptor Locations	SAC	541097	196904
K_15m	HRA SAC Transect Receptor Locations	SAC	541092	196904
K_20m	HRA SAC Transect Receptor Locations	SAC	541087	196904
K_30m	HRA SAC Transect Receptor Locations	SAC	541077	196905
K_40m	HRA SAC Transect Receptor Locations	SAC	541067	196906
K_50m	HRA SAC Transect Receptor Locations	SAC	541057	196907
K_60m	HRA SAC Transect Receptor Locations	SAC	541047	196908
K_70m	HRA SAC Transect Receptor Locations	SAC	541037	196909
K_80m	HRA SAC Transect Receptor Locations	SAC	541027	196910
K_90m	HRA SAC Transect Receptor Locations	SAC	541017	196911
K_100m	HRA SAC Transect Receptor Locations	SAC	541007	196911
K_125m	HRA SAC Transect Receptor Locations	SAC	540982	196914
K_150m	HRA SAC Transect Receptor Locations	SAC	540958	196916
K_175m	HRA SAC Transect Receptor Locations	SAC	540933	196918
K_200m	HRA SAC Transect Receptor Locations	SAC	540908	196920
L_0m	HRA SAC Transect Receptor Locations	SAC	541074	197280
L_5m	HRA SAC Transect Receptor Locations	SAC	541071	197276
L_10m	HRA SAC Transect Receptor Locations	SAC	541067	197273
L_15m	HRA SAC Transect Receptor Locations	SAC	541064	197269
L_20m	HRA SAC Transect Receptor Locations	SAC	541060	197266

L_30m	HRA SAC Transect Receptor Locations	SAC	541053	197259
L_40m	HRA SAC Transect Receptor Locations	SAC	541046	197251
L_50m	HRA SAC Transect Receptor Locations	SAC	541039	197244
L_60m	HRA SAC Transect Receptor Locations	SAC	541032	197237
L_70m	HRA SAC Transect Receptor Locations	SAC	541025	197230
L_80m	HRA SAC Transect Receptor Locations	SAC	541018	197223
L_90m	HRA SAC Transect Receptor Locations	SAC	541011	197216
L_100m	HRA SAC Transect Receptor Locations	SAC	541003	197209
L_125m	HRA SAC Transect Receptor Locations	SAC	540986	197191
L_150m	HRA SAC Transect Receptor Locations	SAC	540968	197174
L_175m	HRA SAC Transect Receptor Locations	SAC	540950	197156
L_200m	HRA SAC Transect Receptor Locations	SAC	540933	197138
M_0m	HRA SAC Transect Receptor Locations	SAC	540994	197855
M_5m	HRA SAC Transect Receptor Locations	SAC	540990	197858
M_10m	HRA SAC Transect Receptor Locations	SAC	540986	197860
M_15m	HRA SAC Transect Receptor Locations	SAC	540982	197863
M_20m	HRA SAC Transect Receptor Locations	SAC	540978	197866
M_30m	HRA SAC Transect Receptor Locations	SAC	540970	197872
M_40m	HRA SAC Transect Receptor Locations	SAC	540961	197878
M_50m	HRA SAC Transect Receptor Locations	SAC	540953	197883
M_60m	HRA SAC Transect Receptor Locations	SAC	540945	197889
M_70m	HRA SAC Transect Receptor Locations	SAC	540937	197895
M_80m	HRA SAC Transect Receptor Locations	SAC	540929	197901
M_90m	HRA SAC Transect Receptor Locations	SAC	540921	197906
M_100m	HRA SAC Transect Receptor Locations	SAC	540912	197912
M_125m	HRA SAC Transect Receptor Locations	SAC	540892	197926
M_150m	HRA SAC Transect Receptor Locations	SAC	540871	197941
M_175m	HRA SAC Transect Receptor Locations	SAC	540851	197955
M_200m	HRA SAC Transect Receptor Locations	SAC	540830	197969
N_0m	HRA SAC Transect Receptor Locations	SAC	540953	197522
N_5m	HRA SAC Transect Receptor Locations	SAC	540951	197527
N_10m	HRA SAC Transect Receptor Locations	SAC	540949	197532
N_15m	HRA SAC Transect Receptor Locations	SAC	540948	197536
N_20m	HRA SAC Transect Receptor Locations	SAC	540946	197541
N_30m	HRA SAC Transect Receptor Locations	SAC	540943	197550
N_40m	HRA SAC Transect Receptor Locations	SAC	540939	197560
N_50m	HRA SAC Transect Receptor Locations	SAC	540936	197569
N_60m	HRA SAC Transect Receptor Locations	SAC	540932	197579
N_70m	HRA SAC Transect Receptor Locations	SAC	540929	197588
N_80m	HRA SAC Transect Receptor Locations	SAC	540926	197597
N_90m	HRA SAC Transect Receptor Locations	SAC	540922	197607
N_100m	HRA SAC Transect Receptor Locations	SAC	540919	197616
N_125m	HRA SAC Transect Receptor Locations	SAC	540910	197640
N_150m	HRA SAC Transect Receptor Locations	SAC	540902	197663
N_175m	HRA SAC Transect Receptor Locations	SAC	540893	197687

N_200m	HRA SAC Transect Receptor Locations	SAC	540884	197710
O_2.5m	HRA SAC Transect Receptor Locations	SAC	541272	199714
O_7.5m	HRA SAC Transect Receptor Locations	SAC	541272	199709
O_12.5m	HRA SAC Transect Receptor Locations	SAC	541272	199704
O_17.5m	HRA SAC Transect Receptor Locations	SAC	541272	199699
O_22.5m	HRA SAC Transect Receptor Locations	SAC	541272	199694
O_32.5m	HRA SAC Transect Receptor Locations	SAC	541272	199684
O_42.5m	HRA SAC Transect Receptor Locations	SAC	541272	199674
O_52.5m	HRA SAC Transect Receptor Locations	SAC	541272	199664
O_62.5m	HRA SAC Transect Receptor Locations	SAC	541272	199654
O_72.5m	HRA SAC Transect Receptor Locations	SAC	541272	199644
O_82.5m	HRA SAC Transect Receptor Locations	SAC	541272	199634
O_92.5m	HRA SAC Transect Receptor Locations	SAC	541272	199624
O_102.5m	HRA SAC Transect Receptor Locations	SAC	541272	199614
O_127.5m	HRA SAC Transect Receptor Locations	SAC	541272	199589
O_152.5m	HRA SAC Transect Receptor Locations	SAC	541272	199564
O_177.5m	HRA SAC Transect Receptor Locations	SAC	541272	199539
O_202.5m	HRA SAC Transect Receptor Locations	SAC	541272	199514
P_1m	HRA SAC Transect Receptor Locations	SAC	542736	199369
P_6m	HRA SAC Transect Receptor Locations	SAC	542740	199366
P_11m	HRA SAC Transect Receptor Locations	SAC	542744	199362
P_16m	HRA SAC Transect Receptor Locations	SAC	542748	199359
P_21m	HRA SAC Transect Receptor Locations	SAC	542751	199356
P_31m	HRA SAC Transect Receptor Locations	SAC	542759	199350
P_41m	HRA SAC Transect Receptor Locations	SAC	542767	199343
P_51m	HRA SAC Transect Receptor Locations	SAC	542774	199337
P_61m	HRA SAC Transect Receptor Locations	SAC	542782	199330
P_71m	HRA SAC Transect Receptor Locations	SAC	542790	199324
P_81m	HRA SAC Transect Receptor Locations	SAC	542797	199317
P_91m	HRA SAC Transect Receptor Locations	SAC	542805	199311
P_101m	HRA SAC Transect Receptor Locations	SAC	542813	199305
P_126m	HRA SAC Transect Receptor Locations	SAC	542832	199288
P_151m	HRA SAC Transect Receptor Locations	SAC	542851	199272
P_176m	HRA SAC Transect Receptor Locations	SAC	542870	199256
P_201m	HRA SAC Transect Receptor Locations	SAC	542889	199240
*Located within AQMA				

APPENDIX C THEORETICAL SCENARIO (NO REDUCTION IN UK FLEET EMISSIONS OVER TIME) RESULTS

Scenario Context

This additional theoretical scenario uses emission factors for 2018 for the 'do minimum' and 'do something' based on a recent appeal decision (planning reference no.APP/D3830/A/14/22269877) that favoured the uncertainty of emissions forecasts. It should be noted that this is a theoretical scenario which assumes that the government (Defra) predictions for reductions in emissions over the forthcoming years will not occur. This should not be considered as a 'more correct' scenario in accordance with the 2010 note [http://laqm.defra.gov.uk/laqm-faqs/faq5.html] which confirms that: '*There is no evidence to suggest that background concentrations associated with the other (non-traffic) source contributions should not behave as forecast. This disparity in the historical data highlights the uncertainty of future year projections of both NO_X and NO_2, but at this stage there is no robust evidence upon which to base any revised road traffic emissions projections."*

The two assessment scenarios are defined below:

- 2022 'Do Minimum' Theoretical Scenario = Baseline conditions + Cumulative Development flows (TEMPro'd) (**using 2019 traffic emission factors**); and,
- 2022 'Do Something' Theoretical Scenario = Baseline conditions + Cumulative Development + The Proposed Development flows (**using 2019 traffic emission factors**).

Nitrogen Dioxide

Table C-1. Theoretical Scenario Average Concentrations of NO_2 at Receptor Locations

Receptor		NO_2 (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	20.49	20.58	20.58	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	20.22	20.28	20.28	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	22.71	22.82	22.82	<0.01
R4	63 Leven Drive, Waltham Cross	26.49	26.55	26.55	<0.01
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	28.72	28.91	28.91	<0.01
R6*	963 Hertford Road, Waltham Cross	27.40	27.51	27.51	<0.01
R7*	44 Arlington Crescent, Waltham Cross	36.07	36.40	36.41	0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	21.42	21.46	21.46	<0.01

R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	25.68	25.81	25.81	<0.01
R10*	83 Queens Road, Waltham Cross	30.86	31.09	31.10	0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	28.50	28.69	28.70	0.01
R12	79 Fisher Close, Waltham Cross	22.84	22.94	22.95	0.01
R13	20 Grove Court, Waltham Abbey	23.57	23.69	23.70	0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	25.80	25.97	25.97	<0.01
R15	91 Crooked Mile, Waltham Abbey	19.24	19.34	19.35	0.01
R16	62a Crooked Mile, Waltham Abbey	26.76	26.93	26.93	<0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	24.95	25.08	25.09	0.01
R18	1 Monkswood Avenue, Waltham Abbey	24.98	25.11	25.12	0.01
R19	16a Sewardstone Road, Waltham Abbey	25.96	26.11	26.11	<0.01
R20	2 Farm Hill Road, Waltham Abbey	27.29	27.47	27.47	<0.01
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	23.04	23.13	23.14	0.01
R22	3 Eastbrook Road, Waltham Abbey	24.40	24.57	24.57	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	19.98	20.06	20.06	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	30.16	30.32	30.32	<0.01
R25	2 Horseshoe Close, Waltham Abbey	18.76	18.82	18.82	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	26.55	26.64	26.64	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	36.24	36.53	36.53	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	19.08	19.11	19.11	<0.01
R29	2 Woodgreen Road, Waltham Abbey	24.31	24.41	24.41	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	26.12	26.30	26.31	0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	22.80	22.91	22.92	0.01
R32	The Lodge, Woodredon Farm, Woodredon Farm	19.14	19.17	19.18	0.01

	Lane, Waltham Abbey				
R33	Old Keppers Lodge, Woodredon Hill, Epping	18.87	18.94	18.94	<0.01
R34*	204 Kings Head Hill, London	25.79	25.94	25.95	0.01
R35*	43 Redwood Gardens, London	23.80	23.91	23.92	0.01
R36	1 Baden Drive	20.12	20.17	20.18	0.01
R37	Dunmain House, Sewardstone Road, London	21.70	21.79	21.81	0.02
R38	Amesbury Mead Farm, Sewardstone Road, London	18.72	18.76	18.78	0.02
R39	Maycroft, Sewardstone Road, London	19.97	20.03	20.06	0.03
R40	Chestnuts, Avey Lane, Waltham Abbey	28.53	28.69	28.75	0.06
R41	1-18 Burrows Close, Waltham Abbey	27.29	27.41	27.44	0.03
R42	30 Beechfield Walk, Waltham Abbey	27.41	27.54	27.55	0.01
R43	1 Beechfield Walk, Waltham Abbey	32.50	32.72	32.73	0.01
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	26.21	26.37	26.38	0.01
R45	14 Roman Way, Waltham Abbey	25.97	26.05	26.06	0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	29.24	29.40	29.41	0.01
R47	6 Godwin Close, Sewardstone Road, London	20.32	20.41	20.45	0.04
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	20.04	20.13	20.22	0.09
R49	2 Hamlet Gate, Sewardstone Road, London	22.21	22.32	22.38	0.06
R50	Hideaway, Green Lane, Bury Road, London	16.23	16.23	16.24	0.01
R51	Woodsprite, Green Lane, Bury Road, London	16.23	16.24	16.24	<0.01
R52	Parsons Croft, Gilwell Park, London	17.21	17.22	17.22	<0.01
D1	Woodsprite, Green Lane, Bury Road	16.23	16.24	16.24	<0.01
D2	Silver Timbers, Green Lane, Bury Road	16.23	16.24	16.24	<0.01
D3	Hideaway, Green Lane, Bury Road	16.23	16.24	16.24	<0.01
D4	Carrolls Farm, Bury Road	17.16	17.17	17.17	<0.01
D5	Parsons Croft, Gilwell Park	17.21	17.22	17.22	<0.01
D6	Oliver’s, Daws Hill	17.22	17.23	17.23	<0.01
D7	Woodlands Bungalow, Sewardstone Road	18.55	18.59	18.60	0.01
D8	White House, Sewardstone	18.40	18.43	18.44	0.01

	Road				
D9	1 the Beeches, Sewardstone Road	18.34	18.37	18.38	0.01
D10	Chapelfield Nursery	17.78	17.79	17.80	0.01
D11	Hillview, Sewardstone Road	19.44	19.49	19.52	0.03
D12	Netherhouse Farm	18.05	18.08	18.09	0.01
D13	Liran, Mott Street	18.07	18.09	18.10	0.01
D14	Cottage 2, Golden Row, Mott Street	17.53	17.54	17.55	0.01
D15	Lipitt's End, Mott Street	16.01	16.02	16.03	0.01
D16	Pin-Hi, Lippitts Hill	15.92	15.93	15.93	<0.01
D17	1 Owl Park, Lippitts Hill	15.91	15.92	15.92	<0.01
Annual Mean AQO		**40 µg/m3**			
*Located within AQMA					

All modelled existing receptors are predicted to be below the AQO for NO_2 in both the 'do minimum' and 'do something' scenarios.

As indicated in **Table C-1.**, the highest predicted increase in the annual average exposure to PM_{10} due to changes in traffic movements associated with the development is 0.09 µg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48).

The impact description of changes in traffic flow associated with the development with respect to annual mean NO_2 exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-2.**.

Table C-2. Significance of Effects at Key Receptors (NO_2)

Impact Description of NO_2 Effects at Key Receptors					
Receptor	**Change Due to Development (DS DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R5*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	0.01	0.03	0%	76-94% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	0.01	0.03	0%	76-94% of AQO	Negligible
R11	0.01	0.03	0%	≤75% of AQO	Negligible
R12	0.01	0.03	0%	≤75% of AQO	Negligible
R13	0.01	0.03	0%	≤75% of AQO	Negligible

R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	0.01	0.03	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	0.01	0.03	0%	≤75% of AQO	Negligible
R18	0.01	0.03	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	0.01	0.03	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	76-94% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	76-94% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	0.01	0.03	0%	≤75% of AQO	Negligible
R31	0.01	0.03	0%	≤75% of AQO	Negligible
R32	0.01	0.03	0%	≤75% of AQO	Negligible
R33	<0.01	<0.01	0%	≤75% of AQO	Negligible
R34*	0.01	0.03	0%	≤75% of AQO	Negligible
R35*	0.01	0.03	0%	≤75% of AQO	Negligible
R36	0.01	0.03	0%	≤75% of AQO	Negligible
R37	0.02	0.05	0%	≤75% of AQO	Negligible
R38	0.02	0.05	0%	≤75% of AQO	Negligible
R39	0.03	0.08	0%	≤75% of AQO	Negligible
R40	0.06	0.15	0%	≤75% of AQO	Negligible
R41	0.03	0.08	0%	≤75% of AQO	Negligible
R42	0.01	0.03	0%	≤75% of AQO	Negligible
R43	0.01	0.03	0%	76-94% of AQO	Negligible
R44	0.01	0.03	0%	≤75% of AQO	Negligible
R45	0.01	0.03	0%	≤75% of AQO	Negligible
R46	0.01	0.03	0%	≤75% of AQO	Negligible
R47	0.04	0.10	0%	≤75% of AQO	Negligible
R48	0.09	0.23	0%	≤75% of AQO	Negligible
R49	0.06	0.15	0%	≤75% of AQO	Negligible
R50	0.01	0.03	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	<0.01	<0.01	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible

D7	0.01	0.03	0%	≤75% of AQO	Negligible
D8	0.01	0.03	0%	≤75% of AQO	Negligible
D9	0.01	0.03	0%	≤75% of AQO	Negligible
D10	0.01	0.03	0%	≤75% of AQO	Negligible
D11	0.03	0.08	0%	≤75% of AQO	Negligible
D12	0.01	0.03	0%	≤75% of AQO	Negligible
D13	0.01	0.03	0%	≤75% of AQO	Negligible
D14	0.01	0.03	0%	≤75% of AQO	Negligible
D15	0.01	0.03	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within AQMA					

The significance of the effects of changes in traffic flow as a result of the proposed development, with respect to NO_2 exposure for existing receptors, is determined to be ‘negligible’ at all modelled receptors. This is based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be ‘high’.

<u>Particulate Matter (PM_{10})</u>

Table C-3 presents a summary of the predicted change in annual mean PM_{10} concentrations at relevant receptor locations, due to changes in traffic flow associated with the development, based on modelled ‘do minimum’ and ‘do something’ scenarios.

Table C-3. Theoretical Scenario Average Concentrations of PM_{10} at Receptor Locations

Receptor		PM_{10} (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	17.26	17.28	17.28	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	17.42	17.43	17.43	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	17.89	17.91	17.91	<0.01
R4	63 Leven Drive, Waltham Cross	18.40	18.41	18.41	<0.01
R5*	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	18.84	18.87	18.87	<0.01
R6*	963 Hertford Road, Waltham Cross	18.64	18.65	18.65	<0.01
R7*	44 Arlington Crescent, Waltham Cross	19.41	19.45	19.45	<0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	17.77	17.78	17.78	<0.01
R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	18.32	18.34	18.34	<0.01
R10*	83 Queens Road, Waltham Cross	19.12	19.16	19.16	<0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	18.74	18.76	18.76	<0.01

R12	79 Fisher Close, Waltham Cross	17.52	17.54	17.54	<0.01
R13	20 Grove Court, Waltham Abbey	17.48	17.50	17.50	<0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	17.70	17.72	17.72	<0.01
R15	91 Crooked Mile, Waltham Abbey	16.66	16.68	16.68	<0.01
R16	62a Crooked Mile, Waltham Abbey	17.64	17.66	17.66	<0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	17.38	17.40	17.40	<0.01
R18	1 Monkswood Avenue, Waltham Abbey	17.60	17.62	17.62	<0.01
R19	16a Sewardstone Road, Waltham Abbey	17.64	17.66	17.66	<0.01
R20	2 Farm Hill Road, Waltham Abbey	17.72	17.75	17.75	<0.01
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	17.15	17.16	17.16	<0.01
R22	3 Eastbrook Road, Waltham Abbey	18.64	18.67	18.67	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	17.62	17.63	17.63	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	18.82	18.84	18.84	<0.01
R25	2 Horseshoe Close, Waltham Abbey	16.97	16.98	16.98	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	18.28	18.30	18.30	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	19.58	19.62	19.62	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	17.75	17.76	17.76	<0.01
R29	2 Woodgreen Road, Waltham Abbey	18.13	18.14	18.14	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	18.55	18.57	18.57	<0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	18.40	18.42	18.42	<0.01
R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	17.77	17.77	17.77	<0.01
R33	Old Keppers Lodge, Woodredon Hill, Epping	17.47	17.48	17.48	<0.01
R34*	204 Kings Head Hill, London	18.61	18.63	18.64	<0.01
R35*	43 Redwood Gardens, London	18.32	18.34	18.34	<0.01
R36	1 Baden Drive	16.46	16.47	16.48	<0.01
R37	Dunmain House, Sewardstone Road, London	16.80	16.82	16.83	0.01
R38	Amesbury Mead Farm, Sewardstone Road, London	16.61	16.62	16.62	<0.01
R39	Maycroft, Sewardstone Road, London	17.32	17.33	17.34	0.01
R40	Chestnuts, Avey Lane, Waltham Abbey	19.32	19.35	19.37	0.01
R41	1-18 Burrows Close, Waltham Abbey	18.69	18.71	18.71	<0.01
R42	30 Beechfield Walk, Waltham Abbey	18.64	18.66	18.66	<0.01
R43	1 Beechfield Walk, Waltham Abbey	19.21	19.24	19.24	<0.01
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	17.71	17.74	17.74	<0.01
R45	14 Roman Way, Waltham Abbey	18.04	18.06	18.06	<0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	18.90	18.92	18.92	<0.01
R47	6 Godwin Close, Sewardstone Road, London	16.95	16.96	16.97	0.01

R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	16.89	16.90	16.92	0.02
R49	2 Hamlet Gate, Sewardstone Road, London	17.82	17.85	17.86	0.01
R50	Hideaway, Green Lane, Bury Road, London	15.84	15.85	15.85	<0.01
R51	Woodsprite, Green Lane, Bury Road, London	15.84	15.85	15.85	<0.01
R52	Parsons Croft, Gilwell Park, London	16.07	16.07	16.07	<0.01
D1	Woodsprite, Green Lane, Bury Road	15.84	15.85	15.85	<0.01
D2	Silver Timbers, Green Lane, Bury Road	15.84	15.85	15.85	<0.01
D3	Hideaway, Green Lane, Bury Road	15.84	15.85	15.85	<0.01
D4	Carrolls Farm, Bury Road	16.06	16.06	16.06	<0.01
D5	Parsons Croft, Gilwell Park	16.07	16.07	16.07	<0.01
D6	Oliver's, Daws Hill	16.07	16.07	16.07	<0.01
D7	Woodlands Bungalow, Sewardstone Road	16.57	16.58	16.58	<0.01
D8	White House, Sewardstone Road	16.53	16.54	16.54	<0.01
D9	1 the Beeches, Sewardstone Road	16.52	16.53	16.53	<0.01
D10	Chapelfield Nursery	16.40	16.40	16.40	<0.01
D11	Hillview, Sewardstone Road	16.76	16.77	16.78	0.01
D12	Netherhouse Farm	16.45	16.45	16.46	<0.01
D13	Liran, Mott Street	16.91	16.91	16.91	<0.01
D14	Cottage 2, Golden Row, Mott Street	16.34	16.34	16.34	<0.01
D15	Lipitt's End, Mott Street	15.94	15.94	15.94	<0.01
D16	Pin-Hi, Lippitts Hill	15.93	15.93	15.93	<0.01
D17	1 Owl Park, Lippitts Hill	15.92	15.92	15.93	<0.01
Annual Mean AQO		**40 µg/m3**			
*Located within AQMA					

All modelled existing receptors are predicted to be below the AQO for PM_{10} in both the 'do minimum' and 'do something' scenarios.

As indicated in **Table C-3**, the highest predicted increase the annual average exposure to $PM_{2.5}$ due to changes in traffic movements associated with the development is 0.02 µg/m^3 at 1 Netherhouse Farm Cottage, Sewardstone Road, London (R48).

The impact description of changes in traffic flow associated with the development with respect to annual mean PM_{10} exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-4**.

Table C-4. Significance of Effects at Key Receptors (PM_{10})

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible

R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R *	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	<0.01	0%	≤75% of AQO	Negligible
R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	<0.01	<0.01	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	≤75% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	≤75% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	<0.01	<0.01	0%	≤75% of AQO	Negligible
R31	<0.01	<0.01	0%	≤75% of AQO	Negligible
R32	<0.01	<0.01	0%	≤75% of AQO	Negligible
R33	<0.01	<0.01	0%	≤75% of AQO	Negligible
R34*	<0.01	0.01	0%	≤75% of AQO	Negligible
R35*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R36	<0.01	0.01	0%	≤75% of AQO	Negligible
R37	0.01	0.01	0%	≤75% of AQO	Negligible
R38	<0.01	0.01	0%	≤75% of AQO	Negligible
R39	0.01	0.01	0%	≤75% of AQO	Negligible
R40	0.01	0.03	0%	≤75% of AQO	Negligible
R41	<0.01	0.01	0%	≤75% of AQO	Negligible
R42	<0.01	<0.01	0%	≤75% of AQO	Negligible
R43	<0.01	<0.01	0%	≤75% of AQO	Negligible
R44	<0.01	0.01	0%	≤75% of AQO	Negligible
R45	<0.01	<0.01	0%	≤75% of AQO	Negligible
R46	<0.01	0.01	0%	≤75% of AQO	Negligible
R47	0.01	0.03	0%	≤75% of AQO	Negligible
R48	0.02	0.04	0%	≤75% of AQO	Negligible

R49	0.01	0.03	0%	≤75% of AQO	Negligible
R50	<0.01	<0.01	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	<0.01	<0.01	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible
D7	<0.01	0.01	0%	≤75% of AQO	Negligible
D8	<0.01	0.01	0%	≤75% of AQO	Negligible
D9	<0.01	0.01	0%	≤75% of AQO	Negligible
D10	<0.01	<0.01	0%	≤75% of AQO	Negligible
D11	0.01	0.01	0%	≤75% of AQO	Negligible
D12	<0.01	0.01	0%	≤75% of AQO	Negligible
D13	<0.01	<0.01	0%	≤75% of AQO	Negligible
D14	<0.01	<0.01	0%	≤75% of AQO	Negligible
D15	<0.01	<0.01	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within AQMA					

The significance of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM$_{10}$ exposure for existing receptors is determined to be ‘negligible’ based on the methodology outlined in Section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the confidence of the assessment is deemed to be ‘high’.

Particulate Matter (PM$_{2.5}$)

Table C-5 presents a summary of the predicted change in annual mean PM$_{2.5}$ concentrations at relevant receptor locations, due to changes in traffic flow associated with the proposed development, based on modelled ‘Do Minimum’ and ‘Do Something’ scenarios.

Table C-5. Theoretical Scenario Average Concentrations of PM$_{2.5}$ at Receptor Locations

Receptor		PM$_{10}$ (µg/m^3)			
		2019 Baseline	2022 Do Minimum	2022 Do Something	Development Contribution
R1*	37 Markwick Avenue, Cheshunt, Waltham Cross	11.51	11.52	11.52	<0.01
R2*	Albury Farm, Great Cambridge Road, Cheshunt	11.44	11.45	11.45	<0.01
R3	Rush Lodge, Theobalds Lane, Waltham Cross	11.71	11.73	11.73	<0.01
R4	63 Leven Drive, Waltham Cross	12.08	12.08	12.08	<0.01

R *	Flat 9, Sawyers Court, Sturlas Way, Waltham Cross	12.37	12.39	12.39	<0.01
R6*	963 Hertford Road, Waltham Cross	12.20	12.21	12.21	<0.01
R7*	44 Arlington Crescent, Waltham Cross	12.84	12.87	12.87	<0.01
R8	The Four Swannes Primary School, King Edward Road, Waltham Cross	11.73	11.74	11.74	<0.01
R9*	Flat 14, Hyde Court, Parkside, Waltham Cross	12.08	12.10	12.10	<0.01
R10*	83 Queens Road, Waltham Cross	12.55	12.57	12.57	<0.01
R11	Flats at Britannia Court, Eleanor Cross Road, Waltham Cross	12.32	12.34	12.34	<0.01
R12	79 Fisher Close, Waltham Cross	11.55	11.57	11.57	<0.01
R13	20 Grove Court, Waltham Abbey	11.54	11.55	11.55	<0.01
R14	Flats above AMS Mortgage Finders Ltd, 47 Highbridge Street, Waltham Abbey	11.68	11.69	11.69	<0.01
R15	91 Crooked Mile, Waltham Abbey	10.88	10.89	10.89	<0.01
R16	62a Crooked Mile, Waltham Abbey	11.75	11.77	11.77	<0.01
R17	Waltham Abbey Community Association Community Centre, 46 Crooked Mile, Waltham Abbey	11.60	11.61	11.61	<0.01
R18	1 Monkswood Avenue, Waltham Abbey	11.72	11.73	11.73	<0.01
R19	16a Sewardstone Road, Waltham Abbey	11.75	11.76	11.76	<0.01
R20	2 Farm Hill Road, Waltham Abbey	11.81	11.82	11.82	<0.01
R21	Flats above Green Man Public House, Broomstick Hall Road, Waltham Abbey	11.46	11.47	11.47	<0.01
R22	3 Eastbrook Road, Waltham Abbey	12.01	12.03	12.03	<0.01
R23	The Leverton Primary School, Honey Lane, Waltham Abbey	11.43	11.44	11.44	<0.01
R24	Waltham Abbey Marriot Hotel, Old Shire Lane, Waltham Abbey	12.04	12.05	12.05	<0.01
R25	2 Horseshoe Close, Waltham Abbey	10.99	11.00	11.00	<0.01
R26	Inner Lodge, Dowding Way, Waltham Abbey	11.72	11.73	11.73	<0.01
R27	The Lodge, Honey Lane, Waltham Abbey	12.53	12.55	12.55	<0.01
R28	Mead Cottage, Pynest Green Lane, Waltham Abbey	11.31	11.31	11.31	<0.01
R29	2 Woodgreen Road, Waltham Abbey	11.53	11.53	11.53	<0.01
R30	The Coach House, Wyldwoods Woodgreen Road, Waltham Abbey	11.84	11.85	11.85	<0.01
R31	Fourways, Woodgreen Road, Waltham Abbey	11.69	11.71	11.71	<0.01

R32	The Lodge, Woodredon Farm, Woodredon Farm Lane, Waltham Abbey	11.32	11.32	11.32	<0.01
R33	Old Keppers Lodge, Woodredon Hill, Epping	11.01	11.02	11.02	<0.01
R34*	204 Kings Head Hill, London	12.07	12.08	12.08	<0.01
R35*	43 Redwood Gardens, London	11.89	11.90	11.90	<0.01
R36	1 Baden Drive	10.99	11.00	11.00	<0.01
R37	Dunmain House, Sewardstone Road, London	11.19	11.20	11.20	<0.01
R38	Amesbury Mead Farm, Sewardstone Road, London	10.93	10.93	10.93	<0.01
R39	Maycroft, Sewardstone Road, London	11.22	11.23	11.23	<0.01
R40	Chestnuts, Avey Lane, Waltham Abbey	12.36	12.38	12.39	0.01
R41	1-18 Burrows Close, Waltham Abbey	12.02	12.03	12.03	<0.01
R42	30 Beechfield Walk, Waltham Abbey	12.01	12.02	12.02	<0.01
R43	1 Beechfield Walk, Waltham Abbey	12.40	12.41	12.42	<0.01
R44	12 Nobel Villas, Sewardstone Road, Waltham Abbey	11.80	11.82	11.82	<0.01
R45	14 Roman Way, Waltham Abbey	11.82	11.83	11.83	<0.01
R46	1 Queen Marys Court, Harrison Road, Waltham Abbey	12.15	12.17	12.17	<0.01
R47	6 Godwin Close, Sewardstone Road, London	11.12	11.13	11.14	0.01
R48	1 Netherhouse Farm Cottage, Sewardstone Road, London	11.09	11.10	11.11	0.01
R49	2 Hamlet Gate, Sewardstone Road, London	11.51	11.52	11.53	0.01
R50	Hideaway, Green Lane, Bury Road, London	10.53	10.53	10.53	<0.01
R51	Woodsprite, Green Lane, Bury Road, London	10.53	10.53	10.53	<0.01
R52	Parsons Croft, Gilwell Park, London	10.69	10.69	10.69	<0.01
D1	Woodsprite, Green Lane, Bury Road	10.53	10.53	10.53	<0.01
D2	Silver Timbers, Green Lane, Bury Road	10.53	10.53	10.53	<0.01
D3	Hideaway, Green Lane, Bury Road	10.53	10.53	10.53	<0.01
D4	Carrolls Farm, Bury Road	10.69	10.69	10.69	<0.01
D5	Parsons Croft, Gilwell Park	10.69	10.69	10.69	<0.01
D6	Oliver’s, Daws Hill	10.69	10.70	10.70	<0.01
D7	Woodlands Bungalow, Sewardstone Road	10.90	10.91	10.91	<0.01
D8	White House, Sewardstone Road	10.88	10.89	10.89	<0.01
D9	1 the Beeches, Sewardstone Road	10.88	10.88	10.88	<0.01

D10	Chapelfield Nursery	10.81	10.81	10.81	<0.01
D11	Hillview, Sewardstone Road	11.01	11.02	11.02	<0.01
D12	Netherhouse Farm	10.84	10.84	10.84	<0.01
D13	Liran, Mott Street	10.99	10.99	10.99	<0.01
D14	Cottage 2, Golden Row, Mott Street	10.77	10.77	10.77	<0.01
D15	Lipitt's End, Mott Street	10.52	10.52	10.52	<0.01
D16	Pin-Hi, Lippitts Hill	10.51	10.51	10.51	<0.01
D17	1 Owl Park, Lippitts Hill	10.51	10.51	10.51	<0.01
Annual Mean AQO		**20 µg/m³**			
*Located within AQMA					

All modelled existing receptors are predicted to be below the AQO for $PM_{2.5}$ in both the 'Do Minimum' and 'Do Something' scenarios.

As indicated in **Table C-5**, the maximum predicted increase in annual average exposure to $PM_{2.5}$ at any existing receptor, due to changes in traffic movements associated with the proposed development is 0.01 µg/m³ at Chestnuts, Avey Lane (R40), 6 Godwin Close (R47), 1 Netherhouse Farm Cottage (R48) and 2 Hamlet Gate (R49).

The impact description of changes in traffic flow associated with the proposed development with respect to annual mean $PM_{2.5}$ exposure has been assessed with reference to the criteria in Section 3. The outcomes of the assessment are summarised in **Table C-6**.

Table C-6. Significance of Effects at Key Receptors ($PM_{2.5}$)

Impact Description of PM_{10} Effects at Key Receptors					
Receptor	**Change Due to Development (DS DM) (µg/m³)**	**Change due to Development (% of AQO)**	**% Change in Concentration Relative to AQO**	**% Annual Mean Concentration in Assessment Year**	**Impact Description**
R1*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R2*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R3	<0.01	<0.01	0%	≤75% of AQO	Negligible
R4	<0.01	<0.01	0%	≤75% of AQO	Negligible
R5*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R6*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R7*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R8	<0.01	<0.01	0%	≤75% of AQO	Negligible
R9*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R10*	<0.01	<0.01	0%	≤75% of AQO	Negligible
R11	<0.01	<0.01	0%	≤75% of AQO	Negligible
R12	<0.01	<0.01	0%	≤75% of AQO	Negligible
R13	<0.01	<0.01	0%	≤75% of AQO	Negligible
R14	<0.01	<0.01	0%	≤75% of AQO	Negligible
R15	<0.01	<0.01	0%	≤75% of AQO	Negligible
R16	<0.01	<0.01	0%	≤75% of AQO	Negligible
R17	<0.01	0.01	0%	≤75% of AQO	Negligible

R18	<0.01	<0.01	0%	≤75% of AQO	Negligible
R19	<0.01	<0.01	0%	≤75% of AQO	Negligible
R20	<0.01	<0.01	0%	≤75% of AQO	Negligible
R21	<0.01	<0.01	0%	≤75% of AQO	Negligible
R22	<0.01	<0.01	0%	≤75% of AQO	Negligible
R23	<0.01	<0.01	0%	≤75% of AQO	Negligible
R24	<0.01	<0.01	0%	≤75% of AQO	Negligible
R25	<0.01	<0.01	0%	≤75% of AQO	Negligible
R26	<0.01	<0.01	0%	≤75% of AQO	Negligible
R27	<0.01	<0.01	0%	≤75% of AQO	Negligible
R28	<0.01	<0.01	0%	≤75% of AQO	Negligible
R29	<0.01	<0.01	0%	≤75% of AQO	Negligible
R30	<0.01	<0.01	0%	≤75% of AQO	Negligible
R31	<0.01	<0.01	0%	≤75% of AQO	Negligible
R32	<0.01	<0.01	0%	≤75% of AQO	Negligible
R33	<0.01	<0.01	0%	≤75% of AQO	Negligible
R34*	<0.01	0.01	0%	≤75% of AQO	Negligible
R35*	<0.01	0.01	0%	≤75% of AQO	Negligible
R36	<0.01	0.01	0%	≤75% of AQO	Negligible
R37	<0.01	0.02	0%	≤75% of AQO	Negligible
R38	<0.01	0.01	0%	≤75% of AQO	Negligible
R39	<0.01	0.02	0%	≤75% of AQO	Negligible
R40	0.01	0.04	0%	≤75% of AQO	Negligible
R41	<0.01	0.01	0%	≤75% of AQO	Negligible
R42	<0.01	<0.01	0%	≤75% of AQO	Negligible
R43	<0.01	<0.01	0%	≤75% of AQO	Negligible
R44	<0.01	0.01	0%	≤75% of AQO	Negligible
R45	<0.01	<0.01	0%	≤75% of AQO	Negligible
R46	<0.01	0.01	0%	≤75% of AQO	Negligible
R47	0.01	0.03	0%	≤75% of AQO	Negligible
R48	0.01	0.05	0%	≤75% of AQO	Negligible
R49	0.01	0.04	0%	≤75% of AQO	Negligible
R50	<0.01	<0.01	0%	≤75% of AQO	Negligible
R51	<0.01	<0.01	0%	≤75% of AQO	Negligible
R52	<0.01	<0.01	0%	≤75% of AQO	Negligible
D1	<0.01	<0.01	0%	≤75% of AQO	Negligible
D2	<0.01	<0.01	0%	≤75% of AQO	Negligible
D3	<0.01	<0.01	0%	≤75% of AQO	Negligible
D4	<0.01	<0.01	0%	≤75% of AQO	Negligible
D5	<0.01	<0.01	0%	≤75% of AQO	Negligible
D6	<0.01	<0.01	0%	≤75% of AQO	Negligible
D7	<0.01	0.01	0%	≤75% of AQO	Negligible
D8	<0.01	0.01	0%	≤75% of AQO	Negligible
D9	<0.01	0.01	0%	≤75% of AQO	Negligible
D10	<0.01	<0.01	0%	≤75% of AQO	Negligible

D11	<0.01	0.02	0%	≤75% of AQO	Negligible
D12	<0.01	0.01	0%	≤75% of AQO	Negligible
D13	<0.01	<0.01	0%	≤75% of AQO	Negligible
D14	<0.01	<0.01	0%	≤75% of AQO	Negligible
D15	<0.01	<0.01	0%	≤75% of AQO	Negligible
D16	<0.01	<0.01	0%	≤75% of AQO	Negligible
D17	<0.01	<0.01	0%	≤75% of AQO	Negligible
*0% means a change of <0.5% as per explanatory note 2 of table 6.3 of the EPUK IAQM Guidance.					
*Located within AQMA					

The impact description of the effects of changes in traffic as a result of the proposed development, with respect to annual mean PM_{10} exposure for existing receptors is determined to be 'negligible' based on the methodology outlined in section 3. Given the quantitative nature of the assessment and the verification of the air quality dispersion model, the level of accuracy of the assessment results is considered to be 'high'.

Figure C-1. ADMS Traffic Modelling Assessment Area Including Receptors Locations

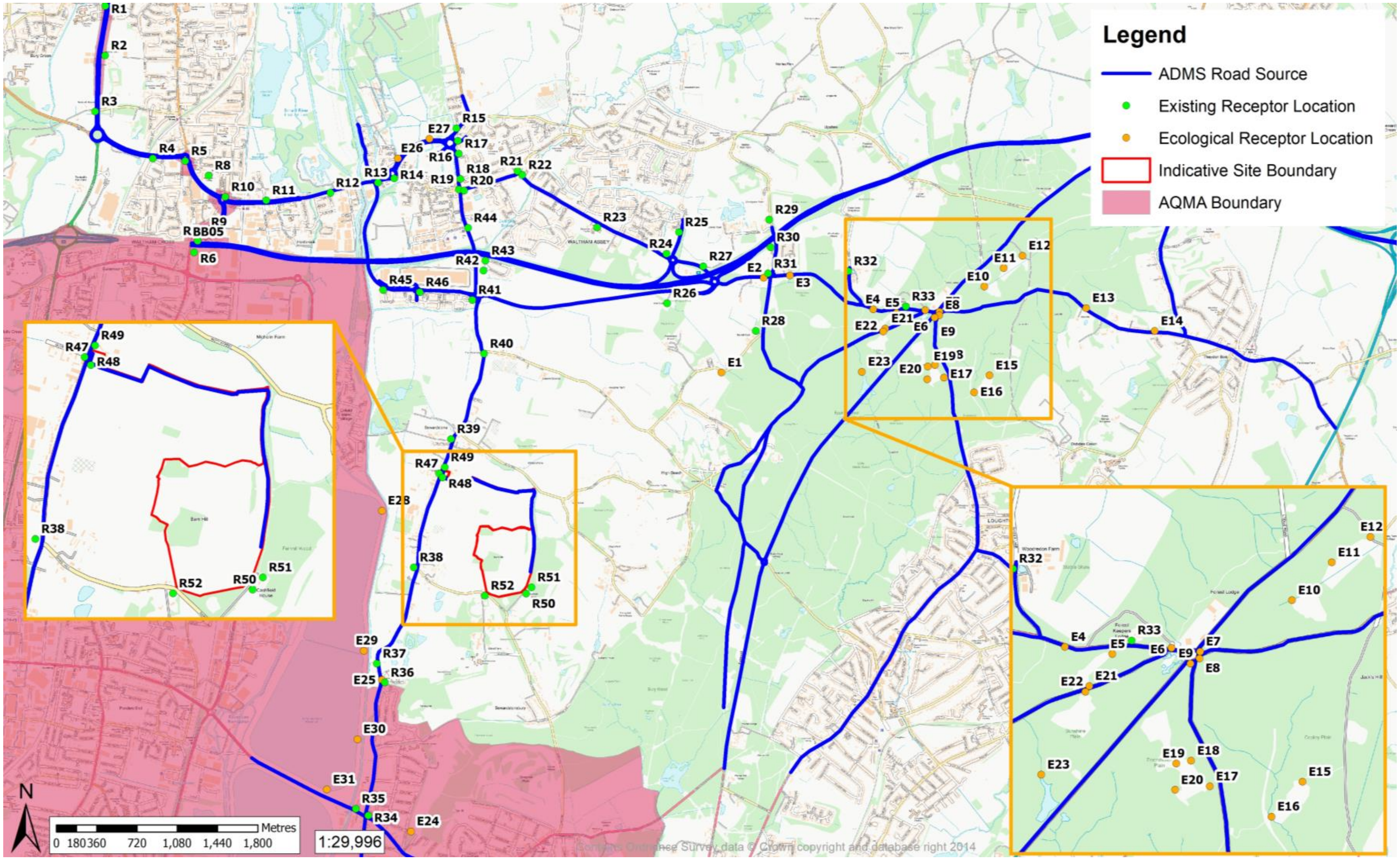
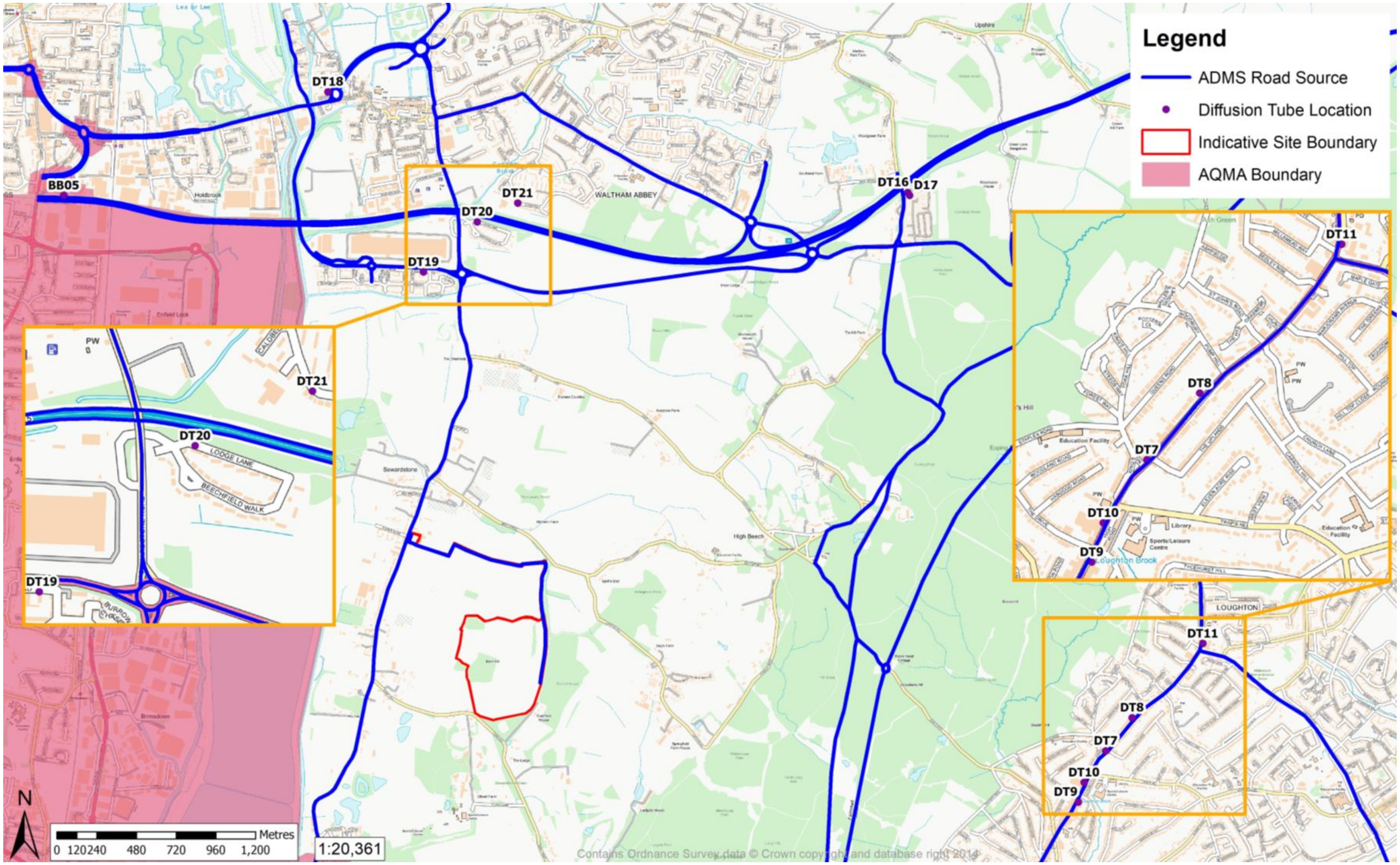
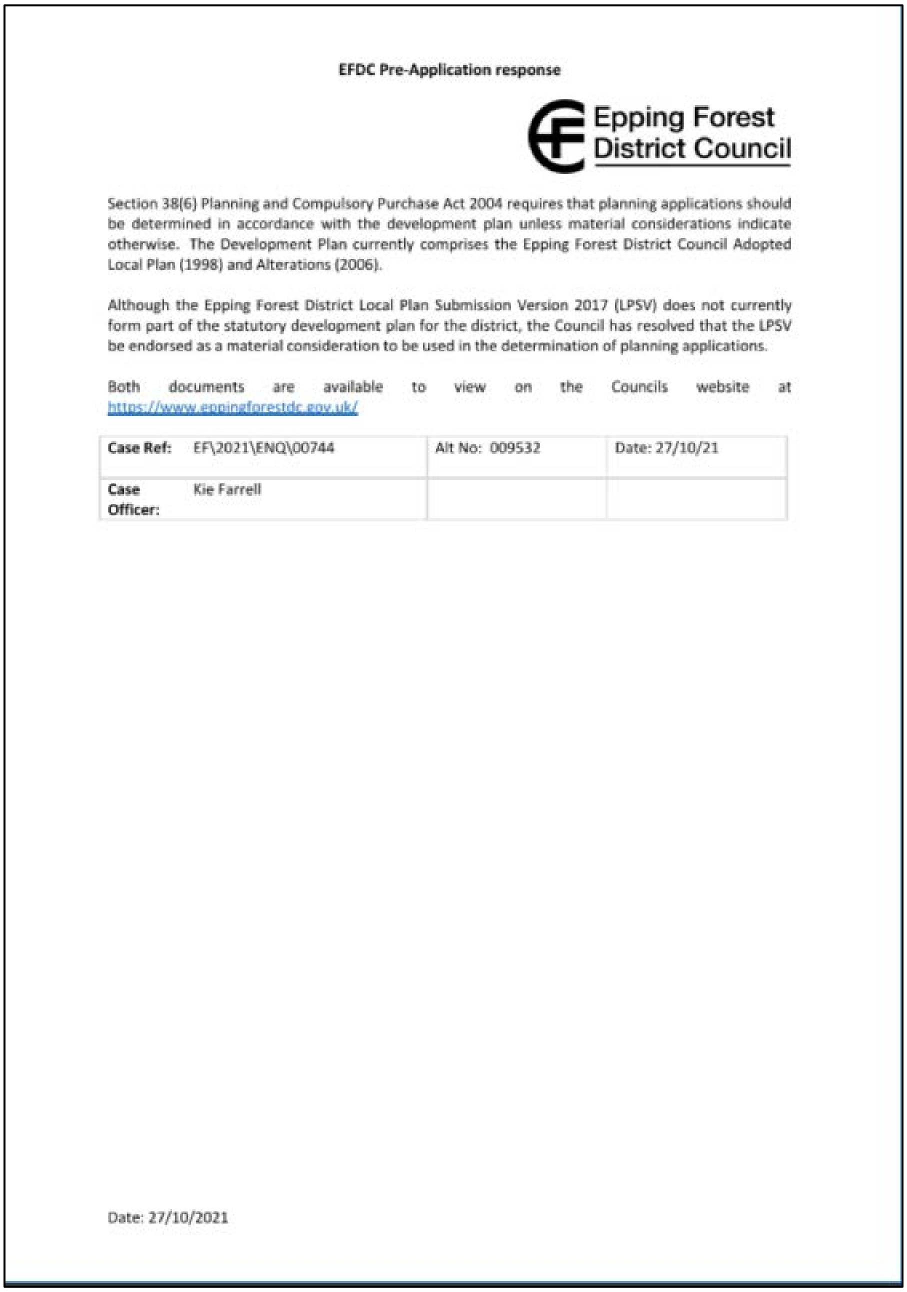


Figure C-2. Traffic Air Quality Assessment Area – Non-Continuous Monitoring Locations



APPENDIX D EFDC PRE-APPLICATION RESPONSE



EFDC Pre-Application response

Epping Forest District Council

Section 38(6) Planning and Compulsory Purchase Act 2004 requires that planning applications should be determined in accordance with the development plan unless material considerations indicate otherwise. The Development Plan currently comprises the Epping Forest District Council Adopted Local Plan (1998) and Alterations (2006).

Although the Epping Forest District Local Plan Submission Version 2017 (LPSV) does not currently form part of the statutory development plan for the district, the Council has resolved that the LPSV be endorsed as a material consideration to be used in the determination of planning applications.

Both documents are available to view on the Councils website at https://www.eppingforestdc.gov.uk/

Case Ref:	EF\2021\ENQ\00744	Alt No: 009532	Date: 27/10/21
Case Officer:	Kie Farrell		

Date: 27/10/2021

EFDC Pre-Application response

Address:	Netherhouse Farm Sewardstone Road Waltham Abbey E4 7RJ
Description of works:	Pre application for a proposed change of use of land to a woodland cemetery **& crematorium** with erection of a meeting hall & associated buildings, **including a revised building layout & design.** (Ref: EPF/0526/17 & EPF/1125/18). Based on paragraph 3.2 of the submitted supporting statement, the proposed pre-app scheme differs from the approved EPF/1125/18 scheme in the following ways: *"The proposed building, its car park and the immediate access arrangements are in approximately the same overall position as permitted.* *The main differences from the earlier approval are as follows:* *• The building is slightly relocated to account for the exclusion distance set out in the Cremation Act 1902.* ***• An electric powered cremator will be included in the revised building.*** ***• The floorspace of the proposed building is increased from 470 sqm to 567 sqm, with 79 sqm at basement level and 488 sqm at ground level.*** *• The proposed offices and buggy store are relocated from the frontage building and are included in the main cemetery/cremator building complex.* *• The application site is reduced slightly to exclude those parts of the lower car park required for other uses at the site.* *• The remaining area of the lower car park will serve the cemetery/crematorium.* *• The number of car spaces adjacent to the proposed building is maintained at 48, including 6 disabled bays.* *• Three buggy parking/charging spaces are provided in the upper car park.* *The gardeners store permitted in the earlier applications has been completed and will remain as built."* - **Cremator Hall added** - Windows and doors enlarged/amended on front elevation - Cremator hall dug into existing ground level to increase ceiling height - Canopy raised/columns widened to improve vehicular access - Car parking relocated away from building - Increased hard landscaping at entrance to provide space for unloading - Funeral procession route increased and widened to improve access - **Comparison Drawings show Chimneys but state exact position TBC. What is the exact position and what is the**

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	height? Documents submitted: Drawing No. 03-91-001 – Location Plan Drawing No. 03-02-002 Rev A – Proposed Site Plan Drawing No. 03-03-000 Rev A – Proposed Ground Floor Drawing No. 03-03-099 – Proposed Basement Drawing No. 03-03-001 Rev A – Proposed Roof Plan Drawing No. 03-04-001 Rev A – Building Sections Drawing No. 03-04-010 Rev A – Site Sections Drawing No. 03-05-001 Rev A – Proposed East and West Elevations Drawing No. 03-05-002 Rev A – Proposed North and South Elevations Design and Access Statement, Benchmark Architects Revised Air Quality Assessment, Tetra Tech, 26th February 2021 Crematorium Need Assessment, Peter Mitchell Associates, Jan 2021 Supporting Statement on GB and other Strategic Issues, gfplanning, July 2021. Comparison drawings document, Benchmark Architects.

Application Check		
Meeting:	Yes Not required	☐ ☒
Site Visit:	Yes No No access	☐ ☒ ☐
Photos/Images available:	No	☒
Consultees notified:	Yes	☒
Consultee responses attached:	Yes	☒

Constraints		
Green Belt:	Yes	☒
Conservation:	Yes No	☐ ☒
Listed Building:	Yes No	☐ ☒
TPO:	Yes No	☐ ☒
Enforcement:	Yes No	☐ ☒
Epping Forest SAC impact (recreational):	Yes No	☒
Epping Forest SAC impact (Air Quality):	Yes No	☒
Other:		

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EFDC Pre-Application response

Planning Considerations	Comments:
Site and Surrounding Area:	The application site comprises a large field with an area of woodland bordering the southern part of the field. The field undulates with higher ground to the western portion of the field which abuts a woodland. The host field slopes gently down from west to east. The site located within the Metropolitan Green Belt.
Planning History: EPF/0599/19 Change of Use of land to a woodland cemetery **and crematorium** with the erection of a meeting hall and associated buildings **including a new basement and revised building layout and design.** (Revised scheme to EPF/0526/17 & EPF/1125/18) Withdrawn 31/03/2021. EPF/1125/18 Minor material amendment on planning approval EPF/0526/17 (Use as a woodland cemetery with the erection of a meeting hall and associated buildings) **to enable relocation of proposed meeting hall.** Approved 22/08/2018. Implemented. EPF/0526/17 Use as a woodland cemetery with the erection of a meeting hall and associated buildings Approved 22/06/2017.	
Green Belt:	NPPF, July 2021: *149. A local planning authority should regard the construction of new buildings as inappropriate in the Green Belt. Exceptions to this are:* *b) the provision of appropriate facilities (in connection with the existing use of land or a change of use) for outdoor sport, outdoor recreation, **cemeteries** and burial grounds and allotments; **as long as the facilities preserve the openness of the Green Belt and do not conflict with the purposes of including land within it.***

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The proposed crematorium is a different use to a cemetery and does not fall under the cemeteries exception of part b) of Paragraph 149 of the NPPF. A crematorium is inappropriate development in the Green Belt where Very Special Circumstances (VSC) will need to be demonstrated.

Just because a crematorium is proposed to be added to a consented cemetery development, this does not change the fact that a crematorium is inappropriate development in the Green Belt.

Cemetery Development Services (CDS), the authors of the original 'Combined Planning and Need Assessment, January 2019' submitted with the withdrawn EPF/0599/19 application, are quite clear in their 'Review of Crematorium Applications, April 2021' document for Tandridge District Council that:

Para 2.1:

"Unlike new cemeteries, crematoria are inappropriate development in the Green Belt, given that the NPPF does not refer to them as an exception. If the provision was to be made on a site within the Green Belt, and such a proposal advanced through a planning application, Very Special Circumstances (VSC) would need to be demonstrated which outweigh harm to the Green Belt and any other harm. This would involve demonstrating a need for the facility, and that provision could not be made outside of the Green Belt (evident from planning case law).

Further, there is no legal requirement for an authority (or on anybody else) to provide burial or cremation facilities, but they can if they want to. There is a legal obligation under S46 of the Public Health (Control of Disease) Act 1984 on local authorities to cause a body to be buried or cremated where no other arrangements have or are being made, but that does not have to be done locally.

Arguably, therefore, the need argument is a critical area to address, specifically in demonstrating VSC in the Green Belt."

Paragraph 3 of the Inspector's Decision for the related appeal (Land off Oxted Road (A25), Oxted, Surrey RH8 9NG / APP/M3645/W/21/3272384, allowed 30th September 2021), states:

"It is common ground between the main parties that, under Framework policy, the appeal proposal was inappropriate development in the Green Belt, by definition harmful to it, and thus should not be approved except in very special circumstances."

In the March 2021 Staffordshire re-determined appeals the

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	Secretary of State also agrees with his Inspectors that crematoria are inappropriate development in the Green Belt.
Very Special Circumstances	**Need:** It is clear from recent appeal decisions that where Need can be demonstrated, this can be accepted as a Very Special Circumstance for a Crematorium development in the Green Belt. In the Tandridge Appeal (Land off Oxted Road (A25), Oxted, Surrey RH8 9NG / APP/M3645/W/21/3272384) allowed 30th September 2021), following an independent review, the Council accepted that need for a new crematorium could be demonstrated and the Inspector also accepted the need argument. In allowing the appeal, the Inspector concluded that the need for additional cremation facilities constituted very special circumstances and found that the benefits would outweigh the harm to the Green Belt: Para 51: *"However, cremation facilities meet an essential community need which in this area is currently not being fully met, either quantitatively or qualitatively, with demand forecast to increase steeply. The proposal would make a significant contribution towards meeting this existing and growing need. This is a need to which I attach very substantial weight. Along with the incidental social, economic and environmental benefits the scheme would provide, I find that the other considerations in this case clearly outweigh the harm that I have identified. Accordingly, I consider that the very special circumstances exist which justify the development. The proposal would therefore accord with Green Belt Policy DP10, and the development plan as a whole, satisfying also national policy as set out in the Framework."* In the March 2021 Staffordshire redetermined appeals the Secretary of State agrees with his Inspectors that Quantitative and Qualitative Need can constitute VSC and that if Need is demonstrated the benefit of a proposed Crematorium in the Green Belt can outweigh the harm caused. **Availability of Alternative Non-Green Belt Sites:** As part of the Very Special Circumstances case we would expect to see a detailed consideration of potential alternative Non-Green Belt sites which demonstrates that no suitable Non-Green Belt sites are available within and outside the District to accommodate the proposed Crematorium.
Other Crematorium considerations – Cremation Act 1902	Under the Cremation Act 1902, crematoria normally need to be located at least 200 yards (183m) away from the nearest dwelling and 50 yards (46m) away from a public highway.

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	The Act permits a crematorium to be closer only where the owner, lessee and occupier of the dwelling have given their consent in writing. The proposed development would need to comply with these requirements.
Air Quality	See Air Quality Officer's comments of 25th October 2021 at Appendix 1 below.
SAC	The Corporation of London (Epping Forest) objected to the withdrawn 2019 application. The City of London and Natural England would need to be satisfied with the Crematorium proposal in terms of potential harmful air quality impact on the Epping Forest SAC.
Land Ownership / Certificate A/B	Some land ownership issues arose prior to the withdrawal of the EPF/0599/19 application. Have these now been resolved?
Neighbouring amenities:	Any additional impact arising from the added Crematorium would need to be assessed as part of any future planning application. The requirements of the 1902 Crematorium Act would need to be met i.e at least 200 yards (183m) away from the nearest dwelling and 50 yards (46m) away from a public highway. Environmental Health will need to be satisfied in terms of Air pollution impact.
Trees and Landscaping:	The Trees and Landscape Officer has not commented on this pre-app but would be consulted at application stage. The Tree Officer's comments (5th September 2019 following submission of amended site location plan and ownership certificate) on the withdrawn EPF/0599/19 application were as follows: "We do have some concerns regarding the height of the chimney and the visual impact that this may have in this green belt setting – you may consider requesting a landscape and visual impact assessment to clarify this impact. If you are minded to approve this please include the tree / landscape conditions requested under EPF/0526/17- Standard condition SCN59 – hard and soft landscaping details Standard condition SCN64 – submission of landscape management plan Standard condition SCN65 – submission of landscape maintenance plan Standard condition SCN66 – tree protection measures Special Condition – surface materials: Prior to the commencement of the development details of the

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proposed surface materials for the access, driveway, and footpaths shall be submitted to and approved in writing by the Local Planning Authority. The agreed surface treatment shall be completed prior to the first use of the development.
Reason: To ensure that a satisfactory surface treatment is provided in the interests of visual amenity, in accordance with the guidance contained within the National Planning Policy Framework and policies CP2 and LL2 of the adopted Local Plan and Alterations.

Special condition – external lighting No means of external lighting shall be installed on the land or buildings without the prior written consent of the Local Planning Authority.
Reason: In the interests of the amenity of this Green Belt area and nocturnal wildlife, in accordance with the National Planning Policy Framework Chapter 11: Conserving and enhancing the natural environment and Epping Forest District Council Local Plan Chapter 7: Nature Conservation.

Special condition – signage / grave markers:
No marker, headstone or other monument shall be erected unless made entirely out of biodegradable materials.
Reason: In the interests of the visual amenity of the site, in accordance with the guidance contained within the National Planning Policy Framework and policies CP2 and LL2 of the adopted Local Plan and Alterations.

Special condition – retention of trees and shrubs –
If any tree, shrub or hedge shown to be retained in the submitted Arboricultural reports is removed, uprooted or destroyed, or dies, or becomes severely damaged or diseased during development activities or within 3 years of the completion of the development, another tree, shrub or hedge of the same size and species shall be planted within 3 months at the same place, unless the Local Planning Authority gives its written consent to any variation. If within a period of five years from the date of planting any replacement tree, shrub or hedge is removed, uprooted or destroyed, or dies or becomes seriously damaged or defective another tree, shrub or hedge of the same species and size as that originally planted shall, within 3 months, be planted at the same place.
Reason:- To comply with the duties indicated in Section 197 of the Town and Country Planning Act 1990 as well as to safeguard the amenity of the existing trees, shrubs or hedges and to ensure a satisfactory appearance to the development in accordance with the guidance contained within the National Planning Policy Framework and policies CP2 and LL10 of the adopted Local Plan and Alterations.

Special Condition – Importation of material
There shall be no importation of material for any earth mounding or landscaping from outside the red lined area of the

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	site for the construction of the development hereby approved. Reason: To safeguard excessive vehicle movement during the construction of the development hereby approved and in the interests of visual amenity, in accordance with the guidance contained within the National Planning Policy Framework and policies CP2 and LL2 of the adopted Local Plan and Alterations. Special Condition – burials within the woodland No excavations for burials shall be undertaken within the mature established woodlands protected by Tree Preservation Order TPO/EPF/16/09. Reason- To safeguard the health and appearance of the legally protected woodland, in accordance with the guidance contained within the National Planning Policy Framework and policies CP2 and LL10 of the adopted Local Plan and Alterations. Please note that whilst some of these conditions may have been approved since the 2017 application was approved, the amendments in this application may mean that revised reports will need to be submitted for approval."
Access /Parking/Access:	EFDC does not provide Highways advice as part of our pre-app response. Essex CC Highway Authority has its own pre-app service and is now charging for all pre-planning application advice, full details can be found here: Planning advice and guidance: Highways planning advice - Essex County Council
Other:	

Likely Officer Recommendation:	**A new full planning application would be required as the addition of a Crematorium is not a Minor Material Amendment to the previously approved Cemetery development.** **The Crematorium element is considered to be inappropriate development in the Green Belt and as such VSC would need to be demonstrated.**

For validation requirements, please check the Councils Validation Checklist at https://www.eppingforestdc.gov.uk/planning-and-building/planning-application-validation-requirements/

Please Note:-

This is a formal response to your pre-application submission and provides you with the relevant constraints and planning considerations. Please note however that this is for advisory purposes only and is not binding on the Council or its Members when assessing the merits of any planning application subsequently received. Also, these views are purely officer opinion and are given without

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prejudice to the final decision of the Council on any planning application received, particularly as no consultation has been carried out with the Parish/Town Council and residents living within close proximity to the site.

Appendix 1 – Environmental Health comments 25th October 2021 (and 25th July 2019):

Ana Ventura 25th October 2021:

"My comments are solely with regards to air quality in relation to human health; matters relating to noise, vibration and the EFSAC will need to be referred to the appropriate team.

I have reviewed the air quality assessment produced by Tetra Tech Project No.784-B026744, February 2021.

I have the following comments/questions with regards to this assessment:

- The monitored diffusion tube data in table 4.1 does not match with our own data. All workings associated with this data will need to be revisited.
- The diffusion tubes are all some distance from the proposed site. It would be beneficial for the applicant to also conduct their own monitoring closer to site. A minimum of 6 months monitoring is preferable to capture seasonal changes.
- Table 4.1 has the same site ID/receptor location as table 6.2 which is for Defra background concentrations. I think I understand what the assessment is doing here but its preferable in table 6.2 to use the Defra coordinates instead of using the same ID name in table 6.2.
- Also, a bit confused with regards to table 6.4 which lists EF15-EF20 as local authority monitoring but that the data was obtained by Defra?
- Was the increase in capacity from 305 cremations per annum to 1,200 reflected in the traffic emission assessment?
- How many total parking spaces are existing and proposed for this site?
- For modelling purposes, preference would have been to stick to base year rather than predict improvements. This is shown in appendix C and provides a worst case scenario which is preferable.
- How was model verification performed with regards to PM10 and PM2.5?
- Will this crematorium have mercury abatement? If so, does it impact on the pollutant dispersion?
- Is a traffic assessment required for this application? If so, it should be included as an appendix to the air quality assessment to ensure the vehicle trip assumptions add up.
- With regards to EFT, v9 was used instead of v10.1
- With regards to table 6.3, can they elaborate on what the other sources are? They contribute a large percentage of NOx according to this table.
- With regards to model verification, was an adjustment factor used? If so, the workings of how this factor was derived and applied so be included in the report.
- With regards to the cremator emissions, the report used data from a crematorium in

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Gelleen. It appears that the data is only for one cremation? More data is requested with regards to this to determine if it is appropriate; one cremation would not be sufficient. Did the consultant consider using the emissions set out in the practice guidance note as this would provide a worst case approach? Alternatively, does the plant come with data on its emission rates?

- With regards to the stack height, 6m was used in the assessment. Was a D1 stack height calculation conducted to establish an appropriate height? It should be included in the assessment. Also, is it 6m from roof level or ground level as the plans suggest a very short flue. If the latter, then the 6m input needs to be changed accordingly.
- How many crematoria units will be installed on site? Does the emissions modelling reflect this?
- Was the MET data listed in section 9.4 also used for the traffic assessment?
- The report needs cleaning up as "Section Error! Reference source not found" appears in a few places.

Conditions should they be required will be recommended when we are formally consulted and have had an opportunity to review an updated air quality assessment. As always however, the site will need to comply with the requirements of Defra's Process Guidance Note for crematoria.

Regards,

Ana Ventura
Air Quality Officer"

Claire Jaggard's comments on EPF/0599/19 application dated 25th July 2019:

- I still have concerns with regards to the operating hours / number of cremations stated in the documentation. The documentation is not clear and there are a contradictions within it. I do not consider that allowing 1.5 hours for a cremation is conservative. Cremations typically last between 1 and 3 hours. The developer has advised that there may be up to 1200 cremations per year, and assuming a truly conservative time for cremations, this would not be achieved within the working hours stated. As the developer has advised that there may be up to 1200 cremations per year, I would like to see the modelling reworked taking into account a conservative length of time for this number of cremations. It may be that this is not completed within the working hours that are currently proposed however the likelihood that the working day would be extended in the event that cremations take longer than the current 1.5 hours assumed in the calculations is thought to be the likely option in this scenario.
- The initial report assumed a different emissions concentration for oxides of nitrogen than is now being assuming in the Addendum Report. I would seek further clarification as to how this alteration has been achieved and justified. If indeed the higher standard of 200 mg Nm3 NOx is to be achieved, this must be set by condition in the event that the proposal is given consent.]
- I would like to see further assessment of traffic using the site. Assuming 1200 cremations a year, plus burials, there will be a significant number of visitors to the site and I do not feel that this has been appropriately assessed to date.
- I note that the D1 calculation sheet states that the building attached to the stack is 0.9

Date: 27/10/2021

EFDC Pre-Application response

metres above the ground. I would seek clarification as to whether this is correct, and a revised calculation if there are any changes needed. Has a plan of the site been provided which shows the layout and building heights across the site (and any other neighbouring properties that would have an impact on the dispersion of gases)

- Further opportunity to comment with regards to mitigation during the development phase is required.

These comments are made on the assumption that the close proximity of the SAC / SSSI has been taken into account, and that Natural England and the Corporation of London (Epping Forest) have also been made aware of this application and given an opportunity to comment with regards to the impact of air quality on their land."

Appendix 2 – Questions sent by Graham Fisher 29th September 2021:

	Question	Response
1	Are our traffic projections robust enough? If not, what amendments are required?	EFDC does not provide Highways advice as part of our pre-app response. Essex CC Highway Authority has its own pre-app service and is now charging for all pre-planning application advice, full details can be found here: Planning advice and guidance: Highways planning advice - Essex County Council
2	Is our air quality report robust enough? If not, what amendments are required?	Please see comments of the Air Quality Officer at Appendix 1
3	Is our needs assessment robust enough? If not, what amendments are required?	This will need to be reviewed by an external independent consultant at application stage.
4	What other specialist reports will be required?	All documents as per last withdrawn application plus: - Landscape and Visual Impact Assessment - Consideration of alternative non-Green Belt sites.
5	Do EFDC consider the development appropriate in the green belt	No. The Crematorium element is inappropriate development.
6	If not, are there the very special circumstances required to permit the development?	The Need argument can form part of the VSC case along with a consideration of other alternative non-Green Belt sites.
7	Will there be any section 106 requirements?	A S106 agreement will be required for SAC mitigation.
8	What, if any, level of public engagement is required pre-application?	At applicant's discretion.
9	Can you confirm that extant permission EPF/1125/18 will be unaffected by these proposals?	If works commenced within the 3 year timeframe and were lawfully implemented then it is extant.

Date: 27/10/2021

APPENDIX E D1 CALCULATIONS

Job Number:	784-B0071839			
Source ID:	Netherhouse Farm			
Building Dimensions				
Stack diameter		0.25	m	
CSA		0.05	m^2	
Volumetric discharge rate	*V*	0.45	m^3/s at stack conditions	
Discharge velocity	*w*	9.17	m/s at stack conditions	
Temperature	T_d	355.8	K	
Emission Concentrations *(by which assessment is to be made)*		129.42	mg/m^3 at stack conditions	
Guideline Concentrations *(against which assessment is to be made)*	G_d	0.200	mg/m^3	MAX = $1.4mg/m^3$
Background Concentrations *(ambient concentrations)*	B_c	0.0349	mg/m^3	
Assessment Discharge Rate	*D*	0.0580	g/s	
Pollution Index	P_i	351	m^3/s	
	Max P_i to be used in the assessment:	351	m^3/s	
Calculation of Heat Release	*Q*	0.03	MW	
Calculation of Discharge Height Due To Buoyancy				
	U_b	2.53	m	
	Minimum value of U_b:	1.01	m	
	Value of U_b to be used in the assessment:	2.53	m	
Calculation Of Discharge Height Due To Momentum				
	M	3.3	m^4/s^2	
	U_m	3.70	m	
	Minimum value of U_m:	1.20	m	
	Value of U_m to be used in the assessment:	3.70	m	

Adjustment for Nearby Buildings

$5U_m$ =	18.52	m

Building Dimensions	*H*	*B*	*K*	*T*
	3.9	24.0	3.9	9.8

Calculation of Final Stack Height

U > 2.5 x H_{max}?	YES	m
If YES, C	*2.53*	*m*
C	3.00	m

Calculation of Final Stack Height for One Building

C	*6.37*	*m*
C	7.00	m

Calculation of Final Stack Height for Multiple Buildings

H_m	3.9	m
T_m	9.8	m
A	1.46	
U	2.53	m
C	*6.367*	*m*
C	7.00	m

No discharge stack should be less than 3m above ground, or adjacent area to which there is access

No discharge stack should be less than the calculated uncorrected stack height
No discharge stack should be less than the height of any building height within 5Um

No discharge stack should be less than 3m above opening windows or ventilation within 5Um

APPENDIX F EPPING FOREST INTERIM AIR POLLUTION MITIGATION STRATEGY

Epping Forest Interim Air Pollution Mitigation Strategy:

Managing the Effects of Air Pollution on the Epping Forest Special Area of Conservation

December 2020

1. Introduction

1.1 Large parts of the Epping Forest have been designated as a Special Area of Conservation (SAC) because of the significance of its ecological features (known as 'qualifying features'), specifically its beech forest, wet and dry heaths and population of stag beetle. SACs are international designations and have the highest level of protection afforded to them through UK legislation and Government policy. It is known that much of the Epping Forest SAC is in an unfavourable condition.

1.2 Under UK legislation Epping Forest District Council (the Council) is a competent authority with a duty to ensure that plans and projects, including the emerging Epping Forest District Local Plan 2011-2033 (the emerging Local Plan) which is at an advanced stage of preparation), have no adverse effect on the integrity of the Epping Forest SAC either alone, or in combination with other plans and projects. This includes not doing anything that would prevent the Epping Forest SAC from achieving the conservation objectives identified for it. As part of that responsibility the Council, as local planning authority, is required to undertake a Habitats Regulations Assessment (HRA) of the emerging Local Plan.

1.3 This Strategy has been developed to provide a strategic approach to mitigating the effects of development on the integrity of the Epping Forest SAC in relation to atmospheric pollution. It has been developed to support the implementation of policies contained within the emerging Local Plan and specifically policies DM2 and DM22. In doing so it reflects the evidence base (the evidence) developed to support the HRA process. This Strategy will therefore support the conclusion of the Local Plan HRA process and facilitate the determination of individual planning applications which have the potential to have an adverse effect on the integrity of the Epping Forest SAC in relation to atmospheric pollution without mitigation.

1.4 It is clear from the evidence that without appropriate mitigation development proposed through the emerging Local Plan, in combination with other plans and projects, would have an adverse effect on the integrity of the Epping Forest SAC as a result of atmospheric pollution. A key contributor to that atmospheric pollution arises from vehicles.

1.5 The Epping Forest SAC is bisected by a number of roads which serve communities in Epping Forest District and beyond. We know, having undertaken detailed traffic modelling, that new development, primarily for housing and employment, will result in increases in traffic on those roads. This traffic modelling has been used to inform air quality modelling, the outputs of which show that over the period of the emerging Local Plan (covering the period up to 2033), if no mitigation measures are introduced, air pollution arising from vehicles will have further harmful effects on the health of the qualifying features within the Epping Forest SAC compared to a situation with no growth. It is important to recognise that whilst vehicles are a contributing factor, there are other activities that are also having an adverse impact on the ecological health of the Epping Forest SAC. Appendix 1 to this Strategy identifies a number of actions that the Council could take to reduce the contribution that these activities have on the Epping Forest SAC.

1.6 This Strategy has been developed in response to the findings of the evidence base by setting out a suite of mitigation measures that are needed to address the effects of atmospheric pollution arising primarily from new development proposed to be brought forward within the District. It is therefore an important part of the evidence base that supports the emerging Local Plan. The Strategy also sets out how these mitigation measures will be implemented and how the efficacy of those mitigation measures will be monitored and reviewed.

2. The evidence base

2.1 To support an understanding of the likely significant effects of the emerging Local Plan on the Epping Forest SAC bespoke traffic and air quality modelling has been undertaken based on observed data and on-site monitoring. As such a robust approach has been undertaken to understanding the issues arising from development within Epping Forest District (EFD). The technical notes explaining the methodology undertaken and the results used to inform the development of this Strategy and the emerging HRA can be viewed here *(insert link).*

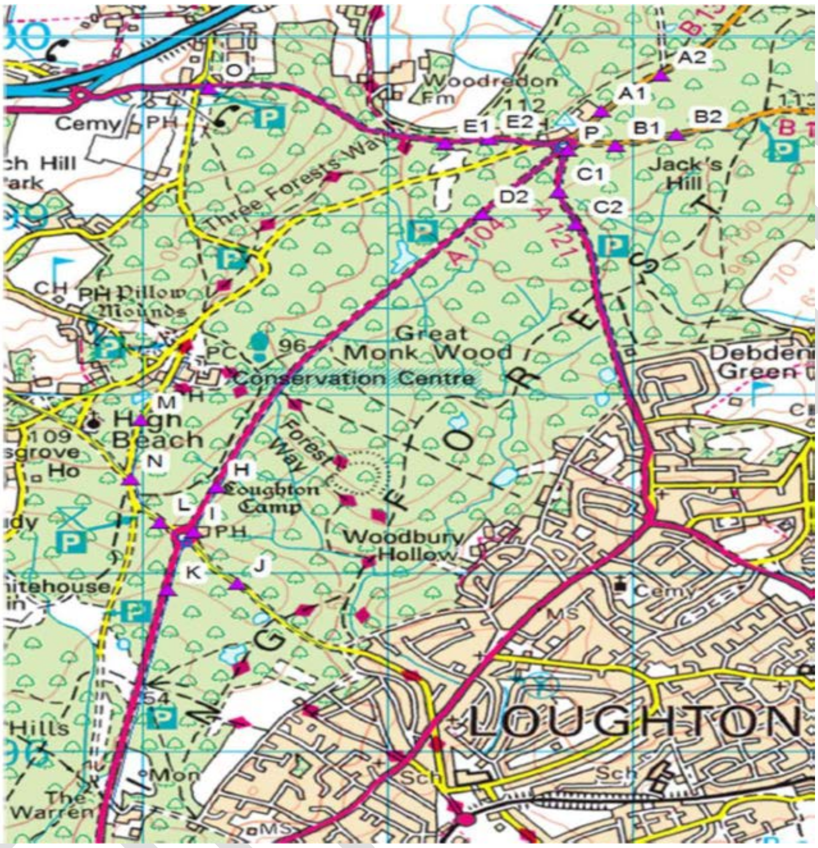
2.2 The predicted change in vehicle flows and mean maximum queue length and duration was modelled on a series of roads in close proximity to the Epping Forest SAC. This took account of all expected growth over the plan period, including Local Plan development and extant planning permissions, background traffic growth arising from development in surrounding local authority areas (including extant planning permissions) and predicted background growth in traffic generally as derived by national traffic growth projections. The level of growth applied within EFD arising from the emerging Local Plan has had regard to the advice note of the Inspector examining the emerging Local Plan dated 2 August 2019.

2.3 The roads were selected in consultation with the Conservators of Epping Forest and were considered to be those most likely to experience the greatest change in flows (and therefore impact) due to the proposed housing and employment growth within and outwith the District for the period to 2033. The modelled network is shown in Figure 1 below.

Figure 1: The modelled road links

2.4 Using the generated traffic scenarios, information on the vehicle fleet mix, average vehicle speeds and queue lengths (all of which influence the emissions profile), air quality specialists calculated expected concentrations, for oxides of nitrogen and ammonia as well as nitrogen deposition rates for the modelled links. For some road sections (particularly around Wake Arms Roundabout) multiple transects were modelled in order to capture the effects of queuing traffic. The modelled links are depicted in Figure 2 below.

Figure 2: Links modelled for air quality purposes



3. The Issue

3.1 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2). Ammonia can also have a direct toxic effect upon vegetation and research suggests that this may also be true for NOx at high concentrations or in the presence of equivalent amounts of sulphur dioxide. In particular, greater NOx or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to vegetation and soils. An increase in the deposition of nitrogen from the atmosphere is generally regarded to lead to an increase in soil fertility, which can have a serious deleterious effect on the quality of semi-natural, nitrogen-limited terrestrial habitats. Ammonia and nitrogen can also have a serious deleterious effect on lichens which take their nutrients directly from the atmosphere.

Table 1: Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on Habitats and Species
Acid Deposition	SO_2, NO_x and ammonia all contribute to acid deposition. Although future trends in SO_2 emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is possible that increased ammonia emissions may cancel out any gains produced by reduced SO_2 levels.	Can affect habitats and species through both wet (acid rain) and dry deposition. Some sites will be more at risk than others depending on soil type, bed rock geology, weathering rate and buffering capacity.
Ammonia (NH_3)	Ammonia is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but levels have increased considerably with expansion in numbers of agricultural livestock. Vehicles fitted with catalytic convertors, such as petrol cars, are also a known source of ammonia. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_x emissions to produce fine ammonium (NH_4+) - containing aerosol which may be transferred much longer distances (can therefore be a significant transboundary issue.)	Adverse effects are as a result of direct toxicity and from nitrogen deposition leading to eutrophication. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for close to the roadside or close to point sources in intensive agricultural landscapes.
Nitrogen oxides (NOx)	Nitrogen oxides are mostly produced in combustion processes. About one quarter of the UK's emissions are from power stations, one-half from motor vehicles, and the rest from other industrial and domestic combustion processes.	Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3) can lead to both soil and freshwater acidification. In addition, NOx can cause eutrophication of soils and water. This alters the species composition of plant communities and can eliminate sensitive species
Nitrogen (N) deposition	The pollutants that contribute to nitrogen deposition derive mainly from NO_x and NH_3 emissions. These pollutants cause acidification (see also acid	Species-rich plant communities with relatively high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication, due to its promotion of competitive and invasive species

	deposition) as well as eutrophication.	which can respond readily to elevated levels of N. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Sulphur Dioxide (SO_2)	Main sources of SO_2 emissions are electricity generation, industry and domestic fuel combustion. May also arise from shipping and increased atmospheric concentrations in busy ports. Total SO_2 emissions have decreased substantially in the UK since the 1980s – UK emissions in 2018 decreased by 96% relative to 1990, below the 2020 NECD and Gothenburg emission targets[1].	Wet and dry deposition of SO_2 acidifies soils and freshwater, and alters the species composition of plant and associated animal communities. The significance of impacts depends on levels of deposition and the buffering capacity of soils

3.2 The Epping Forest SAC is known to be adversely affected by relatively poor local air quality alongside the roads that run through it and this has been demonstrated to have negatively affected the epiphytic lichen communities of the woodland. The nature of the road network around the modelled part of the Epping Forest SAC is such that journeys between a number of key settlements around the Forest by car, van, lorry or bus effectively need to use roads that bisect the Epping Forest SAC. Moreover, queues are known to build up around most arms of the Wake Arms Roundabout, primarily during the AM and PM peak, which increases emissions compared to the same volume and composition of free-flowing traffic.

3.3 As such, emissions from road traffic have been the focus of the air quality modelling. Regulations control the sulphur content of fuel used by vehicles, therefore emissions of SO_2 have not been assessed. Emissions of NO_x from road traffic are decreasing due to the implementation of tighter European type approval standards (Euro Standards). However, ammonia is produced by the control systems that are designed to reduce emissions of NOx from road traffic vehicles. Emissions of ammonia are greater from petrol than from diesel cars, whilst the converse is generally the case for NO_x. The critical levels for NO_x and ammonia and the critical load for nitrogen deposition are set out below:

Pollutant	Critical Level	Critical Load
Oxides of nitrogen (NO_x)	30 micrograms per cubic metre (30µgm^{-3})	N/A
Ammonia (NH_3)	1 microgram per cubic metre (1µgm^{-3})	N/A
Nitrogen deposition	N/A	10-20 kilograms of nitrogen per hectare per year (10 kg N/ha/yr)

[1] UK Informative Inventory Report (1990 to 2018) - https://uk-air.defra.gov.uk/assets/documents/reports/cat07/2003131327_GB_IIR_2020_v1.0.pdf

3.4 The plan showing the Transects that have been modelled are set out in Figure 2 above. The evidence shows that the contributions of NO_x, ammonia and nitrogen deposition at the roadside represent a risk to the qualifying features for which the Epping Forest SAC has been designated.

3.5 The outputs of modelling undertaken showed that growth in Epping Forest District up to 2033 (i.e. the end of the Local Plan period) is the primary source of additional ammonia and NO_x emissions on the modelled road sections and all other plans and projects would appear to make a negligible contribution to the 'in combination' effect. This is thought to be because the average daily traffic flow on all the modelled sections of road is dominated by people who either live or work in Epping Forest District, particularly the settlements that surround the Epping Forest SAC, including Epping itself.

3.6 The evidence demonstrates that the effects of Local Plan development on air quality on the Forest will require mitigation measures to be implemented. Some of the required measures will not only help to avoid adverse impacts of development on the Epping Forest SAC, but also support objectives including responding to the climate change crisis, managing the effects of growth on the highway network and supporting healthy lifestyles.

3.7 The measures contained within this Strategy will be secured through a number of mechanisms including:

- the use of planning conditions and/or legal agreements to secure financial contributions for the implementation of off-site measures as part of the determination of planning and other development related applications;
- the development of strategic Masterplans; and
- strategic initiatives to be implemented by the Council and its partners.

3.8 The policy context against which planning and other development related applications will be assessed in relation to addressing atmospheric pollution is set out in Section 4 below. In particular polices DM2 and DM22 provide the Framework by which the effects on the Epping Forest SAC will be mitigated to such an extent that an adverse effect on site integrity can be avoided. The measures relied upon to avoid adverse effects to the Epping Forest will be secured through the implementation of this Strategy, which identifies a number of measures that will be need to be delivered over the course of the Local Plan period. Appendix 3 to this strategy provides a summary of the measures that will be delivered, how they will be delivered, and when.

3.9 There are other actions the Council can take, outside of the planning regime, which can also support the management of air quality both across the District and within the Epping Forest SAC. These are set out in Appendix 1 to this strategy. Consequently, this Air Pollution Mitigation Strategy brings together all of the proposed approaches to support the improvement of air quality in the District. Whilst this is primarily to avoid any adverse effects on the integrity of the Epping Forest Special Area of Conservation, it will also have wider benefits including in relation to peoples' health.

4. Planning Policy Framework

4.1 The following policies within the emerging Local Plan are of relevance to achieving, either directly or indirectly, a positive contribution to atmospheric improvements.

Policy SP1 Spatial Development Strategy

4.2 Policy SP1 sets out the sequential approach to the location of development with a focus on locations which have access to existing infrastructure, or where there is the greatest opportunity to provide additional infrastructure capacity, including in order to secure a modal shift away from the use of the private car. Both traffic modelling and Habitats Regulations Assessments were used to inform the approach taken. In addition, the allocation of a number of strategic employment sites in locations where new homes are also proposed provides the greatest opportunity to provide an alternative to the private car in terms of journey choice and therefore reduce the harmful effects that traffic emissions have on both ecological and human health.

Policy DM2 Epping Forest SAC and the Lee Valley SPA

4.3 Policy DM 2 sets out the Council's expectations that all relevant development proposals assist in the conservation and enhancement of the biodiversity, character, appearance and landscape setting of the Epping Forest SAC. It contains specific reference to a number of Strategies, including this Strategy, adopted by the Council as a material consideration in the determination of planning applications to ensure that any adverse effects on the integrity of the Epping Forest SAC are avoided. This is a main policy to which this Strategy is linked.

Policy DM22 Air Quality:

4.4 This policy seeks to ensure that both the residents and ecological assets of the District, including the Epping Forest SAC, are protected from the impacts of atmospheric pollution. The policy and supporting text to Policy DM22 includes a policy link to Policy DM2 and is therefore also a main policy to which this Strategy is linked.

Policy T1 Sustainable Transport Choices.

4.5 This policy sets out the Council's commitment to:

- achieve improvements to strategic rail connections and other public transport networks to the wider area;
- promote transport choice through improvements to public transport services and supporting infrastructure;
- provide coherent and direct cycling and walking networks to provide a genuine alternative to the car;
- facilitate a modal shift and to promote opportunities for sustainable transport modes; and
- secure the provision of electric vehicle charging points in all new development which includes vehicle parking spaces.

4.6 The implementation of Policy T1 is one of the ways in which reductions in atmospheric pollution across the District will be achieved. The supporting text to Policy T1 of the emerging Local Plan explains that the sustainable transport policies seek to widen the choice of travel opportunities using public transport, walking and cycling. It states that the emerging Local Plan will ensure the provision of facilities and services in new strategic developments to provide high levels of self-containment and secure the provision of, or financial support for, bus services and walking and cycling facilities. The supporting text explains that such an approach can be expected to have a wider benefit as it can also provide access to new transport opportunities for existing residents, thus reducing increases in background traffic growth and reiterates that the Council will require the provision of electric vehicle charging points in all new development which includes vehicle parking spaces. These requirements are also included within relevant site-specific policies in Chapter 5 and Part 2 to the emerging Local Plan.

4.7 The policy requirement for the provision of electric vehicle charging points in all new developments regardless of their proposed use which include the provision of new parking spaces has two benefits:

- it ensures that developments can support the growth in electric vehicles without the need to retrofit such provision in the future; and
- it provides confidence for people who have not purchased electric vehicles that they can do so because they can access the necessary infrastructure now.

Development proposals will need to be able to demonstrate that all new parking spaces can have direct access to a charging point.

4.8 The Council's Epping Forest District Cycle Action Plan provides a range of specific proposals for improving the cycling infrastructure across the District. The Council's Infrastructure Delivery Plan identifies all of these projects and sets out how these should be funded through the planning process.

<u>Policy DM5: Green and Blue Infrastructure</u>

4.9 This policy provides the framework within which the Council has developed a Green and Blue Infrastructure (GI) Strategy. The GI Strategy supports the provision of suitable alternative natural greenspace, which serve as an interceptor for visitor trips, a large proportion of which are made by private car, as well as improvements to, and provision of new, walking and cycling connections to support sustainable transport choices.

<u>Policy DM 21: Local Environmental Impacts, Pollution and Land Contamination.</u>

4.10 This is a positive development management policy relating to environmental impact, pollution and land contamination. It is a positive policy as it provides for the prevention of detrimental impacts as a result of environmental conditions resulting from new development such as air quality, and provides for the reuse and recycling of building materials and the use of local products, thus reducing atmospheric pollutants further, and the use of water resources during the manufacturing process. Whilst traffic is the main contributor to atmospheric pollution issues there are other generators of air pollution that need to be considered and which will support, albeit only by a small amount, positive improvements to air quality.

Policy D5: Communications Infrastructure.

4.11 This is a development management policy relating to communications infrastructure. It is a positive policy which ensures that developments make provision for high speed internet and telecommunications. This supports the potential to reduce the need to travel, particularly during the morning and evening peak hours and will therefore make a positive contribution to reducing atmospheric pollution.

Site-specific policies

4.12 The emerging Local Plan includes a number of site-specific policies which will support the management of, and improvements to, air quality. The site-specific policies vary depending on the scale of development proposed. The Garden Communities and Strategic Masterplan sites in particular provide a key role in reducing the use of private passenger vehicles including through:

- the delivery of strong local cultural, recreational, social (including health and educational facilities where required), local employment and shopping facilities to support the day-to-day needs of residents which are within walkable distance – the 'self-sufficiency' principle.
- The provision of sustainable movement and access to local and strategic destinations (including by rail, bus and walking/cycling).
- The provision of generous, well connected and biodiverse rich green space provision so that residents do not have to travel by car to be able to access natural green space.

4.13 These site-specific requirements are key to ensuring the provision of infrastructure to support the achievement of a reduction in private car use. In particular there are significant opportunities to secure such infrastructure on the strategic masterplan sites. These larger sites also provide the opportunity to ensure that community infrastructure and services and local employment opportunities (such as education and health provision, local facilities and services, and open space) are integrated as part of the design of development. This will provide opportunities to minimise the use of the private car. These sites will also be supported by the provision of new passenger transport services. Such provision could provide wider benefits to existing residents and businesses where current passenger transport services are limited or non-existent.

5 What we need to achieve by 2033 and how we will get there.

5.1 There is a need for the Council, as competent authority, to not only provide the planning policy framework which ensures that the measures needed to protect the Epping Forest SAC are secured, but also identify the specific mitigation measures that need to be delivered based on the current evidence and in accordance with the requirements of the Habitats Regulations.

5.2 The evidence base modelled a number of scenarios which assessed future development growth in the District 'in combination' with other plans and projects (i.e. the Local Plan plus growth in surrounding authorities). A number of potential measures were initially considered, including the implementation of a Clean Air Zone encompassing the roads within close proximity to the Epping Forest SAC and the closure of roads to HGVs. In addition consideration was given to what beneficial effects a shift from Large Goods Vehicles (LGVs) to Ultra Low Emission Vehicles (ULEVs or simply newer Euro standards) would have. Ultimately, two approaches were selected as being quantifiable in the air quality modelling and the most likely to be sufficiently effective in order to be able to reach a conclusion of no adverse effect on the integrity of the Epping Forest SAC. These were as follows:

1. The introduction of a Clean Air Zone; and
2. Increasing the percentage of the vehicle fleet that constitutes ULEVs to 12-15% by 2033, with a focus on the conversion of petrol cars (these being a major source of ammonia) to ULEVs (e.g. electric cars).

5.3 The evidence base provides a detailed understanding of the air pollution context in 2033 and what needs to be done in order to reach a conclusion of no adverse effect on the integrity of the SAC as a result of new development. This understanding was based on modelling the following:

- A minimum 10% conversion of petrol cars to ULEVs by 2025, in other words, 4-5% of the Epping Forest SAC vehicle fleet to be ULEVs by this year;
- The introduction of a Clean Air Zone from 2025;
- A minimum 20% conversion of petrol cars to ULEVs by 2029; (8-10% of the Epping Forest vehicle fleet to be ULEVs by this year); and
- A minimum 30% conversion of petrol cars to ULEVs by 2033 (12-15% of the Epping Forest SAC vehicle fleet being ULEVs by this year)

The evidence demonstrates that the conversion of petrol cars to ULEVs and the introduction of a Clean Air Zone (CAZ) in 2025 would ensure that planned development would not interfere with the ability of the Epping Forest SAC to achieve its conservation objectives with regard to Nitrogen Deposition, or ammonia and NO_x concentrations.

5.4 There are other measures which would also have a beneficial role in achieving an improvement in air quality within the Epping Forest SAC and beyond. Consequently the measures identified within this section are all considered to be necessary to achieve the primary objective of the delivery of development not adversely affecting the integrity of the Epping Forest SAC. Regular on site air quality and traffic monitoring are also key elements of this Strategy so that we can use data which is specific to the Epping Forest SAC to help us understand the effectiveness of the measures identified in this Strategy or if we need to look at other approaches. The approach to monitoring is set out in Section 6 of this Strategy. The outputs will be used to inform the requirement to regularly review the Local Plan and in particular the indicators set out in Policy D8 of the emerging Local Plan. It is also important that this Strategy is reviewed, and if necessary, updated on a regular basis. In part this is to ensure that it is achieving its objective of improving air quality across the Epping Forest SAC but will also enable consideration to be given to new technologies and other approaches that may emerge in the future. The remainder of this Section sets out the measures that need to be delivered whilst Appendix 3 provides an overview of what will happen when and by who.

5.5 The introduction of a CAZ covering the SAC from 2025 would involve charging people driving certain types of vehicle through the zone based upon the age and type of their vehicle. The aim is to encourage motorists to replace older vehicles with newer vehicles compliant with the latest emissions standards, and in particular Ultra-Low Emission Vehicles or ULEVs, through a graduated charging system (for example, zero charge for ULEV owners, or an increased charge for petrol car owners). It would potentially also encourage those motorists who were able to, to use other routes instead of using roads in close proximity to the Epping Forest SAC. As a precaution no dynamic reassignment has actually been assumed in the traffic modelling used in the development of the evidence base. A series of measures that are intended to encourage the uptake of ULEVs to maximise the likelihood of achieving the conversion of 30% of petrol cars using the modelled roads to ULEVs by 2033 include:

a) ensuring that the necessary infrastructure for ULEVs is widely and easily available across the District;

b) incentivising the replacement of petrol cars with ULEVs, targeted at people who live in areas from which the most frequent trips on roads in close proximity to the Epping Forest SAC arise; and

c) Undertaking awareness-raising of both the issue of air pollution and the things that residents and businesses can do to contribute to improving air quality.

5.6 The Council recognises that the implementation of a CAZ will not come without some impact on residents and businesses across the District but it also has a legal responsibility to ensure that it can support the delivery of new homes and jobs without having an adverse effect on the integrity of the Epping Forest SAC.

5.7 It is vital that the Council ensures that robust monitoring is undertaken so that it can be confident that the implementation of all the measures continues to be 'fit for purpose'. This monitoring will involve the collection of up-to-date traffic and air quality monitoring data from across the Epping Forest SAC. As well as providing up-to-date information on the percentage of ULEVs using roads through the Epping Forest SAC the future monitoring activities will let us know whether the assumed rate of growth in traffic, traffic queuing lengths and time periods when they are greatest are as we thought. It will also enable us to understand whether there are any long-term effects on traffic and travel as a result of the COVID-19 crisis.

5.8 The measures set out below have been identified for two reasons. Some can be modelled and therefore provide the greatest level of certainty in terms of their efficacy. Others have been identified because they will help to achieve the delivery of the modelled objective of securing a switch from petrol to ULEVs, or achieve a reduction in the assumed growth in the number of vehicles using roads in close proximity to the Epping Forest SAC. Some of these measures can be implemented now or within the next one to two years. The CAZ in particular will take longer to bring forward as the scheme needs to be developed in more detail before it can be implemented. A Framework for Delivery is set out in Appendix 3 which sets out the range of measures to be implemented and includes an indicative programme for the delivery of the CAZ.

<u>The required measures:</u>

Provision of Electric Vehicle charging points.

5.9 Policy T1 (Sustainable Transport Choices) of the emerging Local Plan requires that any development which proposes vehicle parking spaces must ensure that those spaces have direct access to an electric vehicle charging point. The requirement ensures that there will be greater opportunities for people to be able to access charging points and therefore have greater certainty that the necessary infrastructure will be in place to support ULEVs. This will help to inform future decision-making by residents and businesses when making vehicle purchases or entering into leasing agreements. Automatic Number Plate Recognition (ANPR) data collected has shown that the Vehicle Fleet Mix for vehicles using modelled roads through the Forest is older than the national average and therefore purchase decisions may come forward sooner than might be expected.

5.10 As the requirement relates to 'destination' sites as well as 'origin' sites it will give people greater comfort that, if they are purchasing or leasing electric vehicles which have greater range limitations, that charging options will be available. This also supports the wider roll out of measures for the provision of electric vehicle charging points (i.e. autonomous measures) being encouraged and supported by the UK Government.

5.11 It is also important to ensure that provision is made in support of Government decisions to introduce the ban of sales of new petrol, diesel and hybrid cars and vans and enable residents and businesses to benefit from financial incentives that have been introduced to support the uptake of electric vehicle purchases and leasing through Road Vehicle Taxation differentiation and company car tax rates.

<u>Can the benefits of the mitigation be modelled?</u>

5.12 No account has been taken of the uptake in electric vehicles over and above those included in the air quality modelling undertaken to support the evidence base developed to update the HRA which uses national projections to represent the policy. The modelling does, however, include the proportion of electric and other low-emission vehicles that are currently using roads within close proximity to the Epping Forest SAC based on the data collected through Automatic Number Plate Recognition (ANPR) surveys undertaken in 2019. It is, however, an important measure in support of the achievement of the conversion of petrol cars to ULEVs.

How it will be funded.

5.13 This is a requirement for development proposals and will be funded by individual developers.

How it will be delivered.

5.14 The measures will be secured through the imposition of planning conditions on individual planning permissions and implemented by site developers.

When it will be delivered.

5.15 The Council has already begun to implement this requirement for development schemes that it has been able to approve in accordance with Natural England advice. Its implementation is not dependent on the adoption of the emerging Local Plan.

How its success will be monitored.

5.16 Through future ANPR surveys. The take up of electric vehicles will be influenced by a number of factors and not solely on the provision of electric vehicle charging points. However it is an important measure in ensuring that the infrastructure is in place to support the use of ULEVs. Further measures to encourage the purchase of electric vehicles are being investigated as the electrification of the fleet will benefit both human health and the integrity of the Epping Forest SAC. These include the introduction of preferential car parking charging for electric vehicles in Council owned car parks, and working with Essex County Council and the Harlow and Gilston Garden Town to explore the feasibility of ULEVs being able to use bus priority lanes.

Awareness Raising Campaign

5.17 The issues of air pollution and the climate crisis are becoming far more widely understood and actions to address them are going higher up the agenda in terms of peoples' and businesses priorities. However, beyond the development world it is thought that little is known by existing residents and businesses within the District of the issues facing the Epping Forest. Beginning an awareness raising campaign about these issues, and helping people to understand that driving a petrol or diesel vehicle on roads within close proximity to the Epping Forest SAC is affecting its long-term health is an important measure in supporting the achievement of a switch from petrol and diesel to electric or other non-polluting vehicles. Of particular importance will be providing information about the range of grants and incentives that exist, together with an understanding of what the longer-term financial savings that could be achieved by switching to electric, or other alternative technologies. This can be an important component of decision making when looking to buy or lease a new vehicle or making decisions as to how people want to travel in the future, as will providing information about the location of charging infrastructure. Such a campaign can begin the conversation and help to achieve the targets that need to be met in terms of switching from petrol and diesel cars to ULEVs to secure improvements in air quality.

How it will be funded

5.18 By Epping Forest District Council.

How it will be delivered

5.19 By Epping Forest District Council

When it will be delivered

5.20 This will be undertaken initially in 2021 and then at further points over the course of the Plan period.

How its success will be monitored.

5.21 Through air quality monitoring and ANPR surveys which will provide an Epping Forest SAC specific understanding of the uptake in ULEVs and changes in travel behaviour.

Introduction of a Clean Air Zone:

5.22 The air quality modelling that has been undertaken to support the development of this Strategy and to inform the Habitats Regulations Assessment for the emerging Local Plan has demonstrated that, based on current information and assumptions, in order to avoid adverse effects to the integrity of the EFSAC a key mitigation measure will be the need to implement a Clean Air Zone (CAZ) in 2025.

5.23 The approach set out below is in accordance with Government guidance for the development of a CAZ. A CAZ is a recognised measure for securing improvements in air quality with a particular focus on addressing emissions from vehicles. A CAZ is normally implemented as a mechanism for addressing concerns about high levels of traffic related pollution on human health i.e. NO_x and particulate matter. However, a CAZ could be equally effective in securing improvements in atmospheric pollution which is having an adverse effect on the integrity of the Epping Forest SAC, when targeted appropriately.

5.24 In undertaking the air quality modelling work to support the development of this strategy the Council has collected data on the type and age of vehicles using roads through the EFSAC on a daily basis which means that we have a much better understanding of which vehicles are having the greatest impact on the Epping Forest SAC in terms of emissions of NO_x and ammonia. This has helped us to focus on the type of CAZ that would need to be implemented.

Types of Clean Air Zones

5.25 There are four types, or classes, of conventional CAZ, as follows:

Class	Vehicle type
A	Buses, coaches, taxis, private hire vehicles
B	Buses, coaches, taxis, private hire vehicles, heavy goods vehicles
C	Buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans, minibuses
D	Buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans, minibuses, cars, the local authority has the option to include motorcycles

5.26 The aim of a conventional CAZ is to discourage older vehicles, and in particular diesel vehicles, from using areas which have significant air quality issues such as Air Quality Management Areas (AQMA), as these vehicles make the greatest contribution to emissions of NO_x. Emissions of ammonia, however, are greater from petrol vehicles. As such, a potential fifth CAZ class, or type, may favour electric vehicles or vehicles using other technologies, which have zero on-road emissions of NOx and ammonia, and would therefore benefit both the integrity of the Epping Forest SAC and the Air Quality Management Area (AQMA), designated within the District in order to protect human health.

5.27 We know from data we have collected that the following vehicle types have the greatest effect on the integrity of the Epping Forest SAC[2]:

- Vans: Approximately 18% of the daily traffic using roads in close proximity to the Epping Forest SAC is made up of diesel vans but they contributed up to 45% of NO_x emissions in 2017.
- HGVs: Approximately 2% of the daily traffic using roads in close proximity to the Epping Forest SAC is made up of diesel HGVs but they contributed up to 37% of NO_x emissions in 2017.
- Older private cars: Approximately 28% of the daily traffic using roads through the Epping Forest SAC is made up of older diesel cars (pre-Euro 6) which contributed up to 45% of NO_x emissions in 2017.
- Petrol cars: Approximately 40% of the daily traffic using roads through the Epping Forest SAC is made up of petrol cars which contributed up to 88% of ammonia emissions in 2017.

What minimum emission standards are currently being applied to CAZs?

5.28 In terms of NO_x, each vehicle type has a minimum emission standard to avoid charges for entering the CAZ, however there are currently no limitations on emissions of ammonia. A vehicle's emission standard can be found in a vehicle logbook or from the vehicle

[2] From 2017 ANPR data and air quality modelling.

manufacturer, although there is also a useful vehicle emissions checker on the Transport for London (TfL) website.

5.29 To avoid being charged in a traditional CAZ, a vehicle must meet the following minimum standard.

Vehicle type	CAZ minimum standard
Buses, coaches, heavy goods vehicles	Euro VI
Vans, minibuses, taxis, private hire vehicles, cars	Euro 6 (diesel) and Euro 4 (petrol)
Motorcycles	Euro 3

5.30 There are some national exemptions from the charge for the following:

- vehicles that are ultra-low emission
- disabled passenger tax class vehicles
- military vehicles
- historic vehicles
- vehicles retrofitted with technology accredited by the Clean Vehicle Retrofit Accreditation Scheme (CVRAS)[3]

What type of CAZ might need to be applied for the Epping Forest SAC?

5.31 Based on the most up-to-date evidence the type of conventional CAZ that would need to be applied would be a Class D CAZ. This means that the following vehicles would be included:

Buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans, minibuses, and cars.

We also have the option to include motorcycles and can bring in some local exemptions. In particular we will need to think about how this might apply to vehicles operated by the emergency services.

Further consideration of the potential implications on emissions of ammonia is currently underway. The feasibility of a potential 'Class E' CAZ, which further promotes the use of electric vehicles, should be considered.

[3] The key retrofit technologies are:
• Exhaust after treatment systems – these use a diesel particulate filter (DPF) to reduce emissions of particulate matter and a selective catalytic reduction (SCR) system which reduces nitrogen oxide emissions. They are applied to an existing vehicle powertrain.
• Re-power systems – this involves completely stripping out the existing engine and replacing it with a brand-new powertrain which could be a cleaner diesel engine, a petrol engine + LPG system, a 100% electric powertrain or a hybrid electric powertrain.

What does this mean in practice?

5.32 The standards for a conventional Class D CAZ are as follows:

- **Euro 3** for motorcycles, mopeds, motorised tricycles and quadricycles (L category).
- **Euro 4** for petrol cars, vans, minibuses and other specialist vehicles.
- **Euro 6** for diesel cars, vans and minibuses and other specialist vehicles.
- **Euro VI** for lorries, buses and coaches and other specialist heavy vehicles.

This means that vehicles which comply with the appropriate NO_x standard would be able to enter the CAZ without being charged.

5.33 With regard to NO_x, **Euro 3** became mandatory for all new motorcycles in 2007. **Euro 4** became mandatory for all new cars in 2005 and light vans in 2006. **Euro 6** became mandatory for all new heavy-duty engines for goods vehicles and buses from January 2014, from September 2015 for cars and light vans, and from September 2016 for larger vans up to and including 3.5 tonnes gross vehicle weight.

5.34 In developing a CAZ for the Epping Forest SAC careful consideration will need to be given to what categories are included to ensure that we are addressing both NO_x and ammonia. To provide an understanding of the current situation in relation to the vehicles using the Forest we have used the data that we collected in 2017 and 2019. This has enabled us to identify the proportion of vehicles currently using the roads within the Forest which would not comply with the CAZ standards. The 'Epping Forest Special Area of Conservation: Comparing 2017 and 2019 ANPR Vehicle Composition with EFT National Default Fleets Technical Note' 20 February 2020 provides the detailed analysis of the Fleet Composition (*links to be inserted)*.

5.35 Vehicles that comply with the CAZ standards set will be able to be driven within the CAZ without having to pay a daily charge. Vehicles which do not comply with the standards can still be driven within the CAZ but would be subject to a daily charge.

5.36 The following are examples of the level of charging, or proposed levels of charging, for other schemes of a similar nature. This helps to understand potential charging levels but it is likely that the charging strategy for the Epping Forest CAZ will differ from a standard CAZ in order to encourage petrol car users to convert to ULEVs or potentially encourage such vehicles to avoid driving through the Epping Forest SAC at all. There is also a potential that some of the monies raised could be used to fund locally based incentives to encourage people to buy ULEVs.

<u>The London Ultra Low Emission Zone (ULEZ):</u>

- £12.50 for most vehicle types, including cars, motorcycles and vans (up to and including 3.5 tonnes).
- £100 for heavier vehicles, including lorries (over 3.5 tonnes) and buses/coaches (over 5 tonnes).

Birmingham CAZ:

- £8 for cars, vans and minibuses
- £50 for HGVs, buses and coaches.

When would a CAZ for the Epping Forest SAC be put in place?

5.37 Based on the current evidence a CAZ would need to be put in place in 2025. Prior to that date a significant amount of practical work needs to be undertaken which the Council will need to do in partnership with Essex County Council as the highway authority. Key activities that need to be undertaken in developing the CAZ are set out at Appendix 2. An indicative programme of delivery is provided at Appendix 3 which provides more detail on the indicative dates to support the implementation of the CAZ and its commencement, which is currently anticipated to be in September 2025.

5.38 Further monitoring, updating of the evidence base and the Local Plan Habitats Regulations Assessment will form part of the preparatory work to ensure that the CAZ is taken forward based on the most up-to-date evidence available. This is because there are already some initiatives which may influence the take up of less polluting vehicles as set out below.

Changes to London Low Emission Zone

5.39 The Mayor of London is introducing higher standards for heavier vehicles entering the London Low Emission Zone (LLEZ) from 1 March 2021. The LLEZ operates to encourage the most polluting heavy diesel vehicles driving in London to become cleaner. The LEZ covers most of Greater London and is in operation 24 hours a day, every day of the year. This includes roads within the London Borough of Waltham Forest such as Woodford Green, which then links in to Epping New Road.

Extension of London Ultra Low Emission Zone

5.40 The Mayor of London is introducing changes to the London Ultra Low Emission Zone (LULEZ) in which start on 25 October 2021. The changes involve expanding the current central London LULEZ to create a single, larger zone up to, but not including, the North Circular Road (A406) and South Circular Road (A205). The North Circular Road lies close to the administrative boundary of Epping Forest District and it is likely that some journeys that originate within the District and are made using roads within close proximity to the Epping Forest SAC would have destinations within the extended LULEZ area. Conversely some journeys originating within the ULEZ area may have destinations within the District and beyond which are reached by using roads within close proximity to the Epping Forest SAC. As a result individuals and organisations whose vehicles currently do not comply with the LULEZ standards may already be making decisions about purchasing or leasing less polluting vehicles, and in particular electric or other zero-emission vehicles.

Tax incentives

5.41 Government has introduced a number of fiscal incentives and grants for businesses and individuals designed to encourage the take up of electric and low emission vehicles including:

- Reduced car tax
- Significantly lower tax levels for users of company cars. For company car drivers and fleet operators choosing an electric car from April 2020, there will be zero tax on Benefit in Kind (BIK) during 2020/2021. This zero rate also applies to hybrid vehicles with emissions from 1 - 50g/km and a pure electric range of over 130 miles. There are now 11 new tax bands for vehicles with emissions of 75g/km and below, some of which are linked to the electric mile range that the vehicle offers. The government has also announced the tax rate for the next three years, helping businesses to plan ahead. The electric car tax on benefit in kind rate will increase to 1% in 2021/2022 and 2% in 2022/ 2023.
- Cars bought by a business with CO_2 emissions of less than 50g/km are eligible for 100% first year capital allowances. This means with electric cars, the business can deduct the full cost from its pre-tax profits. On a car costing around £40,000 this could amount to a tax relief of £7,600 in the first year.
- Employers who provide electricity at a place of work can qualify for an exemption to this being taxed as a benefit-in-kind if the electricity is provided via a dedicated charge point, if the charging facilities are provided at or near the workplace and the charging must be available to either all employees or all the employer's employees at a particular location.
- There are also grants available for businesses and private individuals towards the costs of buying electric charging infrastructure and towards the cost of purchasing a vehicle.

Scrappage schemes

5.42 It is understood that the government is potentially exploring introducing a vehicle scrappage scheme which, if introduced, would be incentivising those with the oldest and most polluting vehicles to replace them with an electric vehicle. In addition a number of the larger car manufacturers have initiated their own scrappage schemes. A shift toward electric vehicles would reduce emissions of both ammonia and NO_x and would therefore be of great benefit to the integrity of the Epping Forest SAC. The Council is also exploring options as to whether there is a potential to introduce a locally-based scrappage scheme.

Monitoring and review

5.43 The Council fully recognises that the introduction of a CAZ will have a real impact on both individuals and businesses. Therefore, committing to the development and implementation of a CAZ covering roads in close proximity to the Epping Forest SAC has not been taken lightly. However, if we do not take this approach then we would be prevented from bringing forward much needed homes and job opportunities across the District. That is why as part of the detailed work that we will be starting to undertake we need to make sure that the introduction of a CAZ is based on the most up-to-date information so that we can be certain that we are focusing our efforts in the correct way. We will also be looking at ways in which we may be able to provide financial assistance needed by individuals and businesses in particular and how these could be targeted in the most effective way. It is also important to recognise that although the CAZ would be put in place to protect the Epping Forest SAC, which is an important resource to residents across the District, the more cleaner vehicles there are using roads within the District the better the District's air quality will be for all of our residents.

<u>How it will be funded</u>

5.44 The development and implementation of the CAZ, will be funded by securing contributions from relevant development schemes within the District. However, there are currently a number of Government funding initiatives in place to support the development of CAZs. Whilst these are focused on addressing issues of air pollution as they affect human health the Council will be discussing with the Department for the Environment, Farming and Rural Affairs and the Ministry of Housing, Communities and Local Government the potential of securing Government funding recognising the unique challenges that the District is facing. Consequently, the Council will ensure that if alternative funding is secured financial contributions from developments which relate to the implementation of the CAZ will be reimbursed.

Introducing a right-hand turn ban at the junction of the A121 (Honey Lane) into Forest Side

5.45 The evidence base has identified that the introduction of a ban for vehicles on the A121 (Honey Lane) turning into Forest Side from the direction of Junction 26 of the M25 motorway towards the Wake Arms Roundabout may be beneficial to parts of the Epping Forest SAC. Introducing this ban may reduce the level of traffic that currently uses Forest Side to access the Robin Hood Roundabout and therefore could reduce the residual nitrogen and ammonia doses past transect N. It would also have a wider benefit in that it would reduce the length of queuing traffic which is currently impeding the safe operation of Junction 26 and the M25 motorway. The Council recognises that the effects of diverting traffic on Epping Forest SAC will need to be adequately assessed and is therefore currently exploring the detailed approach that would be needed to implement this measure.

Site specific initiatives to support species and veteran tree resilience

5.46 Local site-based measures will be necessary to increase the resilience of the Drosera plant species within parts of the Epping Forest SAC and align with its conservation objectives. This species is a key attribute of the wet heath SAC qualifying feature and measures are needed to address any possible effects of predicted increases in nitrogen deposition rates. Local site-based measures for a number of veteran oak trees including at Wake Arms Roundabout will also be needed even with the introduction of a ULEZ and the change in the composition of the Vehicle Fleet by 2033.

Initiatives to support walking, cycling and increased public transport use

5.47 Policy T1 of the emerging Local Plan seeks to secure reductions in the use of private vehicles for journeys, and in particular, journeys during the peak hours. The spatial strategy for the emerging Local Plan has also been developed in order to maximise the opportunities for reducing vehicle usage. This is a well-established approach to plan-making and decision-making and has multiple benefits. In this instance securing modal shift will have benefits for the Epping Forest SAC and is a positive measure as it will reduce the level of growth in the number of vehicles using roads in close proximity to it. This will support slowing the predicted growth in the number of vehicles contributing to atmospheric pollution and potentially the estimated length of queues, particularly at peak times, which is known to be a contributing factor in respect of atmospheric pollution.

Can the benefits of the mitigation be modelled?

5.48 Only a limited amount of modal shift has been modelled as part of the evidence base recognising that what could be achieved is difficult to predict with sufficient certainty. In addition the interventions will ~~also~~ provide opportunities for existing residents of Epping Forest District to change the way that they chose to travel but the limited amount of modal shift assumed does not take account of this wider benefit. Therefore securing a higher level of modal shift has the potential to make an additional contribution to improvements in air quality. For example the Harlow and Gilston Garden Town has set ambitious modal shift targets. Whilst these are challenging there will be significant investment in walking, cycling and public transport infrastructure to support their achievement as part of the development of the allocated Garden Communities. Modal shift is also an important element of the development of the other Masterplan sites within the District, including at Epping and North Weald Bassett.

How it will be delivered

5.49 The Council has recently appointed a Sustainable Transport Officer who will be leading on the development of this initiative. This will include taking forward the development of an area wide public transport strategy and working with the Conservators of Epping Forest in the development of an Epping Forest Transport Strategy to support the objective of getting more visitors to come to the Forest by means other than the car.

5.50 These strategies will help to then further develop the package of measures to be brought forward. A current package of measures include the provision of public transport, walking and cycling infrastructure and supporting measures as identified in the Infrastructure Delivery Plans developed to support the emerging Local Plan and the Harlow and Gilston Garden Town. The delivery of these measures will be secured primarily in partnership with Essex County Council including through the design of new development, the provision of, or financial contributions toward, sustainable transport initiatives and the adoption of site specific travel plans. Taking forward the implementation of these measures is a key task for the Council's recently appointed Sustainable Transport Officer. The measures and, where appropriate, funding for off-site measures will be secured through the imposition of planning conditions or securing Section 106 planning obligations on individual planning permissions and implemented by site developers or Essex County Council. For larger sites the provision of infrastructure to support public transport, walking and cycling related infrastructure will be provided on, or in close proximity to the relevant site and the design and layout of schemes will be required, primarily through Policies SP2 (Place Shaping) SP3 (Development and Delivery of Garden Communities in the Harlow and Gilston Garden Town) T1 (Sustainable Transport Choices), DM9 (High Quality Design), D1 (Delivery of Infrastructure) and the site specific requirements set out in Chapter 5 and Part Two of the emerging Local Plan.

How it will be funded

5.51 Through a number of funding schemes including through the securing of financial contributions from planning applications, Essex County Council Local Transport Funding, Department for Transport funding and where appropriate available funding bids such as the Housing Infrastructure Fund.

When will it happen

5.52 In accordance with the timescales for delivery as set out in the relevant Infrastructure Delivery Plans and through the phasing plans developed to support the Masterplanning of the strategic sites proposed for allocation in the emerging Local Plan. In addition larger development schemes are already required to be supported by Travel Plans.

How its success will be monitored

5.53 Through the monitoring of site specific travel plans, the delivery of infrastructure through investment programmes including those identified in the emerging Local Plan and Harlow and Gilston Infrastructure Delivery Plans, and through future traffic monitoring. Ultimately the success of these elements together with the other proposed measures will collectively be understood through the future on-site air quality and traffic monitoring to be undertaken on roads through the Epping Forest SAC.

HGV Route Management Strategies

5.54 Route Management Strategies will be required for relevant developments which will generate HGV movements, including in relation to construction traffic. This is a well-established planning mechanism and will enable HGV restrictions to be placed on, primarily, employment development within the District to prevent an increase in HGVs on roads in close proximity to the Epping Forest SAC. HGVs contribute to atmospheric pollution in two ways. Firstly, they are primarily diesel fuelled. Secondly, they contribute to queuing traffic both in terms of their size (an HGV is on average equivalent to 2.3 passenger car units) but also because they are slower moving vehicles when they move through junctions they take a greater amount of time and therefore contribute to queuing at those junctions. The use of Route Management Strategies will help to reduce the number of new HGVs that will use roads within close proximity to the Epping Forest SAC from the larger employment allocations proposed in the emerging Local Plan.

How it will be funded

5.55 This will be a requirement of any planning application in relation to principally new employment development sites or extensions to existing sites. Therefore, there is no specific financial cost associated with this measure.

How it will be delivered

5.56 The measures will be secured through the imposition of planning conditions or Section 106 planning obligations on individual planning permissions and implemented by site developers.

When it will be delivered

5.57 The requirement for certain types of development to provide Route Management Strategies is already in place and is therefore already being implemented.

How its success will be monitored

5.58 Through future traffic monitoring and ANPR surveys.

Provision of Digital Communications Infrastructure

5.59 The promotion and enhancement of communications infrastructure supports the objective of reducing car usage, and will support reductions in work based travel. This will therefore support a slowing down of the predicted growth in traffic on roads in close proximity to the Epping Forest SAC.

Can the benefits of the mitigation be modelled?

5.60 Not specifically. However it is considered to be a required measure as it will have a beneficial effect on the Epping Forest SAC as a result of reductions in traffic growth.

How it will be delivered

5.61 Through the application of Policy D5 of the emerging Local Plan. The Policy requires all major development proposals to demonstrate how high speed broadband infrastructure will be accommodated. In addition other initiatives that are in place which are not linked to development, such as the Superfast Essex programme, will result in improved communications infrastructure for existing residents and businesses which will support home-working for existing residents.

How it will be funded

5.62 This is a requirement for new development sites and will be funded by individual developers.

When will it be delivered

5.63 The requirement for certain types of development to provide Digital Communications Infrastructure is already in place and is therefore already being implemented.

How its success will be monitored

5.64 Through traffic monitoring which will tell us whether the growth in traffic is as predicted.

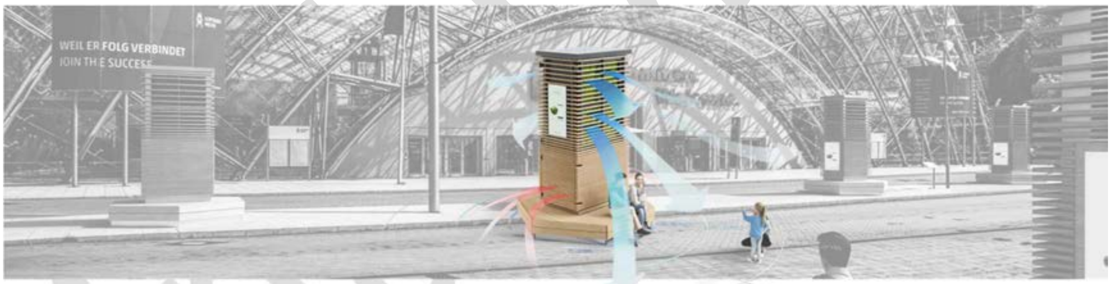
Trialling new technologies

5.65 Recognising the challenges that many places are experiencing in relation to the effects of air quality on both human and ecological health there are a number of new technologies that the Council considers could be trialled in the Epping Forest SAC to support the measures identified above. It is important that we consider trying some of these technologies, which in some cases, may actually involve using the Epping Forest SAC as a real world opportunity to test their effectiveness. There are two measures in particular that we are investigating implementing.

City Trees

5.66 The ability of certain moss cultures to filter pollutants such as particulate matter and nitrogen oxides from the air makes them ideal natural air purifiers. But in cities, where air purification is a great challenge, mosses are barely able to survive due to their need for water and shade. This problem can be solved by connecting different mosses with fully automated water and nutrient provision based on unique Internet of Things technology. Air filtering performance is quantitatively proven and the plants' requirements are measured in real time. The City Tree came into being in order to address these issues by providing the world's first bio-tech filter to quantifiably improve air quality.

5.67 City Trees have been installed by the London Borough of Waltham Forest at Leytonstone Station and The Thatched House (at the junction of two heavily trafficked roads – Leytonstone High Road / Leytonstone Road and Cann Hall Road / Crownfield Road). Whilst these have been developed in order to respond to the effects of air pollution on human health they target one of the key pollutants that we are trying to address. They are self-sustaining structures that contain a water tank, with automatic irrigation and plant sensors all powered by on board solar panels and batteries. Consequently, they could be suitable for locating at Wake Arms Roundabout and Robin Hood Roundabout in particular. More information can be viewed here. This initiative is currently being explored with the potential to implement within the next twelve months.



A road based pollution extraction system

5.68 This is a new patented technology which captures pollution at the source of production - in the roadway, next to vehicle exhausts. A series of partially submerged pods are installed in the centre of the roadway at "hotspot areas" of high pollution, slow moving and or stationary traffic. These pods are connected under the surface to pipework which extracts the polluted air into a roadside cleaning unit. The air that leaves the roadside unit is cleaned to a rate of 99%, removing particulate matter (PM1 - PM10) along with a range of harmful gases including Nitrogen Oxide (NO_x), Carbon Monoxide (CO), Hydrocarbons (HC) and Ozone (O_3). The road based pods can also be used for "lane delineation" also known as "white lines". The maintenance required by the roadside air cleaning unit varies depending on the density of pollution and volume of traffic but timescales vary between 3 and 12 month intervals. This is currently being explored with the developers of the initiative and once further details of its implementation are known the Council will seek Essex County Council's support for its implementation. There is potential that this could be trialled within the next 12-24 months.

Other initiatives

5.69 This Strategy identifies the package of measures that the Council has identified as being the most effective in managing the effects of development on the Epping Forest SAC. However, the Council recognises that there may be other measures that developers may wish to propose or which may emerge in due course arising from national and international research and development activity. The Council will consider such measures and support site specific initiatives not referred to in this Strategy if it can be clearly demonstrated that such approaches will be effective in addressing the effects of atmospheric pollution on the integrity of the Epping Forest SAC.

6 Monitoring and Review

6.1 The Council, as local planning authority, is legally required to undertake a review of its Local Plan every five years. The first review needs to be completed within five years of the adoption of the emerging Local Plan. Whilst this does not automatically mean that the Local Plan itself will be updated the review should be informed by the monitoring of data to understand if key indicators in the Local Plan are being achieved, and if they are not, then this can act as a ‘trigger’ which requires the Council to undertake an update to its Local Plan in order to rectify/remedy any issues identified through the review.

6.2 In this regard, undertaking a planned approach to air quality monitoring to assess progress on improvements to air quality across the Epping Forest SAC is a necessary and key component of this Strategy as ultimately the success of all the mitigation measures collectively will be better understood through monitoring in order to assess the progress being made towards improving air quality. This will involve a number of elements as follows:

- Provision of a continuous air quality monitoring unit. The pollutants to be monitored and the most effective location for doing so will be discussed and agreed with Natural England and the Conservators of Epping Forest. The permanent facility will provide an important source of information based on continuous monitoring which takes account of different seasons and changes in traffic levels across the year and enable verification of the data collected from the periodic on-site monitoring data (see below).
- Undertaking on-site passive monitoring of Ammonia and NO_2 (primarily through the use of diffusion tubes but also using Alpha Samplers on transects which the evidence has indicated are the subject of the greatest impacts from ammonia concentrations within the Epping Forest SAC. The same sites and methodology as that undertaken for the air quality monitoring undertaken over the period May 2018 – February 2019 will be used to ensure consistency in the data used and its analysis for comparative purposes. The next period of on-site monitoring will be undertaken for a period of 9 months and will commence in May 2024. This date has been proposed as it will provide more up-to-date

information to inform the final scheme design of the CAZ and give an early indication of the progress toward achieving the Strategy's objectives. This approach is in accordance with Policy D8 of the emerging Local Plan. There is also a need to provide sufficient time for some development to come forward recognising that very little development has been consented across the District since 2018. The nine month period will allow for an analysis of conditions with and without leaf cover and provides significant periods where traffic levels are not reduced as a result of school and public holidays. This monitoring will build on the outputs from the continuous air quality monitoring station.

- The results of the on-site monitoring will be used to assess progress towards the 'predicted' air quality conditions as set out in the current evidence base.
- Undertaking traffic monitoring using Automatic Traffic Counts and Automatic Number Plate Recognition will enable comparisons to be made at key parts of the road network in close proximity to the Epping Forest SAC which aligns with the air quality monitoring. This will provide a comparable basis for undertaking a review of progress and indicate whether there is a need to update the Local Plan in order to be able to continue to demonstrate that it will not have an adverse effect on the integrity of the Epping Forest SAC.

6.3 This monitoring information will be assessed by undertaking further air quality modelling work, using the same methodology and using the most up-to-date projections from the Department for Environment, Food and Rural Affairs. On the basis of the most up-to-date modelling outputs the Council will undertake an assessment as to whether the Local Plan should be updated in relation to the level and location of development across the District in consultation with Natural England as the statutory body responsible for the oversight of internationally designated sites. This will include consideration as to whether any issues regarding expected improvements are locally derived or are related to regional or national effects, and to which pollutants these issues relate to. It will also help to identify whether any changes to the CAZ scheme are required.

6.4 Natural England have also advised that the extent and abundance of the cushion moss Leucobryum should be surveyed and monitored in areas which are vulnerable as part of the monitoring programme to inform the Local Plan interim reviews.

7. Implementing the Strategy

7.1 The approach to implementing the Strategy is summarised at Appendix 3 and costing information is summarised at Appendix 4. The Strategy requires the implementation of some measures which are strategic in nature rather than site specific. In addition there is a cost associated with undertaking the monitoring and comparative assessments. These elements will be delivered by the Council and its partners and will be funded through the payment of financial contributions from all relevant development proposals which are proposed to be approved under the Town and Country Planning Acts. The approach has been developed in accordance with Regulation 122 of the Community Infrastructure Regulations based on the relative contribution made by development proposed in the Council's emerging local plan (derived from the Council's evidence base to support the development of this Strategy) and viability considerations. The financial contributions to be secured are as follows:

Residential Development:

The Garden Communities (GCs): £232 per dwelling.
North Weald Bassett Masterplan Area and South of Epping Masterplan Area: £641 per dwelling.
Smaller sites (including windfall sites) and the Waltham Abbey Masterplan Area: £335 per dwelling.

Non-residential development

The Council has given consideration to viability issues in relation to employment related developments within the District including as a result of the impact of the COVID 19 crisis. It therefore will only be seeking financial contributions from development proposals on the proposed employment allocations at North Weald Airfield (NWB.E4) and Land north of A121 (WAL.E8) as follows:

NW Airfield: £206,017
WAL.E8: £206,017

Other trip generating development proposals will be considered on a case by case basis.

Appendix 1: Non-planning related activities

Wider activities being undertaken or proposed to be undertaken by the Council

1.1 As well as its function as a local planning authority the Council has duties under the Environment Act 1995 with respect to Local Air Quality Management (LAQM). Whilst the Council's LAQM role is focused on the effects of air quality on human health some of these activities will also have a benefit with respect to supporting improvements in air quality which will be beneficial to ecological health. The Council has decided to incorporate all activities that support air quality improvements for both human and ecological health to ensure that a complete and comprehensive approach is provided in one place. Some of the activities that the Council is undertaking or exploring are as follows:

➢ Clean Air Day – undertake additional promotional work outside schools, focussing on known problem areas, speaking to parents in vehicles and also raising awareness with the children.

➢ Idling vehicles promotion campaign – Raise awareness of the impacts of idling vehicles and that idling is an offence that may lead to the issuing of an FPN Enforcement of Idling Vehicles by EFDC – officers have been given the necessary authority to serve Fixed Penalty Notices (May 2018). It is intended for this power to be targeted where complaints are received and it will follow a promotional campaign to highlight this power to residents. There are opportunities to consider whether there are opportunities to include the use of FPNs at sensitive parts of the Forest.

➢ Effective regulation of Part B and Part A2 regulated activities including solvent emission activities.

➢ Investigation of complaints regarding, and regular reviews to search for unpermitted industrial activities.

➢ Investigation of complaints and effective regulation in respect of industrial and domestic bonfires.

➢ Investigation of complaints, provision of information and effective regulation of smoke control areas (Loughton and Waltham Abbey).

➢ Participation in 'Clean Air Day' anti-idling promotion initiatives with a focus outside schools.

Working with Partners and Landowners

1.2 There are a number of areas where the Council will use its influence with Partners and Landowners, including though the Green Arc Partnership, in respect of the following:

➢ Encouraging the change to cleaner buses

- Working with the Conservators of Epping Forest, as a landowner, with regard to management of its agricultural landholdings and use of buffer lands for grazing
- Working with the Conservators of Epping Forest and Essex County Council to encourage the development of an up-to-date Transport and Access Management Strategy for the Forest, including an appropriate approach to encouraging visits to the Forest by means other than the Car such as charging for car parking.
- Working with landowners to encourage changes to land management and agricultural practices by promoting, for example, the government's national Code of Good Agricultural Practice.

Activities outside of the Council's sphere of influence

1.3 The government's Clean Air Strategy 2019 has identified a number of actions that it will undertake which will support reductions in the effects on habitats from ammonia, which primarily arises from agricultural practices. It should be noted that these measures have not been taken into account in modelling the 'Mitigated' scenarios in relation to understanding the effects of development on air quality on the Forest. These actions are as follows:

- Government has provided a national code of good agricultural practice (COGAP) to reduce ammonia emissions.
- Government will require and support farmers to make investments in the farm infrastructure and equipment that will reduce emissions.
- A future environmental land management system will fund targeted action to protect habitats impacted by ammonia.
- Government will continue to work with the agriculture sector to ensure the ammonia inventory reflects existing farming practice and the latest evidence on emissions.
- Government will regulate to reduce ammonia emissions from farming by requiring adoption of low emissions farming techniques.
- Government will extend environmental permitting to the dairy and intensive beef sectors.
- Government will regulate to minimise pollution from fertiliser use, seeking advice from an expert group on the optimal policy approach.
- A future environmental land management system will fund targeted action to protect habitats impacted by poor air quality. Achievement of our 2030 air quality targets will reduce the pressure of emissions on semi-natural habitats. However, despite projected improvements, some vulnerable habitats will still be exposed to nitrogen deposition and atmospheric levels of ammonia that are greater than they can tolerate. Natural England is currently examining options to improve the effectiveness of incentive schemes for mitigating ammonia emissions to air and protecting natural ecosystems. In addition, we have commissioned further work to investigate how these habitats might be protected most effectively through new environmental land management schemes.

1.4 Government proposes to introduce rules on specific emissions reducing practices including:

- a requirement to take action to reduce emissions from urea-based fertilisers. Government proposes to consult on this policy in 2019 with a view to introducing legislation in the shortest possible timeframe;
- a requirement for all solid manure and solid digestate spread to bare land (other than that managed in a no-till system) to be incorporated rapidly (within 12 hours) with legislation to be introduced in the shortest possible timeframe;
- a requirement to spread slurries and digestate using low-emission spreading equipment (trailing shoe or trailing hose or injection) by 2025. Government will also consider options for phasing in this requirement so that those spreading digestate or large volumes of slurry may be required to adopt the practice at an earlier date;
- a requirement for slurry and digestate stores to be covered by 2027. Government will consider options for phasing in this requirement so that those producing or storing digestate or large volumes of slurry may be required to adopt the practice at an earlier date.
- mandatory design standards for new intensive poultry, pig and beef livestock housing and for dairy housing. The standards will be designed in collaboration with industry experts and will include design features to improve animal health and welfare and minimise environmental pollution to air (including greenhouse gas emissions), water and land as far as practicable
- Emissions of ammonia fell by 13% between 1980 and 2015. However, since then there has been an increase in emissions, largely as a result of fertiliser use. Government's aim is to reduce emissions of ammonia against the 2005 baseline by 8% by 2020 and 16% by 2030.

Appendix 2

Process for the implementation of a Clear Air Zone for the Epping Forest SAC

Developing the Clean Air Zone (CAZ) will be undertaken in line with the latest Government guidance which is currently 'Clean Air Zone Framework: Principles for setting up Clean Air Zones in England.' February 2020

A number of actions and activities that will need to be undertaken in the development of the CAZ and its current anticipated date of delivery of 1 September 2025 subject to the outcomes of the monitoring scheduled to be undertaken in 2024/25.

A summary of a number of key actions are set out below.

Establishment of a Stakeholder Working Group to take forward the development of the CAZ.

The Stakeholder Working Group would be jointly led by:

Epping Forest District Council (in its role as competent authority and potential funding authority)
Essex County Council (in its role as local traffic and charging authority)

Core membership:
Highways England
Transport for London
London Borough of Waltham Forest
London Borough of Redbridge
Natural England
Conservators of Epping Forest

Engagement with wider group of stakeholders including:

Local business representatives
Bus operators
Transport user groups
Local community representatives
Emergency services
Taxi companies

Development of traffic model to allow analysis of traffic growth, distribution and the potential for trip assignment with the implementation of a Clean Air Zone.

This is a necessary tool to be able to understand the effects of the introduction of a CAZ across the Epping Forest Special Area of Conservation on the wider road network. This will aid the work of the Stakeholder Working Group in understanding and identifying any interventions needed within the wider road network to mitigate any reassigned traffic. The stakeholder working group will be used to agree the nature of the model to be used and the assumptions to be incorporated. However, this should be based on the data incorporated into the traffic modelling used to inform the HRA 2020 and should use data collected in 2017 to ensure consistency with future forecasting of vehicle trips.

Roads to be incorporated in the CAZ to be confirmed by the stakeholder working group but are likely to include all roads which provide access into the Epping Forest SAC and align with those roads which were used for the collection of ANPR data in 2019.

Awareness raising:

The Council has committed to undertaking an initial awareness raising campaign in 2021 with the intention of this being a longer-term initiative. Raising awareness of the issue is an important step in the journey of moving toward the implementation of a CAZ.

Development of the business case:

The stakeholder working group to develop the full business case for, and detailed implementation of, the scheme including the most appropriate approach to enforcement being either:

- an access restricted zone based on vehicle standards using a traffic regulation order (TRO); or
- an environmental charging scheme using road user charging powers.

In addition the stakeholder working group should establish the level of charges.

Consultation and engagement:

Consultation and engagement with communities and stakeholders will be undertaken at key stages of developing the CAZ proposals to provide opportunity to shape the final scheme.

Democratic Oversight

It will be important that elected members of both Epping Forest District Council and Essex County Council are fully engaged in the process. This will include regular briefings and more formal agreement at key stages in the process. This will include securing democratic sign-off of the scheme for implementation. The decision in relation to the final scheme design will be informed by the analysis of the latest evidence base and any further HRA considerations in consultation with Natural England.

Monitoring and Review

The stakeholder working group would be responsible for the oversight of the traffic and air quality monitoring to be undertaken in accordance with the approach to monitoring and review set out in the Monitoring and Review section of this Strategy.

Implementation

This will include the necessary statutory processes needed to implement the CAZ, as well as putting in place the necessary physical infrastructure (including complementary highway schemes and/or measures) including signage and monitoring equipment, publicity and guidance in relation to the operation of the scheme.

Appendix 3: Mitigation Measures Framework for Delivery

Measure	When	How	Whom
Electric Vehicle Charging Points	**Now and on-going**	**Planning condition**	**Planning applicants**
Electric Vehicle charging points in EFDC car parks	**2021 onwards**	**Financial investment by the Council**	**EFDC**
Awareness Raising campaign	**2021**	**Development and implementation of publicity and information sharing**	**EFDC**
Introduction of Clean Air Zone	**September 2025 (see detailed indicative timeline below).**	**Securing financial contributions from relevant planning applications.**	**EFDC/ECC**
Implementation of right-turn ban from A121 to Forest Side.	**Prior to the first operation of any development permitted on Land north of the A121 (Wal.E8).**	**Legal agreement in relation to any development permitted on Land north of the A121 (WAL.E8).**	**ECC/EFDC**
Veteran Tree Management Plan	**2021 and then on-going implementation**	**Securing financial contributions from relevant planning applications.**	**EFDC/Conservators of Epping Forest**
Initiatives to support walking, cycling and increased public transport use.	**Now and on-going**	**Through the implementation of the Harlow and Gilston Garden Communities, Masterplan sites, and/or securing financial contributions from relevant planning applications in accordance with the emerging Local Plan and Harlow and Gilston Garden Town Infrastructure Delivery Plans.**	**ECC/EFDC/Planning applicants.**
Route Management Strategies	**Now and on-going**	**Planning condition and/or Section 106 planning obligation.**	**ECC/EFDC/planning applicants.**
Supporting home working	**Now and on-going**	**Planning condition and/or Section 106 planning obligation to secure broadband/digital infrastructure.**	**Planning applicants**
Trialling City Trees	**Indicative timescale: 2021**	**Securing financial contributions from relevant planning applications.**	**EFDC/landowners**
Road based pollution extraction system	**Indicative timescale: 2021**	**Securing financial contributions from relevant planning applications or on a trial basis.**	**ECC/EFDC**

Indicative timetable and actions for implementation of Clean Air Zone in 2025

Activity	When
Establishment of core working group	January 2021
Development of traffic and air quality model specifications	March – June 2021
Initial awareness raising (local communities/businesses/wider stakeholder groups.	Spring/Summer 2021
Development of traffic and air quality models (including data collection if necessary)	June 2021- June 2022
Preparation of full business case including feasibility and options testing.	July 2022-December 2022
Further awareness raising and stakeholder engagement activity	January 2023 – March 2023.
Detailed scheme design	April 2023-September 2023
Democratic processes	October 2023- December 2023
Consultation on final scheme	January 2024-March 2024
Finalisation of scheme and legal processes.	April 2024-October 2024
Analysis of the latest evidence base and any further HRA considerations in consultation with Natural England.	March 2025-May 2025
Further awareness raising of scheme implementation	May 2025 – June 2025
Provision of scheme infrastructure (e.g. cameras/signage)	May 2025 – August 2025
Commencement of CAZ	September 2025
Review of CAZ following further on-site traffic and air quality monitoring	2030

Appendix 4: Indicative costs of implementing the Strategy

Activity	Components	Costs
Development and Implementation of Clean Air Zone	**Feasibility and scheme development comprising (includes ECC staff costs):** • **Development of traffic model including data collection** • **Updating air quality model** • **Development of scheme including business case** • **Consultation and engagement** **Implementation comprising:** • **Purchase and placement of scheme infrastructure** • **Publicity** • **Statutory processes** • **Charging IT systems** **Scheme monitoring and review.**	**£1,310,000** **£1,151,110** **Costs included in Monitoring and Review section below**
Air quality monitoring and review	**Monitoring comprising:** • **Permanent air quality monitoring station and on-going analysis of data.** • **On-site monitoring of pollutants for a nine month period in 2024/25 and 2029/30 and analysis of data for progress and model verification purposes.** • **Traffic monitoring (including Automatic Number Plate Recognition).** • **Survey and monitoring of extent and abundance of cushion moss Leucobryum** • **Update of HRA traffic and air quality modelling and verification.** • **Update of HRA to establish progress and ability to continue to conclude 'no adverse effects'.**	**£472,500**
Veteran Tree Management and Drosera plant species	**Development of Strategy and implementation over Plan period (12 years)**	**£40,000**
City Trees	**Purchase and placement – 2 x City Trees**	**£60,000**
EFDC Staff costs	**Implementation of Strategy (2021 – 2033)**	**£400,000**

Total costs		**£3,433,610**