

Medway Council

Four Elms Hill

Air Quality Action Plan

In fulfilment of Part IV of the

Environment Act 1995

Local Air Quality Management

June 2022

|  |  |
| --- | --- |
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# Executive Summary

This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management (LAQM) framework. It outlines the action we will take to improve air quality within the Four Elms Hill Air Quality Management Area (AQMA) between 2022-2027.

Medway declared the Four Elms Hill, Chattenden AQMA in 2017, following a Detailed Assessment published in 2016[[1]](#footnote-2). The Detailed Assessment included a dispersion modelling exercise which predicted that the nitrogen dioxide (NO2) annual mean Air Quality Objective (AQO) of 40 µgm-3 was exceeded at several residential receptors along Four Elms Hill.

A source apportionment exercise showed that where receptors are located near to junctions, with a reduced traffic speed, emissions from Heavy Goods Vehicle (HGVs) represent the largest emission source followed by Light Goods Vehicle (LGVs) and diesel cars. Away from junctions however, the largest local emission source is diesel cars, followed by LGVs and HGVs.

Medway previously declared three AQMAs in 2010 (Central Medway AQMA, High Street Rainham AQMA and Pier Road Gillingham AQMA), and developed an AQAP presenting measures to improve the air quality within these AQMAs[[2]](#footnote-3).

Further details on the declared AQMAs are presented on Defra’s UK AIR website[[3]](#footnote-4).

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[[4]](#footnote-5),[[5]](#footnote-6).

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[[6]](#footnote-7). Medway Council is committed to reducing the exposure of people in Medway to poor air quality in order to improve health.

We have developed actions that can be considered under the following broad topics:

* Alternatives to private vehicle use
* Freight and delivery management
* Policy guidance and development control
* Promoting low emission transport
* Promoting travel alternatives
* Public information
* Transport planning and infrastructure
* Traffic management
* Vehicle fleet efficiency

Our priorities are to tackle emissions due to servicing and freight vehicles, and so we will explore the possibility to only allow zero emissions HGVs and LGVs travelling through the AQMA.

In this AQAP we outline how we plan to effectively tackle air quality issues within our control. However, we recognise that there are a large number of air quality policy areas that are outside of our influence (such as vehicle emissions standards agreed in Europe), but for which we may have useful evidence, and so we will continue to work with regional and central government on policies and issues beyond Medway Council’s direct influence.

## Responsibilities and Commitment

This AQAP was prepared by Medway Council’s Environmental Protection Team with the support and agreement of the following officers and departments:

* Planning;
* Transport and Parking;
* Climate Response; and
* Public Health.

This AQAP was approved for adoption by members of the Cabinet on 23rd August 2022.

Progress each year will be reported in the Annual Status Reports (ASRs) produced by Medway Council, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP please send them to:

environmental.protection@medway.gov.ukTable of Contents

[Executive Summary 1](#_Toc106283072)

[Responsibilities and Commitment 2](#_Toc106283073)

[1 Introduction 6](#_Toc106283074)

[2 Summary of Current Air Quality in Medway’s Four Elms Hill AQMA 7](#_Toc106283075)

[2.1 LAQM review and assessment 7](#_Toc106283076)

[2.2 Defra background concentrations 9](#_Toc106283077)

[3 Medway Council’s Air Quality Priorities for Four Elms Hill AQMA 11](#_Toc106283078)

[3.1 Public Health Context 11](#_Toc106283079)

[3.2 Planning and Policy Context 12](#_Toc106283080)

[3.2.1 National policy 12](#_Toc106283081)

[3.2.2 Local plan 13](#_Toc106283082)

[3.2.3 2015 Air Quality Action Plan 14](#_Toc106283083)

[3.2.4 Air quality planning guidance 14](#_Toc106283084)

[3.2.5 Climate change action plan 14](#_Toc106283085)

[3.2.6 Bus Service Improvement Plan 15](#_Toc106283086)

[3.2.7 Local Transport Plan 15](#_Toc106283087)

[3.3 Source Apportionment 15](#_Toc106283088)

[3.4 Required Reduction in Emissions 22](#_Toc106283089)

[3.5 Key Priorities 23](#_Toc106283090)

[4 Development and Implementation of Medway’s Four Elms Hill AQAP 24](#_Toc106283091)

[4.1 Consultation and Stakeholder Engagement 24](#_Toc106283092)

[4.2 Steering Group 25](#_Toc106283093)

[5 AQAP Measures 26](#_Toc106283094)

[6 Dispersion modelling of selected measures 31](#_Toc106283095)

[6.1 Methodology 31](#_Toc106283096)

[6.2 Results 33](#_Toc106283097)

[7 References 37](#_Toc106283098)

[Appendix A: Response to Consultation 39](#_Toc106283099)

[Appendix B: Reasons for Not Pursuing Action Plan Measures 40](#_Toc106283100)

[Appendix C: Modelling methodology 41](#_Toc106283101)

[Meteorological data 41](#_Toc106283102)

[The road network 42](#_Toc106283103)

[Model verification 50](#_Toc106283104)

[Appendix D: Modelling results 54](#_Toc106283105)

[Appendix E: Source apportionment 68](#_Toc106283106)

**List of Tables**

[Table 2.1 ‒ Details of Automatic Monitoring Sites 7](#_Toc106283107)

[Table 2.2 ‒ Annual mean concentration of NO2 (µgm-3) 8](#_Toc106283108)

[Table 2.3 ‒ Defra mapped background annual mean pollutant concentrations (µgm-3) 10](#_Toc106283109)

[Table 3.1 ‒ 2019 Predicted Annual Mean NO2 concentrations (μg/m3) and Source Contribution (%) 22](#_Toc106283110)

[Table 3.2 ‒ Improvement in Annual Mean NO2 Concentrations and road NOX Concentration Required to Meet the Objective (2015) 23](#_Toc106283111)

[Table 4.1 ‒ Consultation Undertaken 24](#_Toc106283112)

[Table 5.1 ‒ Air Quality Action Plan Measures 27](#_Toc106283113)

**List of Figures**

Figure 2.1 ‒ Map of Non-Automatic Monitoring Sites within Four Elms Hill AQMA…..3

Figure 3.1 ‒ Modelled Receptors 1/3………………………………………………….…19

Figure 3.2 ‒ Modelled Receptors 2/3………………………………………………….…20

Figure 3.3 ‒ Modelled Receptors 3/3………………………………………………….…21

Figure 3.4 ‒ Relative Contribution of Each Source Type to the Total Predicted 2019 Annual Mean NO2 Concentration at Receptor Locations (μg/m3) ……………………23

# Introduction

This report outlines the actions that Medway Council will pursue between 2022-2027 in order to reduce concentrations of air pollutants and exposure to air pollution; thereby positively impacting on the health and quality of life of residents and visitors to the Four Elms Hill area.

This Air Quality Action Plan (AQAP) has been developed in recognition of the legal requirement on the local authority to work towards the Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the LAQM statutory process.

This Plan will be reviewed every five years at the latest and progress on measures set out within this Plan will be reported on annually within Medway Council’s air quality Annual Status Report (ASR).

# Summary of Current Air Quality in Medway’s Four Elms Hill AQMA

## LAQM review and assessment

Air quality in Medway is reviewed annually as part of the LAQM review and assessment process. The 2021 ASR presents annual mean concentrations monitored in 2020[[7]](#footnote-8).

Medway Council carries out LAQM reviewing and reporting duties in line with the requirements of the Environment Act 1995. All previous years’ reports are available at [www.kentair.org](http://www.kentair.org).

There are four diffusion tubes within the Four Elms Hill AQMA which monitor the annual mean concentration of NO2. Details are presented in Table 2.1.

Table 0.1 ‒ Details of Automatic Monitoring Sites

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Location** | **Type** | **X** | **Y** | **Distance to Relevant Exposure (m) (1)** | **Distance to kerb of nearest road (m) (2)** | **Tube Co-located with a Continuous Analyser?** | **Tube Height (m)** |
| DT22 | Joy Lodge, Four Elms Hill | R | 575488 | 171616 | 0.0 | 12.0 | No | 1.2 |
| DT24 | 1A Main Road | K | 575948 | 171847 | 2.2 | 0.5 | No | 2.6 |
| DT32 | 6 Balls Cottages, Main Road | R | 575903 | 171802 | 8.4 | 1.9 | No | 2.4 |
| DT33 | 2 Broadwood Road | R | 575971 | 171833 | 2.4 | 1.8 | No | 2.6 |

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Monitored concentrations for the last six years are included in Table 2.2. Annual mean concentrations of NO2 within the Four Elms Hill AQMA have been slightly declining over the past six years, however in 2019 concentrations still exceeded the annual mean AQO at three of the four monitoring locations within the AQMA.

During the 2020 monitoring period, the UK was put into a national lockdown due to COVID-19 which resulted in reduced traffic for several months. As a result, measured concentrations decreased significantly at all sites during 2020. In 2020, diffusion tube

site DT24 still recorded an annual mean concentration exceeding the annual mean AQO (44.5 µgm-3). As seen in Table 2.2, site 24 has recorded annual mean concentrations significantly higher than the other three sites since monitoring started. This could be explained by the fact that the site is located closer to the kerb of the nearest road than the other three sites, as detailed in Table 2.1. Site DT24 is also located on the eastbound side of the A228 where vehicles are driving uphill, which is expected to result in higher emissions.

For further investigation, two additional diffusion tubes monitoring sites have been installed in line with the façade of the worst case receptor (1A Main Road) to see if turbulence is a factor in the high concentrations recorded at DT24. This will be reported through the 2023 ASR. An additional diffusion tube has also been put on a property on the new development near to Peninsula Way.

Table 0.2 ‒ Annual mean concentration of NO2 (µgm-3)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Location** | **2015 Annual mean concentration (µgm-3)** | **2016 Annual mean concentration (µgm-3)** | **2017 Annual mean concentration (µgm-3)** | **2018 Annual mean concentration (µgm-3)** | **2019 Annual mean concentration (µgm-3)** | **2020 Annual mean concentration (µgm-3)** |
| DT22 | Joy Lodge, Four Elms Hill | 31.0 | 29.0 | 31.0 | 28.0 | 27.2 | 23.4 |
| DT24 | 1A Main Road | **52.0** | **50.9** | **50.8** | **49.4** | **53.2** | **44.5** |
| DT32 | 6 Balls Cottages, Main Road | - | - | **47.5** | **46.3** | **43.1** | 38.9 |
| DT33 | 2 Broadwood Road | - | - | **43.5** | **41.6** | **42.0** | 36.6 |

Figure 2.1 represents the diffusion tube locations in relation to the Four Elms Hill AQMA.

Figure 2.1 ‒ Map of Non-Automatic Monitoring Sites within Four Elms Hill AQMA



## Defra background concentrations

Defra has made estimates of background pollution concentrations on a 1 km2 grid for the UK for seven of the main pollutants, including NO2, nitrogen oxides (NOX), particulate matter with a diameter less than 10µm and 2.5µm (PM10 and PM2.5). The latest estimates are using data for a base year of 2018, making projections for years from 2018 to 2030 inclusive[[8]](#footnote-9).

Table 2.3 shows the estimated concentrations of the pollutants for 2019, 2024 and 2030 for the cells that will be used in the road dispersion modelling as presented in Section 6.

Table 0.3 ‒ Defra mapped background annual mean pollutant concentrations (µgm-3)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pollutant** | **Grid Cell** | **2019** | **2024** | **2030** |
| NO2 | 575500, 171500  (representative of AQMA diffusion tubes) | 17.4 | 14.3 | 12.1 |
| NOX | 575500, 171500  (representative of AQMA diffusion tubes) | 24.4 | 19.5 | 16.2 |
| PM10 | 575500, 171500  (representative of AQMA diffusion tubes) | 16.6 | 15.6 | 15.5 |
| PM2.5 | 575500, 171500  (representative of AQMA diffusion tubes) | 11.0 | 10.2 | 10.0 |
| NO2 | 576500, 171500 | 15.2 | 12.8 | 11.2 |
| NOX | 576500, 171500 | 21.0 | 17.3 | 15.0 |
| PM10 | 576500, 171500 | 15.5 | 14.5 | 14.3 |
| PM2.5 | 576500, 171500 | 10.5 | 9.7 | 9.6 |

# Medway Council’s Air Quality Priorities for Four Elms Hill AQMA

## Public Health Context

The impact of air quality upon health is unquestionable and has been a major driver in national and international attempts to reduce levels of air pollution. Pollutants such as NO2, ozone, benzene, sulphur dioxide (SO2) alongside PM10 and PM2.5 and other chemicals or compounds by both chronic and acute exposure are linked to increased mortality and morbidity. Through their association with the development of cardiovascular disease[[9]](#footnote-10), lung cancer[[10]](#footnote-11), aggravation of asthma and other allergic illnesses[[11]](#footnote-12), reduced quality of life[[12]](#footnote-13) and contribution to low birthweight[[13]](#footnote-14).

The distribution of harm from low air quality is not even. Air Quality is evidenced to impact those who reside in areas of deprivation to a greater extent and is also recognised as a contributor to widening health inequalities[[14]](#footnote-15). In Medway rates of long-term illness, emergency hospital admissions and death are higher in those who are more disadvantaged. Health outcomes are not only worse in those who are the most disadvantaged; the inequalities follow a gradient and as such the response also needs to follow a gradient. This means that interventions and measures should be made available to all, with increasing effort needed for those who are increasingly disadvantaged.

Medway council takes action to protect its residents health from potential harm emanating from low air quality in a variety of ways. This includes partnership work with colleagues in planning to mitigate potential for air quality related harm related to developments. As well as proactively through communication initiatives identified in the Medway Air Quality Communications Strategy. Such as undertaking targeted information campaigns to increase community awareness of means by which individuals can reduce their exposure and contributions to poor air quality, or manage their long term health conditions which may otherwise leave greater susceptibility to harm from low air quality. Such initiatives underpin priority actions of the Joint Health and Wellbeing strategy (2018-2023) to encourage self-management of long term conditions and shape the environment to make healthy choices easier.

## Planning and Policy Context

### National policy

The National Planning Policy Framework (NPPF)[[15]](#footnote-16) provides guidance as to how planning can take account of the impact of new development on air quality. Paragraph 181 of the NPPF states that “*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 AQMA and Clean Air Zones, and the cumulative impacts from individual sites in local areas*” and “*Planning decisions should ensure that any new development in AQMA and Clean Air Zones is consistent with the local air quality action plan”*.

To support the delivery of the NPPF, Defra has produced National Planning Policy Guidance (NPPG), including one specifically referring to air quality[[16]](#footnote-17). The NPPG states in Paragraph 005 (Reference ID: 32-005-20191101) “*Whether air quality is relevant to a planning decision will depend on the Proposed Development and its location. Concerns could arise if the development is likely to have an adverse effect on air quality in areas where it is already known to be poor, particularly if it could affect the implementation of air quality strategies and action plans and/or breach legal obligations (including those relating to the conservation of habitats and species). Air quality may also be a material consideration if the Proposed Development would be particularly sensitive to poor air quality in its vicinity*.”

The Government’s Clean Air Strategy[[17]](#footnote-18) published in 2019 sets out the comprehensive actions required across all parts of government and society to improve air quality. The strategy explains that under the current framework, local authorities produce AQAP when local air quality monitoring has identified concentration exceedances against maximum limits. Compliance with maximum limits however does not incentivise prevention. New legislation therefore will seek to shift this focus towards prevention. This will enable early action to be taken by local authorities to avoid exceedances against future targets set by national government. This new approach will be instrumental for the government to achieve its objective of improving public health and the environment.

### Local plan

Medway Council actively manages the effects of new developments on air quality within its area through the Medway Local Plan (2003)[[18]](#footnote-19) Policy BNE24 ‘Air Quality’, to ensure that new developments do not exacerbate existing air quality issues.

Medway Council is currently preparing its emerging Local Plan 2021 – 2037[[19]](#footnote-20). The plan recognises the Hoo peninsula as an opportunity for growth, and that there is a need to plan for sustainable community development providing the services and infrastructure they need alongside the delivery of new housing and jobs. Large sites at Grain and Kingsnorth are important to Medway’s portfolio of employment land.

As part of the implementation of the Local Plan, a large area of residential and employment land has been attributed for development on the Hoo Peninsula, which will lead to additional traffic on Four Elms Hill.

As part of the Housing Infrastructure Fund (HIF), £170 million of funding has been secured to deliver strategic transport and environmental projects on the Hoo Peninsula[[20]](#footnote-21). The HIF current proposals[[21]](#footnote-22) are intended to address the challenge of getting on and off the peninsula and include the following transport related improvements:

* An upgrade of the existing road network with the provision of new infrastructure including slip roads, junctions and interchanges on the A228 and A289 and wider highway improvements, as well as a new relief road to access the peninsula via Woodfield Way; and
* a new train station and reinstated passenger service on the Grain branch line.

### 2015 Air Quality Action Plan

Medway also works to manage local air quality through the implementation of the Medway 2015 AQAP2 (covering Central Medway AQMA, High Street Rainham AQMA and Pier Road Gillingham AQMA), and the supporting Medway Air Quality Communications Strategy. Medway Council is also working with Public Health colleagues to prioritise action on air quality in its area to help reduce the health burden from air pollution. The 2015 AQAP is planned to be reviewed in 2023/2024.

### Air quality planning guidance

In conjunction with the Kent and Medway Air Quality Partnership, Medway produced in 2016 its Air Quality Planning Guidance[[22]](#footnote-23), to deal with planning applications that could impact air quality. The guidance was produced in response to changes in national planning policy, through the National Planning Policy Framework (NPPF). The guidance uses a method for assessing the air quality impacts of a development which includes the quantification of impacts, calculation of damage costs, and the identification of mitigation measures to be implemented to negate the impact of development on air quality. The guidance provides clarity and consistency of approach for developers, the local planning authority and local communities.

### Climate change action plan

After declaring a climate emergency in 2019, Medway published its climate change action plan in 2021[[23]](#footnote-24). The action plan makes clear link between reduction in carbon emissions and improvement in air quality. Measure 6 of the climate change action plan aims to reduce emissions from road transport by promoting and facilitating uptake of electric and ultra-low emissions vehicles, encouraging modal shift through enhanced sustainable infrastructure, and tackling congestion hotspots. Progress to this measure will significantly improve air quality as well as reduce carbon emissions.

### Bus Service Improvement Plan

Medway recently published a draft Bus Service Improvement Plan (BSIP) 2021-2026[[24]](#footnote-25). In order to improve air quality, the plan commits to continue to seek additional funding from government and other available sources to improve fleet standards, whether that be retrofitting to Euro VI, or contributions towards the costs of new low or zero-emission vehicles thus allowing timely improvements to Medway AQMAs.

### Local Transport Plan

Medway adopted its Local Transport Plan in 2011[[25]](#footnote-26). The Plan sets a strategy to deliver transport intervention that contribute to improving air quality. Key interventions focus on more efficient management of the highway network and car parks, together with highway improvements that focus on congestion and air quality hotspots, thereby improving the reliability and environmental impact of the transport network.

## Source Apportionment

The measures presented in this AQAP are intended to be targeted towards the predominant sources of emissions within the Four Elms Hill area.

As part of the Detailed Assessment published in 20161, a source apportionment exercise was carried out for year 2015 with 56 sensitive residential receptors selected to provide an overview of source contributions affecting pollutant concentrations. As part of developing this AQAP, the source apportionment exercise was updated for year 2019 in line with Box 7.5 of the LAQM TG(16). Traffic data was provided by Sweco and presented in Table C.1 within Appendix C. Traffic flows were split for the following vehicle types:

* Cars;
* LGVs;
* HGVs; and
* Buses.

Defra’s Emissions Factors Toolkit (EFT) v10.1[[26]](#footnote-27) was used to determine emission source apportionment from the vehicle types listed above[[27]](#footnote-28). Car emissions were further split between petrol and diesel using default emissions included within the EFT. The emission apportionment of the nearest road link for each of the 56 receptor was determined. The locations of the receptors are shown in Table 3.1, 3.2 and 3.3.

Figure 3.1 ‒ Modelled Receptors 1/3



Figure 3.2 ‒ Modelled Receptors 2/3

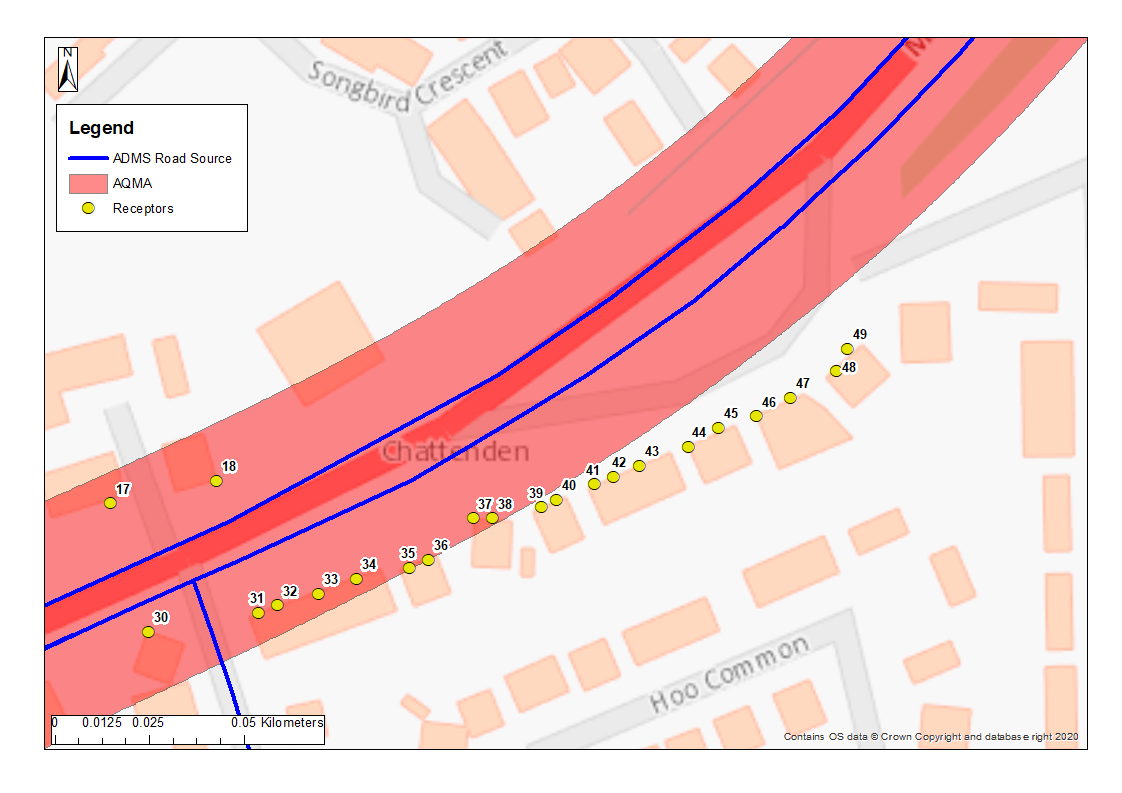


Figure 3.3 ‒ Modelled Receptors 3/3



Figure 3.4 shows the relative contribution of each source type to the total predicted 2019 annual mean NO2 concentrations at the 56 receptor locations modelled.

The figure showed that the most significant component at all receptors, other than the ambient background concentrations, was emissions from diesel cars, HGVs and LGVs.

Where receptors are located near to junctions, with a reduced traffic speed, emissions from HGVs represent the largest emission source followed by LGVs and diesel cars. Away from junctions however, the largest local emission source is diesel cars, followed by LGVs and HGVs. The emission source apportionment is influenced by traffic speed.

Figure 3.4 ‒ Relative Contribution of Each Source Type to the Total Predicted 2019 Annual Mean NO2 Concentration at Receptor Locations (μg/m3)

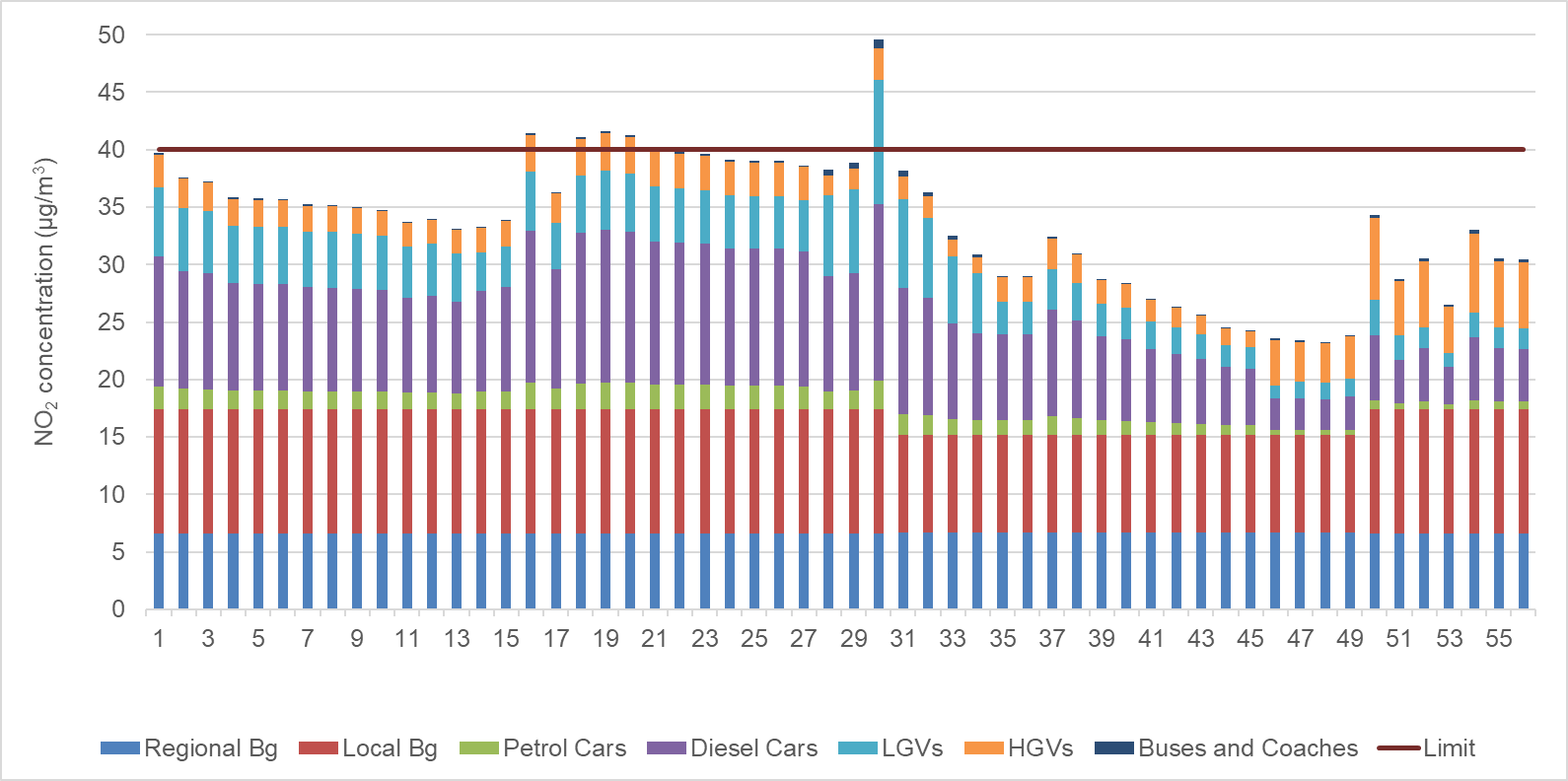


Table 3.1 sets out the percentage contribution from emission sources at the five receptor locations where exceedances of the annual mean AQO of 40 μg/m3 were predicted. The highest concentration predicted in 2019 was 49.6 μg/m3 at Receptor 30 situated southwest of the junction between Four Elms Hill and Broadwood Road. At Receptor 30, the highest contribution is predicted to be from HGVs, followed by diesel cars, LGVs, petrol cars and buses.

Table 0.1 ‒ 2019 Predicted Annual Mean NO2 concentrations (μg/m3) and Source Contribution (%)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Receptor** | **Annual NO2 (μg/m3)** | **Regional Bg**  **(%)** | **Local Bg**  **(%)** | **Petrol Cars (%)** | **Diesel Cars (%)** | **LGVs (%)** | **HGVs (%)** | **Buses/**  **Coaches (%)** |
| 16 | **41.5** | 15.9% | 26.0% | 5.2% | 29.5% | 15.8% | 7.3% | 0.3% |
| 18 | **41.1** | 16.0% | 26.2% | 2.9% | 19.2% | 10.6% | 24.2% | 0.9% |
| 19 | **41.7** | 15.8% | 25.9% | 5.5% | 31.3% | 12.1% | 8.9% | 0.4% |
| 20 | **41.3** | 16.0% | 26.1% | 5.4% | 31.1% | 12.0% | 8.9% | 0.4% |
| 30 | **49.6** | 13.3% | 21.8% | 2.9% | 19.2% | 10.6% | 24.2% | 0.9% |

## Required Reduction in Emissions

Table 3.2 sets out the required reduction in local emissions of NOX that would be required at the five receptor locations where exceedances were predicted, in order for the annual mean NO2 AQO to be achieved.

The degree of improvement needed in order for the annual mean NO2 objective to be achieved is defined by the difference between the highest measured or predicted concentration and the objective level (40 μg/m3). The highest NO2 concentration was predicted at receptor 30 (49.6 μg/m3), requiring a reduction of 9.6 μg/m3 in order for the objective to be achieved.

In terms of describing the reduction in emissions required, it is more useful to consider NOX. The required reduction in local NOX emission has been calculated in line with guidance presented in Box 7.6 of LAQM.TG(16). Table 3.2 sets out the required reduction in local emissions of NOX that would be required at the five receptor locations where exceedances of the annual mean AQO are predicted.

Table 3.2 shows that at receptor 30, where the highest annual mean concentrations was predicted, a reduction of 32.9% in local road traffic emissions would be required in order to achieve the objective. Annual mean concentrations at the four other receptors where exceedances are predicted are below 42 μg/m3 and the required reduction in local road traffic at these receptors ranges from 5.1% to 7.7%,

Table 0.2 ‒ Improvement in Annual Mean NO2 Concentrations and road NOX Concentration Required to Meet the Objective (2015)

|  |  |  |
| --- | --- | --- |
| **Receptor** | **Required reduction in annual mean NO2 concentration (μg/m3)** | **Required reduction in emissions of NOX from local roads (%)** |
| 16 | 1.5 | 6.9% |
| 18 | 1.1 | 5.1% |
| 19 | 1.7 | 7.7% |
| 20 | 1.3 | 6.0% |
| 30 | 9.6 | 32.9% |

## Key Priorities

Based on the outcome of the source apportionment exercise, and taking into account the receptor with the highest predicted NO2 annual mean concentration in 2019, the key priority sources for the Four Elms Hill AQMA are:

* Priority 1 – Emissions from HGVs;
* Priority 2 – Emissions from diesel cars; and
* Priority 3 – Emissions from LGVs.

# Development and Implementation of Medway’s Four Elms Hill AQAP

## Consultation and Stakeholder Engagement

In developing this AQAP, we have worked with the local community and relevant Medway Council departments to improve local air quality. We have undertaken the following stakeholder engagement:

* Residents engagement survey in February 2019;
* Medway Council internal workshop in July 2019; and
* Follow up Medway Council internal workshop in September 2021.

The response to our consultation stakeholder engagement is given in Appendix A.

Schedule 11 of the Environment Act 1995 requires local authorities to consult the bodies listed in Table 0.1.

Table 0.1 ‒ Consultation Undertaken

|  |  |
| --- | --- |
| **Yes/No** | **Consultee** |
| Yes | the Secretary of State |
| Yes | the Environment Agency |
| Yes | the highways authority |
| Yes | all neighbouring local authorities |
| Yes | other public authorities as appropriate, such as Public Health officials |
| Yes | bodies representing local business interests and other organisations as appropriate |

## Steering Group

Following the publication of Medway’s first AQAP, a Steering Group, chaired by the Assistant Director of Front Line Services, was established in 2016 to provide oversight, and facilitate further development of the measures included. The Steering Group consists of representatives from key council services including, amongst others, Environmental Protection, Public Health, Planning and Integrated Transport, who have agreed to work together with the shared goal of seeking to improve air quality in Medway through behavioural, strategic and infrastructure change.

As reported in Medway’s ASR, the Air Quality Steering Group has continued to meet on a quarterly basis up until the end of 2019. Frequency of meetings, membership, terms of reference will be reviewed by the group as part of the Four Elms Hill AQAP.

# AQAP Measures

Table 0.1 shows the proposed Four Elms Hill AQAP measures. It contains:

* a list of the actions that form part of the plan;
* the responsible individual and departments/organisations who will deliver this action;
* expected benefit in terms of pollutant emission and/or concentration reduction;
* the timescale for implementation; and
* how progress will be monitored.

Please see future ASRs for regular annual updates on the implementation of these measures

Table 0.1 ‒ Air Quality Action Plan Measures

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Measure** | **EU Category** | **EU Classification** | **Lead Authority** | **Planning Phase** | **Implementation Phase** | **KPI** | **Target Pollution Reduction in the AQMA** | **Progress to Date** | **Estimated Completion Date** | **Comments** |
| 1 | Several road improvements proposed as part of HIF. This includes:   * New junction off the A289. * Relief road from Upchat roundabout to the A228 Main Rd roundabout. * Improvements to Four Elms roundabout. * New railway station on Hoo peninsula. | Traffic Management | Strategic highway improvements | MC | TBC | TBC | Reduced congestion within AQMA | Low | Not started | TBC |  |
| 2 | Explore opportunities to support electrification of the bus fleet travelling on Hoo peninsula through the AQMA.  Emissions from buses/coaches contribute up to 1.3% of NO2 annual mean concentrations at properties where annual mean AQO is exceeded. | Vehicle Fleet Efficiency | Vehicle Retrofitting programmes | MC | TBC | TBC | % of EV buses travelling through AQMA | Low:  Reduction in annual mean NO2 concentrations up to 0.6 µgm-3 at properties within AQMA | Not started | TBC |  |
| 3 | Explore opportunities to support implementation of zero emissions only HGVs and LGVs travelling on Hoo peninsula through AQMA.  Emissions from HGV/LGV contribute up to 39.1% of NO2 annual mean concentrations at properties where annual mean AQO is exceeded. | Vehicle Fleet Efficiency | Vehicle Retrofitting programmes | MC | TBC | TBC | % of electric HGV and LGV travelling through AQMA | High:  Reduction in annual mean NO2 concentrations up to 19.4 µgm-3 at properties within AQMA | Not started | TBC |  |
| 4 | Explore opportunities to introduce Park and Ride shuttle buses to shopping hubs such as Bluewater and Hempstead Valley. | Alternatives to private vehicle use | Bus based Park & Ride | MC | TBC | TBC | Number of shuttle users | Low | Not started | TBC |  |
| 5 | Promote and incentivise car sharing on Hoo peninsula using apps, points system.  Emissions from cars contribute up to 36.8% of NO2 annual mean concentrations at properties where annual mean AQO is exceeded (diesel cars only, contribute up to 31.3%). | Alternatives to private vehicle use | Car Clubs | MC | TBC | TBC | Number of car club users | Medium | Not started | TBC |  |
| 6 | Improve facilities (medical, leisure, supermarket) within Hoo peninsula to remove need to travel through AQMA. | Alternatives to private vehicle use | Other: Avoid need to travel through AQMA | MC | TBC | TBC | Reduced congestion within AQMA | Medium | Not started | TBC |  |
| 7 | Explore feasibility to introduce a depot outside Hoo peninsula for goods to be dropped off and transported onto Hoo by zero emissions vehicles. | Freight and Delivery Management | Freight Consolidation Centre | MC | TBC | TBC | Reduced congestion within AQMA | High | Not started | TBC |  |
| 8 | Development and implementation of Hoo Peninsula Area Wide Travel Plan.  Commitment from new commercial/industrial developments to implement Hoo Peninsula travel plan which could include fleet standard and on number of trips.  Ensure new developments support cycle/walking schemes.  Explore feasibility of introducing a central contribution fund by developers to explore sustainable transport technologies. | Policy Guidance and Development Control | Air Quality Planning and Policy Guidance | MC | TBC | TBC |  | High | Work commissioned | Hoo Peninsula Travel Plan to be completed by summer 2022 |  |
| 9 | Continue to increase availability of EV infrastructure on development and public spaces in line with Medway’s Air Quality Planning Guidance. | Promoting Low Emission Transport | Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging | MC | Ongoing | Ongoing | Number of EV infrastructure within peninsula | Medium | Ongoing | TBC |  |
| 10 | Build communal work-hubs with fast internet for workers / rent a desk (draft Medway Local Plan proposes to include community spaces including for example coworking space).  Enable ultrafast internet speeds to encourage working from home. | Promoting Travel Alternatives | Encourage / Facilitate home-working | MC | TBC | TBC | Number of residents switching to work-hub or WFH. | Low | MC discussing with developers | TBC |  |
| 11 | Cycle scheme funding for bikes. Introduce regular and electric bike hire services. Dedicated cycle park on peninsula to encourage uptake of cycling. Tour de Hoo - encourage cycling/ marketing of cycle routes/ competitions for children. Promote Saxon Shore Way - walking / cycling route. Segregated safer cycle and walkways / tree or vegetation buffer to separate. Walking bus for school children. | Promoting Travel Alternatives | Promotion of cycling and walking | MC | TBC | TBC | Number of bike users within AQMA | Low | Not started | TBC |  |
| 12 | Explore feasibility and opportunities of water-based transport, such as water taxis between riverside urban areas. | Promoting Travel Alternatives | Promote use of rail and inland waterways | MC | TBC | TBC | Number or rail/waterway users. | Medium | Not started | TBC |  |
| 13 | Raise awareness of health and financial impacts of poor air quality.via communication campaigns. This will include communication on anti-idling (targeting local schools) and encouraging off peak travelling. | Public Information | Via the Internet | MC | TBC | TBC |  | Low | Not started | TBC |  |
| 14 | Explore opportunities to introduce emerging technologies to monitor air quality and traffic flows, in order to support road improvement schemes.  This could include air quality sensors within AQMA, intelligent road stud scheme at Main Road roundabout, enforcement cameras to monitor HGV movement. | Traffic Management | Strategic highway improvements | MC | TBC | TBC | Reduced congestion within AQMA | Medium | Not started | TBC |  |
| 15 | Explore opportunities to encourage larger uptake of public transport versus single private vehicle. | Transport Planning and Infrastructure | Public transport improvements-interchanges stations and services | MC | TBC | TBC | Number of public transport users | Medium | Not started | TBC |  |
| 16 | Investigate the impact of traffic speed on air quality in the AQMA and the feasibility of speed limit changes and/or enforcement to reduce emissions | Traffic Management | Strategic highway improvements | MC | TBC | TBC |  | Medium | Not started | TBC |  |

# 

# Dispersion modelling of selected measures

## Methodology

A dispersion modelling exercise was undertaken using ADMS-Roads to estimate the potential air quality benefit from three selected measures. Full details on the methodology are included in Appendix C, and detailed results are presented in Appendix D.

Traffic data comprising Annual Average Daily Traffic (AADT) flows of different vehicle types, was obtained from Sweco for the following scenarios:

* 2016 Baseline (a site specific conversion factor for 2019 was provided);
* 2037 Reference Case (including committed developments); and
* 2037 Local plan with Mitigations (including HIF relief road).

The following three measures were selected for modelling:

HIF Relief Road

Annual mean concentrations of NO2, PM10 and PM2.5 were predicted using traffic data corresponding to the implementation of the Local Plan, which includes the construction of the HIF relief road. As part of the implementation of the Local Plan, a large area of residential and employment land has been attributed for development on the Hoo Peninsula, which will lead to additional traffic on Four Elms Hill. The HIF relief road will alleviate some of this additional traffic however it is not currently proposed for HGVs and buses to have access to the relief road.

Zero emissions buses only through AQMA

Annual mean concentrations were predicted using traffic data corresponding to the implementation of the Local Plan including the relief road. Emissions from buses were adjusted as follow:

* NOX emissions were removed; and
* PM10 and PM2.5 exhaust emissions were removed but emissions from brake, tyre and road abrasion were retained.

Zero emissions LGVs and HGVs only through AQMA

Annual mean concentrations were predicted using traffic data corresponding to the implementation of the Local Plan including the relief road. In order to highlight reductions in pollution that can be achieved and represent a scenario where only zero emissions HGVs and LGVs are allowed into the AQMA, emissions from HGVs and LGVs were adjusted as follow:

* NOX emissions were removed; and
* PM10 and PM2.5 exhaust emissions were removed but emissions from brake, tyre and road abrasion retained.

In summary, the following scenarios were assessed using ADMS-Roads:

HIF Relief Road

* 2024 Local Plan with Mitigations based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP];

Zero emissions buses only through AQMA

* 2024 Local Plan with Mitigations, with zero emissions buses, based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations, with zero emissions buses, based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP];

Zero emissions LGVs and zero emissions HGVs only through AQMA

* 2024 Local Plan with Mitigations, with zero emissions LGVs and HGVs, based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations, with zero emissions LGVs and HGVs , based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP].

Scenarios were modelled with EFT emissions and background concentrations for 2024 in line with the HIF relief road initially proposed opening year[[28]](#footnote-29). This is however a worst-case assumption as future traffic flows used, which account for significant development in the area in accordance with the emerging Local Plan, are for 2037.

Measure scenarios were also modelled using emissions and background for 2030 (the latest year for which EFT and background data is available) for comparison as this represents a more realistic scenario.

Annual mean concentrations of NO2 as well as PM10 and PM2.5 for indication were predicted at the same 56 receptors identified in the 2016 Detailed Assessment1. Their locations are presented in Figure 3.1, 3.2 and 3.3.

## Results

Full detailed results are presented in Appendix D. Table D1, D2 and D3 presents the predicted annual mean concentrations of NO2, PM10 and PM2.5, predicted at all receptors. Concentrations were predicted in 2024, in line with the HIF relief road initially proposed opening year[[29]](#footnote-30), however this is a worst-case assumption as traffic data used is for 2037. Concentrations were also predicted for 2030 which corresponds to a more realistic assumption for vehicle emissions.

HIF Relief Road

In 2024 with the Local Plan and the HIF Relief Road implemented, exceedances of the NO2 annual mean AQO of 40 µgm-3 are predicted at over half of the modelled receptors. One exceedance of 60 µgm-3 (68.5 µgm-3)is also predicted at receptor 30, which suggests that the NO2 hourly mean of 200 µgm-3 not to be exceeded more than 18 times a year could also be exceeded at this receptor.

In 2030, with the Local Plan and the HIF Relief Road implemented two exceedances of the annual mean AQO are predicted, the highest concentration predicted is 51.9 µgm-3 at receptor 30. The other exceedance predicted is 42.7 µgm-3 at receptor 18.

These results suggests that without further measures implemented, concentrations could exceed the annual mean AQO and potentially the hourly mean AQO within the AQMA.

This is however a worst-case assumption as future traffic flows used, which account for significant development in the area in accordance with the emerging Local Plan, are for 2037.

Predicted annual concentrations of PM10 and PM2.5 remain below the annual mean AQO of 40 µgm-3 and 20 µgm-3 at all receptors in 2024 and 2030.

Zero emissions buses only through AQMA

In 2024 with zero emissions buses only travelling through the AQMA, exceedances of the NO2 annual mean AQO of 40 µgm-3 are still predicted at a large number of receptors. Receptor 30 is still predicted to experience a concentration over 60 µgm-3 (68.3 µgm-3) suggesting that the NO2 hourly mean could be exceeded at this receptor. In 2030, two exceedances of the AQO are still predicted at receptors 18 and 30 (42.5 µgm-3 and 51.7 µgm-3, respectively).

This is however a worst-case assumption as future traffic flows used, which account for significant development in the area in accordance with the emerging Local Plan, are for 2037.

The significance of the reduction in concentration with the implementation of zero emissions only buses was determined using the Institute of Air Quality Management (IAQM) guidance on planning for air quality[[30]](#footnote-31), which takes into account the % change of concentration relative to the AQO, as well as the resulting concentration.

Implementing zero emissions buses only travelling through the AQMA had little impact on the predicted annual mean concentrations. In 2024, predicted reductions in NO2 concentrations range from 0.1 µgm-3 to 0.4 µgm-3. In IAQM terms these reductions are Negligible at 39 out of 56 receptors. They are Slight Beneficial at 1 receptor; and Moderate Beneficial at 19 receptors (including receptor 30).

In 2030, reductions range from 0.1 µgm-3 to 0.4 µgm-3 and are considered Negligible at all receptors except at receptors 1 and 19 where they are considered Slight Beneficial.

Predicted annual concentrations of PM10 and PM2.5 remain below the annual mean AQO of 40 µgm-3 and 25 µgm-3 at all receptors in 2024 and 2030.

Zero emissions LGVs and HGVs only through AQMA

The modelled scenario with zero emissions LGVs and HGVs allowed to travel through the AQMA had the largest impact on predicted annual mean concentrations. In 2024, concentrations were predicted to be below the annual mean AQO of 40 µgm-3 at all receptors, with the highest NO2 concentration predicted to be 31.8 µgm-3 at receptor 30.

In 2030, the highest NO2 concentration predicted was 22.6 µgm-3 alsoat receptor 30.

In 2024, the predicted NO2 reductions range from 8.9 µgm-3 to 36.7 µgm-3. In IAQM terms these reductions are considered Moderate Beneficial at all receptors.

In 2030, reductions range from 5.5 µgm-3 to 29.3 µgm-3 and are considered as Moderate Beneficial at all receptors.

Predicted annual concentrations of PM10 and PM2.5 remain below the annual mean AQO of 40 µgm-3 and 20 µgm-3 at all receptors in 2024 and 2030.

Glossary of Terms

|  |  |
| --- | --- |
| **Abbreviation** | **Description** |
| AADT | Average Annual Daily Traffic flows |
| AQAP | Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values’ |
| AQMA | Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives |
| AQS | Air Quality Strategy |
| ASR | Air quality Annual Status Report |
| Defra | Department for Environment, Food and Rural Affairs |
| EU | European Union |
| LAQM | Local Air Quality Management |
| NO2 | Nitrogen Dioxide |
| NOX | Nitrogen Oxides |
| PM10 | Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less |
| PM2.5 | Airborne particulate matter with an aerodynamic diameter of 2.5µm or less |

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# Appendix A: Response to Consultation

Table A.1 ‒ Summary of Responses to Consultation and Stakeholder Engagement on the AQAP

|  |  |  |
| --- | --- | --- |
| **Consultee** | **Category** | **Response** |
| Engagement survey in February 2019 | Local residents | Many comments highlighted that Four Elms Hill is the only route to access Hoo. Majority agreed that development planning should be a priority, facilities within the peninsula are inadequate therefore people need to travel through the AQMA to access services including schools and medical facilities. A majority agreed that public transport should be encouraged. A majority also agreed that low emissions vehicles should be a priority. A small majority agreed that promoting walking and cycling should be a priority. It was highlighted that it is currently not safe to do so as the route is too busy. |
| Medway Council workshop in July 2019 | Medway Council | Stakeholders identified a long list of measures to include within AQAP. |
| Follow up Medway Council workshop in September 2021 | Medway Council | Follow-up discussion to determine if measures identified in 2019 were still suitable. |
| Defra’s AQAP appraisal (Reference AQAP22-1168) | Defra | Revisions made following Defra’s appraisal. Revisions includes the update of the source apportionment exercise, the update of the ADMS-Roads model verification year to 2019 in order to include two further monitoring sites. |
| Other consultees | Responders to online questionnaire | Additional measure included in response to comments on speeding, see Measure 16 in Table 5.1. |

# Appendix B: Reasons for Not Pursuing Action Plan Measures

Table B.1 ‒ Action Plan Measures Not Pursued and the Reasons for that Decision

|  |  |  |
| --- | --- | --- |
| **Action category** | **Action description** | **Reason action is not being pursued (including Stakeholder views)** |
| Traffic Management | Timed road use restrictions at peak hours for HGVs / off-peak deliveries | Not a viable option for the A228 as it is a strategic route serving a major port and significant commercial land uses, and represents the only route on and off the Peninsula. This would be met with significant opposition from large employers such as Amazon and enforcement would be extremely challenging. It could also result in HGVs attempting to use unsuitable routes, for example via the B2000. |
| Traffic Management | Average speed cameras on Four Elms Hill | Potential reduction in traffic speed could increase congestion and emissions. |
| Transport Planning and Infrastructure | Cablecar between Upnor & St Mary's island | Likely to become a tourist attraction and may increase car use through AQMA. Public transport links would need to be improved prior to implementation. |
| Transport Planning and Infrastructure | Introduce a tramline | Issue with space available and high costs associated with running a tramline. |

# Appendix C: Modelling methodology

Annual average concentrations in air of NOX, PM10 and PM2.5 have been determined using the ADMS-Roads version 5.0 atmospheric dispersion model[[31]](#footnote-32).

Annual mean concentrations of NO2 were derived from the model-predicted NOX concentrations, through application of the NOX to NO2 conversion tool version 8.1 developed for LAQM purposes, which takes into account the interaction between NOX and background O3[[32]](#footnote-33).

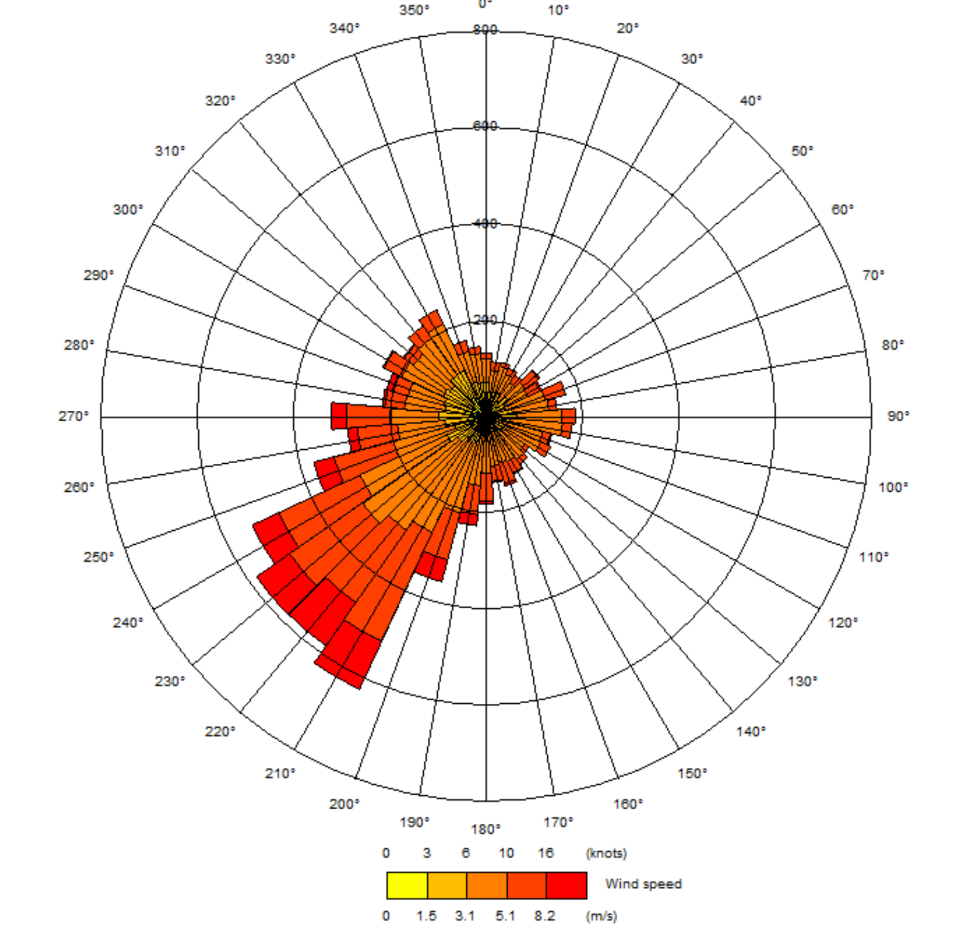
The modelling assessment requires source, emissions, meteorological and other site-specific data. For modelling traffic impacts, one year of data is used and model verification is carried out following Defra’s guidance.

## Meteorological data

Detailed dispersion modelling requires hourly sequential meteorological data from a representative synoptic observing station. Hourly sequential meteorological data was obtained for the year 2019 for Southend meteorological station, which is considered to provide representative data for the AQMA. The station is located approximately 20km to the north east of the site. The meteorological data for 2019 has been used with monitoring data from 2019 in the traffic assessment and model verification.

Figure C1 summarises the hourly wind speed and wind direction for the meteorological data as a wind rose. The windrose shows a predominance of winds from the south-west which is the usual pattern observed in the south of England.

Figure C1 Southend wind rose for 2019



## The road network

Traffic data comprising AADT of different vehicle types, was obtained from Sweco for the following scenarios:

* 2016 Baseline (a site specific factor was provided to calculate a 2019 baseline scenario);
* 2037 Reference Case (which includes all committed developments without the Local Plan); and
* 2037 Local plan with Mitigations.

Future scenarios were modelled with EFT emissions and background concentrations for 2024 in line with the HIF relief road initially proposed opening year[[33]](#footnote-34). This is however a worst-case assumption as future traffic flows used are for 2037. They were also modelled using emissions and background for 2030 (the latest year for which EFT and background data is available) for comparison as this represents a more realistic scenario.

Emissions for 2024 and 2030 were calculated using the latest emissions factors from Defra’s EFT v10.1[[34]](#footnote-35), which is used to predict emissions which are imported into ADMS-Roads. Particulate generated due to brake and tyre wear are also included in the EFT.

In summary the following scenarios were assessed:

* 2019 Baseline used for model verification and source apportionment based on 2019 traffic data, 2019 emission factors and predicted background concentrations [2019 baseline];
* 2024 Reference case, based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 RC];
* 2030 Reference case, based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 RC].

**HIF Relief Road**

* 2024 Local Plan with Mitigations based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP].

**Zero emissions buses only through AQMA**

* 2024 Local Plan with Mitigations, with zero emissions buses, based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations, with zero emissions buses, based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP].

**Zero emissions LGVs and HGVs only through AQMA**

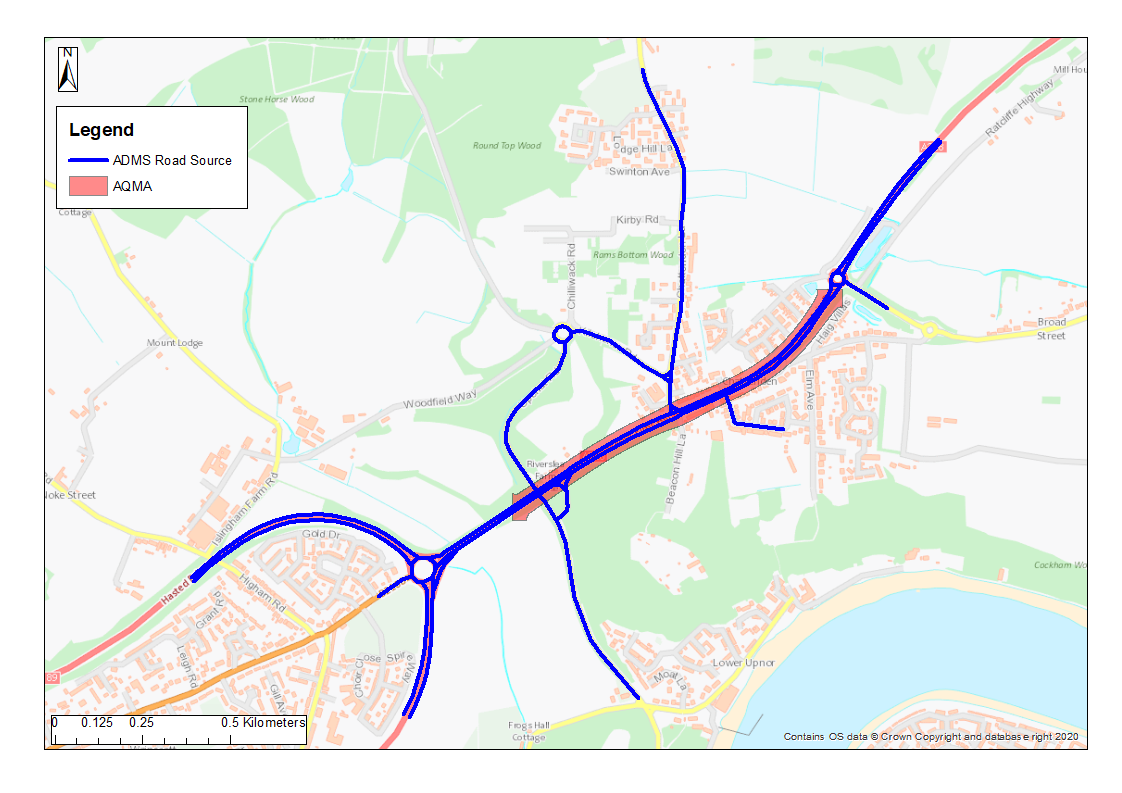
* 2024 Local Plan with Mitigations, with zero emissions LGVs and HGVs, based on 2037 traffic data, 2024 emission factors and predicted background concentrations [2024 LP];
* 2030 Local Plan with Mitigations, with zero emissions LGVs and HGVs, based on 2037 traffic data, 2030 emission factors and predicted background concentrations [2030 LP].

Figure C2 shows the road links that have been modelled and Table C1 shows the traffic data used in the modelling. Traffic data comprising AADT and numbers of different vehicle types, was obtained from Sweco.

Table C1 ADMS-Roads input data

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Name** | **2019**  **AADT** | **2019**  **Car %** | **2019**  **LGV %** | **2019**  **HGV %** | **2019 Bus and Coach**  **%** | **2019 Speed**  **kph** | **2037**  **RC**  **AADT** | **2037**  **RC**  **Car %** | **2037**  **RC**  **LGV %** | **2037**  **RC**  **HGV**  **%** | **2037**  **RC**  **Bus and Coach**  **%** | **2037**  **RC**  **Speed**  **kph** | **2037 LP AADT** | **2037 LP Car**  **%** | **2037 LP**  **LGV**  **%** | **2037 LP HGV%** | **2037 LP Bus and Coach**  **%** | **2037 LP Speed**  **kph** |
| **3139** | Wulfere Way | 14339 | 84.5 | 10.6 | 4.3 | 0.6 | 92 | 13684 | 85.1 | 11.0 | 3.3 | 0.6 | 92 | 14900 | 82.9 | 11.1 | 5.7 | 0.3 | 68 |
| **6045** | Peninsula Way E | 9375 | 79.8 | 14.5 | 5.7 | 0.0 | 95 | 17183 | 65.4 | 27.3 | 7.3 | 0.0 | 95 | 19185 | 59.6 | 28.9 | 11.5 | 0.0 | 96 |
| **6314** | Wulfere Way | 19383 | 86.3 | 9.7 | 4.0 | 0.0 | 93 | 18760 | 76.2 | 17.6 | 6.1 | 0.0 | 86 | 24636 | 76.3 | 17.4 | 6.3 | 0.0 | 68 |
| **6385** | Peninsula Way E | 10239 | 84.3 | 10.6 | 5.1 | 0.0 | 95 | 19548 | 69.3 | 23.9 | 6.8 | 0.0 | 93 | 25405 | 63.4 | 26.7 | 9.9 | 0.0 | 96 |
| **7411** | Chattenden Ln | 1837 | 84.4 | 9.9 | 3.1 | 2.6 | 35 | 2156 | 81.0 | 12.7 | 4.2 | 2.1 | 34 | 947 | 77.5 | 12.4 | 5.3 | 4.9 | 34 |
| **7422** | Chattenden Ln | 2835 | 89.0 | 10.6 | 0.5 | 0.0 | 31 | 2543 | 81.7 | 15.8 | 2.5 | 0.0 | 30 | 521 | 64.4 | 31.2 | 4.4 | 0.0 | 30 |
| **21061** | Wulfere Way | 23353 | 87.1 | 8.0 | 4.6 | 0.2 | 95 | 25521 | 84.9 | 10.7 | 4.2 | 0.2 | 95 | 28035 | 82.1 | 12.2 | 5.6 | 0.2 | 68 |
| **21064** | Hasted Rd | 16814 | 85.3 | 10.1 | 4.6 | 0.0 | 96 | 22476 | 76.1 | 17.9 | 6.0 | 0.0 | 96 | 25517 | 66.5 | 22.7 | 10.8 | 0.0 | 68 |
| **22139** | Hasted Rd | 15703 | 85.6 | 10.8 | 3.6 | 0.0 | 85 | 17393 | 80.5 | 15.7 | 3.8 | 0.0 | 93 | 26184 | 70.6 | 20.9 | 8.6 | 0.0 | 68 |
| **26670** | Main Rd Chattenden | 15817 | 84.4 | 11.6 | 3.9 | 0.1 | 54 | 23818 | 72.4 | 21.7 | 5.9 | 0.1 | 54 | 29787 | 63.6 | 26.7 | 9.6 | 0.0 | 50 |
| **27057** | Main Rd Chattenden | 17531 | 87.3 | 8.6 | 4.0 | 0.1 | 55 | 25763 | 74.5 | 19.4 | 6.0 | 0.1 | 54 | 34906 | 68.8 | 22.1 | 9.1 | 0.1 | 55 |
| **27058** | Main Rd Chattenden | 17531 | 87.3 | 8.6 | 4.0 | 0.1 | 54 | 25763 | 74.5 | 19.4 | 6.0 | 0.1 | 54 | 34906 | 68.8 | 22.1 | 9.1 | 0.1 | 53 |
| **27060** | Peninsula Way | 15817 | 84.4 | 11.6 | 3.9 | 0.1 | 55 | 23818 | 72.4 | 21.7 | 5.9 | 0.1 | 0 | 29787 | 63.6 | 26.7 | 9.6 | 0.0 | 54 |
| **36674** | Upchat Rd | 1239 | 63.3 | 11.1 | 20.1 | 5.5 | 84 | 1970 | 79.6 | 7.8 | 9.3 | 3.4 | 82 | 256 | 26.8 | 4.0 | 43.4 | 25.8 | 83 |
| **36683** | Upchat Rd | 928 | 99.6 | 0.4 | 0.0 | 0.0 | 89 | 1259 | 99.2 | 0.7 | 0.0 | 0.0 | 87 | 2751 | 86.9 | 12.7 | 0.4 | 0.0 | 91 |
| **38674** | Four Elms Hill | 14847 | 83.3 | 11.6 | 4.5 | 0.6 | 95 | 23459 | 72.0 | 21.4 | 6.1 | 0.4 | 95 | 30241 | 64.0 | 26.1 | 9.6 | 0.3 | 68 |
| **38675** | Four Elms Hill | 14818 | 83.5 | 11.6 | 4.5 | 0.4 | 96 | 23431 | 72.1 | 21.5 | 6.1 | 0.3 | 96 | 30213 | 64.0 | 26.2 | 9.6 | 0.2 | 87 |
| **38678** | Four Elms Hill | 8271 | 77.1 | 15.1 | 6.7 | 1.1 | 84 | 15542 | 66.0 | 25.8 | 7.6 | 0.6 | 85 | 19068 | 56.8 | 29.3 | 13.5 | 0.5 | 68 |
| **38679** | Four Elms Hill | 14818 | 83.5 | 11.6 | 4.5 | 0.4 | 92 | 23431 | 72.1 | 21.5 | 6.1 | 0.3 | 90 | 30213 | 64.0 | 26.2 | 9.6 | 0.2 | 86 |
| **38680** | Four Elms Hill | 17015 | 86.7 | 8.6 | 4.6 | 0.1 | 94 | 26707 | 74.8 | 19.0 | 6.1 | 0.1 | 93 | 34698 | 68.6 | 22.1 | 9.2 | 0.1 | 94 |
| **38682** | Four Elms Hill | 17327 | 84.3 | 9.3 | 5.9 | 0.5 | 95 | 27419 | 74.0 | 19.1 | 6.6 | 0.3 | 89 | 32205 | 66.7 | 22.8 | 10.2 | 0.3 | 68 |
| **42213** | Four Elms Hill | 9054 | 90.9 | 3.9 | 5.2 | 0.0 | 95 | 11875 | 84.5 | 10.2 | 5.3 | 0.0 | 93 | 13135 | 81.1 | 13.4 | 5.5 | 0.0 | 68 |
| **132643** | Main Rd Chattenden | 17015 | 86.7 | 8.6 | 4.6 | 0.1 | 53 | 26707 | 74.8 | 19.0 | 6.1 | 0.1 | 53 | 34698 | 68.6 | 22.1 | 9.2 | 0.1 | 53 |
| **891590** | Peninsula Way | 17531 | 87.3 | 8.6 | 4.0 | 0.1 | 54 | 25763 | 74.5 | 19.4 | 6.0 | 0.1 | 0 | 34906 | 68.8 | 22.1 | 9.1 | 0.1 | 54 |
| **132612+18989** | Hoo Rd | 10148 | 77.0 | 13.5 | 7.4 | 2.0 | 38 | 15227 | 78.4 | 14.7 | 5.6 | 1.3 | 38 | 8854 | 75.1 | 13.6 | 9.0 | 2.3 | 38 |
| **132655+6920** | Main Rd Hoo | 11156 | 90.2 | 7.3 | 2.2 | 0.3 | 47 | 14278 | 88.3 | 8.5 | 3.0 | 0.2 | 44 | 16922 | 72.7 | 23.0 | 4.1 | 0.2 | 48 |
| **18562+18565** | Kitchener Rd | 449 | 87.8 | 9.9 | 2.3 | 0.0 | 30 | 1400 | 87.3 | 10.1 | 2.5 | 0.0 | 33 | 524 | 63.3 | 31.0 | 5.6 | 0.0 | 33 |
| **18568+18569** | Kitchener Rd | 2557 | 82.3 | 7.3 | 6.0 | 4.5 | 32 | 3000 | 86.3 | 5.6 | 4.5 | 3.7 | 31 | 328 | 42.3 | 24.1 | 0.0 | 33.6 | 31 |
| **2039907+18564** | Kitchener Rd | 3007 | 83.1 | 7.7 | 5.5 | 3.8 | 34 | 4400 | 86.7 | 7.0 | 3.8 | 2.5 | 32 | 4309 | 85.7 | 10.5 | 1.2 | 2.6 | 33 |
| **2647+2646** | Upchat Rd | 2311 | 76.8 | 8.3 | 7.1 | 7.8 | 36 | 4021 | 84.8 | 7.0 | 4.0 | 4.3 | 36 | 5133 | 77.1 | 18.3 | 1.2 | 3.4 | 36 |
| **2655+201907** | Upchat Rd | 1651 | 77.9 | 9.5 | 9.8 | 2.8 | 37 | 2372 | 83.9 | 7.9 | 6.3 | 1.9 | 35 | 6283 | 85.5 | 11.3 | 2.5 | 0.7 | 36 |
| **36683+36674** | Upchat Rd | 2167 | 78.8 | 6.5 | 11.5 | 3.2 | 89 | 3229 | 87.3 | 5.1 | 5.7 | 2.0 | 87 | 3008 | 81.8 | 11.9 | 4.1 | 2.2 | 91 |
| **7412+7423** | Chattenden Ln | 4672 | 87.2 | 10.3 | 1.5 | 1.0 | 34 | 4699 | 81.4 | 14.4 | 3.3 | 1.0 | 34 | 1469 | 72.8 | 19.0 | 5.0 | 3.1 | 34 |
| **7414+7425** | Chattenden Ln | 4387 | 86.7 | 10.4 | 1.8 | 1.1 | 34 | 4347 | 83.3 | 12.8 | 2.9 | 1.1 | 34 | 944 | 78.1 | 12.4 | 4.7 | 4.9 | 34 |
| **7416+7427** | Chattenden Lane | 6944 | 85.0 | 9.3 | 3.4 | 2.3 | 34 | 7325 | 84.5 | 9.8 | 3.5 | 2.1 | 34 | 1265 | 68.7 | 15.5 | 3.5 | 12.3 | 34 |

Figure C2 Modelled Road Links



## Model verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the Defra’s LAQM.TG(16)**Error! Bookmark not defined.** guidance as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the Proposed Development site. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including uncertainties associated with:

* background concentration estimates;
* meteorological data;
* source activity data such as traffic flows and emissions factors;
* model input parameters such as surface roughness length, minimum monin‑obukhov length;
* monitoring data, including locations; and
* overall model limitations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

Model setup parameters and input data were checked prior to running the models in order to reduce these uncertainties. The following were checked to the extent possible to ensure accuracy:

* traffic data;
* road widths;
* distance between sources and monitoring as represented in the model;
* speed estimates on roads;
* source types, such as elevated roads and street canyons;
* selection of representative meteorological data;
* background monitoring and background estimates; and
* monitoring data.

Suitable local monitoring data for the purpose of verification is available for annual 2019 mean NOX/NO2 concentrations as shown in Figure C3. Their details are presented in Table C2 below.

Table C2 Local monitoring data suitable for ADMS-roads model verification

|  |  |  |  |
| --- | --- | --- | --- |
| **Location** | **2019 Annual Mean NO2 (µgm-3)** | **X (m)** | **Y (m)** |
| DT22 | 27.2 | 575488 | 171616 |
| DT24 | 53.2 | 575950 | 171847 |
| DT32 | 43.1 | 575903 | 171802 |
| DT33 | 42.0 | 575971 | 171833 |

#### Verification calculations

The verification of the modelling output was performed in accordance with the methodology provided in Annex 3 of LAQM.TG(16). Table C3 shows that there was systematic under prediction of monitored concentrations for all diffusion tubes.

Table C3 Verification, modelled versus monitored

|  |  |  |  |
| --- | --- | --- | --- |
| **Site** | **2019 Modelled Annual Mean NO2 (µgm-3)** | **2019 Monitored Annual Mean NO2 (µgm-3)** | **% (Modelled- Monitored)/ Monitored** |
| DT22 | 22.2 | 27.2 | -18.2% |
| DT24 | 29.4 | 53.2 | -44.7% |
| DT32 | 28.8 | 43.1 | -33.2% |
| DT33 | 28.4 | 42.0 | -32.5% |

Table C4 shows the comparison of modelled road-NOX, a direct output from the ADMS-Roads modelling, with the monitored road-NOX, determined from the LAQM NOX to NO2 conversion tool.

Table C4 Comparison of modelled and monitored road NOX to determine verification factor

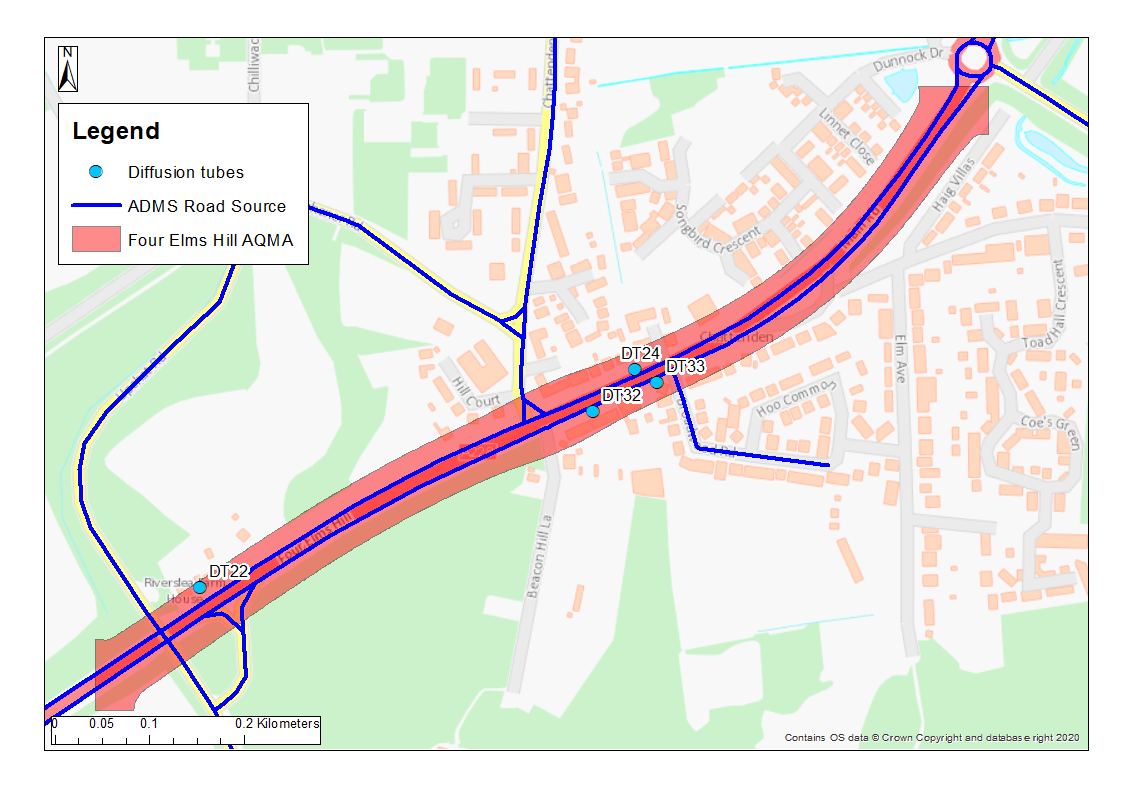
|  |  |  |  |
| --- | --- | --- | --- |
| **Site** | **2019 Modelled Annual Mean Road NOX (µgm-3)** | **2019 Monitored Annual Mean Road NOX (µgm-3)** | **Ratio** |
| DT22 | 9.2 | 19.0 | 2.06 |
| DT24 | 23.5 | 78.4 | 3.33 |
| DT32 | 22.3 | 53.6 | 2.41 |
| DT33 | 21.3 | 51.1 | 2.39 |

Table C5 shows the comparison of the modelled NO2 concentration calculated by multiplying the modelled road NOX by the regression adjustment factor of 2.7 and using the LAQM’s NOX to NO2 conversion tool to calculate the total adjusted modelled NO2.

Table C5 Comparison of adjusted modelled NO2 and modelled NO2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Site** | **2019 Background NO2 Concentration (µgm-3)** | **2019 Adjusted Modelled Annual Mean NO2 (µgm-3)** | **2019 Monitored Annual Mean NO2 (µgm-3)** | **% (Adjusted Modelled- Monitored)/ Monitored** |
| DT22 | 17.4 | 30.1 | 27.2 | 10.5% |
| DT24 | 17.4 | 47.2 | 53.2 | -11.2% |
| DT32 | 17.4 | 45.8 | 43.1 | 6.3% |
| DT33 | 17.4 | 44.8 | 42.0 | 6.6% |

Figure C3 Diffusion tubes used in verification



# Appendix D: Modelling results

Table D1 NO2 Annual Mean concentrations (µgm-3)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **2019 Baseline** | **2024**  **RC** | **2024**  **LP** | **2024**  **Zero emissions Buses** | **Zero emissions Buses**  **Change** | **IAQM impact** | **2024**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** | **2030 RC** | **2030**  **LP** | **2030**  **Zero emissions Buses** | **Zero emissions Buses Change** | **IAQM impact** | **2030**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** |
| **1** | 39.7 | **40.0** | **50.5** | **50.0** | -0.44 | Moderate Beneficial | 24.6 | -25.86 | Moderate Beneficial | 29.7 | 38.4 | 38.0 | -0.37 | Slight Beneficial | 18.2 | -20.12 | Moderate Beneficial |
| **2** | 37.6 | 37.7 | **47.6** | **47.27** | -0.37 | Moderate Beneficial | 23.94 | -23.70 | Moderate Beneficial | 27.9 | 36.0 | 35.7 | -0.31 | Negligible | 17.8 | -18.19 | Moderate Beneficial |
| **3** | 37.3 | 37.4 | **47.3** | **47.0** | -0.33 | Moderate Beneficial | 24.0 | -23.26 | Moderate Beneficial | 27.6 | 35.6 | 35.3 | -0.27 | Negligible | 17.9 | -17.72 | Moderate Beneficial |
| **4** | 35.8 | 35.6 | **44.7** | **44.4** | -0.31 | Moderate Beneficial | 23.5 | -21.23 | Moderate Beneficial | 26.2 | 33.5 | 33.2 | -0.26 | Negligible | 17.5 | -15.93 | Moderate Beneficial |
| **5** | 35.7 | 35.4 | **44.4** | **44.1** | -0.30 | Moderate Beneficial | 23.7 | -20.78 | Moderate Beneficial | 26.0 | 33.1 | 32.8 | -0.24 | Negligible | 17.6 | -15.46 | Moderate Beneficial |
| **6** | 35.7 | 35.2 | **44.1** | **43.8** | -0.28 | Moderate Beneficial | 23.9 | -20.15 | Moderate Beneficial | 25.7 | 32.5 | 32.3 | -0.22 | Negligible | 17.8 | -14.76 | Moderate Beneficial |
| **7** | 35.2 | 34.5 | **42.8** | **42.5** | -0.26 | Moderate Beneficial | 24.0 | -18.84 | Moderate Beneficial | 25.0 | 31.3 | 31.1 | -0.21 | Negligible | 17.8 | -13.47 | Moderate Beneficial |
| **8** | 35.2 | 34.3 | **42.4** | **42.2** | -0.24 | Moderate Beneficial | 24.1 | -18.30 | Moderate Beneficial | 24.7 | 30.8 | 30.6 | -0.19 | Negligible | 17.9 | -12.87 | Moderate Beneficial |
| **9** | 35.0 | 33.9 | **41.8** | **41.6** | -0.23 | Moderate Beneficial | 24.3 | -17.53 | Moderate Beneficial | 24.3 | 30.0 | 29.9 | -0.18 | Negligible | 18.0 | -12.04 | Moderate Beneficial |
| **10** | 34.8 | 33.6 | **41.3** | **41.1** | -0.21 | Moderate Beneficial | 24.3 | -16.99 | Moderate Beneficial | 24.0 | 29.5 | 29.3 | -0.17 | Negligible | 18.0 | -11.50 | Moderate Beneficial |
| **11** | 33.7 | 32.4 | 39.6 | 39.4 | -0.20 | Slight Beneficial | 23.7 | -15.89 | Moderate Beneficial | 23.2 | 28.3 | 28.1 | -0.16 | Negligible | 17.7 | -10.63 | Moderate Beneficial |
| **12** | 34.0 | 32.7 | **40.0** | 39.8 | -0.19 | Negligible | 24.0 | -16.06 | Moderate Beneficial | 23.4 | 28.5 | 28.4 | -0.15 | Negligible | 17.8 | -10.69 | Moderate Beneficial |
| **13** | 33.1 | 31.8 | 38.9 | 38.7 | -0.19 | Negligible | 23.3 | -15.56 | Moderate Beneficial | 22.9 | 27.9 | 27.8 | -0.14 | Negligible | 17.4 | -10.48 | Moderate Beneficial |
| **14** | 33.3 | 32.1 | 39.4 | 39.2 | -0.18 | Negligible | 23.4 | -15.98 | Moderate Beneficial | 23.1 | 28.4 | 28.2 | -0.14 | Negligible | 17.5 | -10.88 | Moderate Beneficial |
| **15** | 33.9 | 33.0 | **41.1** | **40.9** | -0.18 | Negligible | 23.5 | -17.57 | Moderate Beneficial | 24.0 | 30.0 | 29.8 | -0.14 | Negligible | 17.5 | -12.44 | Moderate Beneficial |
| **16** | **41.5** | **41.9** | **53.6** | **53.4** | -0.19 | Negligible | 27.8 | -25.82 | Moderate Beneficial | 30.2 | 39.2 | 39.0 | -0.15 | Negligible | 20.1 | -19.09 | Moderate Beneficial |
| **17** | 36.3 | 36.9 | **47.9** | **47.7** | -0.19 | Negligible | 23.8 | -24.05 | Moderate Beneficial | 27.4 | 36.3 | 36.1 | -0.16 | Negligible | 17.7 | -18.61 | Moderate Beneficial |
| **18** | **41.1** | **42.6** | **56.2** | **56.0** | -0.20 | Moderate Beneficial | 26.3 | -29.92 | Moderate Beneficial | 31.6 | **42.7** | **42.5** | -0.17 | Negligible | 19.2 | -23.52 | Moderate Beneficial |
| **19** | **41.7** | **42.3** | **53.7** | **53.5** | -0.25 | Moderate Beneficial | 28.3 | -25.39 | Moderate Beneficial | 30.4 | 39.3 | 39.1 | -0.21 | Slight Beneficial | 20.5 | -18.79 | Moderate Beneficial |
| **20** | **41.3** | **41.5** | **52.4** | **52.2** | -0.23 | Moderate Beneficial | 28.6 | -23.82 | Moderate Beneficial | 29.5 | 37.7 | 37.5 | -0.19 | Negligible | 20.6 | -17.08 | Moderate Beneficial |
| **21** | **40.0** | 39.8 | **49.9** | **49.7** | -0.22 | Moderate Beneficial | 28.0 | -21.89 | Moderate Beneficial | 28.1 | 35.6 | 35.4 | -0.17 | Negligible | 20.3 | -15.26 | Moderate Beneficial |
| **22** | 39.8 | 39.5 | **49.3** | **49.1** | -0.20 | Moderate Beneficial | 28.1 | -21.17 | Moderate Beneficial | 27.7 | 34.8 | 34.7 | -0.16 | Negligible | 20.4 | -14.48 | Moderate Beneficial |
| **23** | 39.7 | 39.2 | **48.8** | **48.6** | -0.19 | Negligible | 28.2 | -20.57 | Moderate Beneficial | 27.4 | 34.2 | 34.1 | -0.16 | Negligible | 20.4 | -13.83 | Moderate Beneficial |
| **24** | 39.1 | 38.5 | **47.7** | **47.5** | -0.19 | Negligible | 28.0 | -19.71 | Moderate Beneficial | 26.8 | 33.3 | 33.1 | -0.15 | Negligible | 20.3 | -13.02 | Moderate Beneficial |
| **25** | 39.1 | 38.3 | **47.4** | **47.2** | -0.18 | Negligible | 28.0 | -19.36 | Moderate Beneficial | 26.6 | 32.9 | 32.8 | -0.14 | Negligible | 20.3 | -12.63 | Moderate Beneficial |
| **26** | 39.0 | 38.3 | **47.2** | **47.1** | -0.18 | Negligible | 28.1 | -19.10 | Moderate Beneficial | 26.5 | 32.7 | 32.6 | -0.14 | Negligible | 20.4 | -12.34 | Moderate Beneficial |
| **27** | 38.6 | 37.8 | **46.6** | **46.4** | -0.17 | Negligible | 27.9 | -18.64 | Moderate Beneficial | 26.2 | 32.2 | 32.0 | -0.13 | Negligible | 20.2 | -11.95 | Moderate Beneficial |
| **28** | 38.3 | 37.4 | **46.0** | **45.9** | -0.16 | Negligible | 27.7 | -18.32 | Moderate Beneficial | 25.9 | 31.8 | 31.7 | -0.13 | Negligible | 20.1 | -11.69 | Moderate Beneficial |
| **29** | 38.9 | 38.0 | **46.8** | **46.6** | -0.16 | Negligible | 28.1 | -18.65 | Moderate Beneficial | 26.2 | 32.2 | 32.1 | -0.13 | Negligible | 20.4 | -11.87 | Moderate Beneficial |
| **30** | **49.6** | **52.4** | **68.5** | **68.3** | -0.24 | Moderate Beneficial | 31.8 | -36.73 | Moderate Beneficial | 38.7 | **51.9** | **51.7** | -0.19 | Negligible | 22.6 | -29.33 | Moderate Beneficial |
| **31** | 38.2 | **40.1** | **51.6** | **51.4** | -0.20 | Moderate Beneficial | 24.4 | -27.17 | Moderate Beneficial | 30.2 | 39.6 | 39.5 | -0.16 | Negligible | 18.1 | -21.53 | Moderate Beneficial |
| **32** | 36.3 | 37.7 | **48.6** | **48.4** | -0.18 | Negligible | 23.8 | -24.79 | Moderate Beneficial | 28.2 | 37.0 | 36.9 | -0.15 | Negligible | 17.7 | -19.29 | Moderate Beneficial |
| **33** | 32.5 | 32.9 | **41.9** | **41.8** | -0.15 | Negligible | 22.2 | -19.69 | Moderate Beneficial | 24.4 | 31.4 | 31.3 | -0.12 | Negligible | 16.8 | -14.62 | Moderate Beneficial |
| **34** | 30.9 | 30.8 | 39.0 | 38.9 | -0.14 | Negligible | 21.6 | -17.43 | Moderate Beneficial | 22.8 | 29.0 | 28.9 | -0.10 | Negligible | 16.4 | -12.56 | Moderate Beneficial |
| **35** | 29.0 | 28.7 | 36.2 | 36.1 | -0.12 | Negligible | 20.6 | -15.64 | Moderate Beneficial | 21.4 | 27.0 | 26.9 | -0.10 | Negligible | 15.8 | -11.25 | Moderate Beneficial |
| **36** | 29.0 | 28.7 | 36.3 | 36.1 | -0.13 | Negligible | 20.5 | -15.78 | Moderate Beneficial | 21.5 | 27.2 | 27.1 | -0.10 | Negligible | 15.7 | -11.44 | Moderate Beneficial |
| **37** | 32.4 | 32.9 | **42.8** | **42.7** | -0.16 | Negligible | 22.2 | -20.62 | Moderate Beneficial | 24.7 | 32.6 | 32.4 | -0.13 | Negligible | 16.8 | -15.80 | Moderate Beneficial |
| **38** | 31.0 | 31.3 | **40.5** | **40.3** | -0.15 | Negligible | 21.4 | -19.09 | Moderate Beneficial | 23.6 | 30.8 | 30.7 | -0.12 | Negligible | 16.3 | -14.56 | Moderate Beneficial |
| **39** | 28.8 | 28.6 | 36.6 | 36.5 | -0.13 | Negligible | 20.2 | -16.40 | Moderate Beneficial | 21.7 | 27.8 | 27.7 | -0.10 | Negligible | 15.6 | -12.28 | Moderate Beneficial |
| **40** | 28.4 | 28.1 | 35.9 | 35.7 | -0.13 | Negligible | 20.0 | -15.82 | Moderate Beneficial | 21.3 | 27.2 | 27.1 | -0.10 | Negligible | 15.5 | -11.76 | Moderate Beneficial |
| **41** | 27.0 | 26.4 | 33.1 | 33.0 | -0.11 | Negligible | 19.4 | -13.70 | Moderate Beneficial | 19.9 | 25.0 | 24.9 | -0.09 | Negligible | 15.1 | -9.87 | Moderate Beneficial |
| **42** | 26.4 | 25.6 | 31.9 | 31.8 | -0.11 | Negligible | 19.1 | -12.74 | Moderate Beneficial | 19.3 | 24.0 | 23.9 | -0.09 | Negligible | 14.9 | -9.02 | Moderate Beneficial |
| **43** | 25.6 | 24.6 | 30.4 | 30.3 | -0.10 | Negligible | 18.8 | -11.64 | Moderate Beneficial | 18.6 | 22.8 | 22.7 | -0.08 | Negligible | 14.7 | -8.05 | Moderate Beneficial |
| **44** | 24.5 | 23.3 | 28.3 | 28.2 | -0.09 | Negligible | 18.2 | -10.09 | Moderate Beneficial | 17.6 | 21.2 | 21.1 | -0.06 | Negligible | 14.4 | -6.77 | Moderate Beneficial |
| **45** | 24.3 | 22.9 | 27.8 | 27.7 | -0.09 | Negligible | 18.1 | -9.68 | Moderate Beneficial | 17.4 | 20.8 | 20.7 | -0.06 | Negligible | 14.4 | -6.42 | Moderate Beneficial |
| **46** | 23.6 | 22.2 | 26.8 | 26.7 | -0.08 | Negligible | 17.8 | -9.03 | Moderate Beneficial | 17.0 | 20.1 | 20.0 | -0.07 | Negligible | 14.1 | -5.98 | Moderate Beneficial |
| **47** | 23.4 | 22.0 | 26.5 | 26.4 | -0.08 | Negligible | 17.6 | -8.89 | Moderate Beneficial | 16.8 | 20.0 | 19.9 | -0.06 | Negligible | 14.1 | -5.90 | Moderate Beneficial |
| **48** | 23.3 | 21.9 | 26.5 | 26.4 | -0.08 | Negligible | 17.5 | -8.96 | Moderate Beneficial | 16.8 | 20.0 | 20.0 | -0.06 | Negligible | 14.0 | -6.04 | Moderate Beneficial |
| **49** | 23.9 | 22.6 | 27.5 | 27.5 | -0.08 | Negligible | 17.9 | -9.68 | Moderate Beneficial | 17.3 | 20.8 | 20.7 | -0.06 | Negligible | 14.2 | -6.60 | Moderate Beneficial |
| **50** | 34.4 | 33.6 | **41.5** | **41.1** | -0.40 | Moderate Beneficial | 23.1 | -18.32 | Moderate Beneficial | 24.5 | 30.5 | 30.2 | -0.33 | Negligible | 17.4 | -13.13 | Moderate Beneficial |
| **51** | 28.8 | 27.0 | 32.1 | 31.9 | -0.22 | Negligible | 20.7 | -11.43 | Moderate Beneficial | 19.7 | 23.1 | 22.9 | -0.17 | Negligible | 15.8 | -7.26 | Moderate Beneficial |
| **52** | 30.5 | 29.3 | 35.7 | 35.4 | -0.27 | Negligible | 21.5 | -14.17 | Moderate Beneficial | 21.3 | 25.9 | 25.7 | -0.20 | Negligible | 16.4 | -9.51 | Moderate Beneficial |
| **53** | 26.5 | 24.5 | 28.5 | 28.3 | -0.24 | Negligible | 19.1 | -9.45 | Moderate Beneficial | 18.2 | 21.2 | 21.0 | -0.17 | Negligible | 14.9 | -6.31 | Moderate Beneficial |
| **54** | 33.0 | 31.1 | 35.6 | 35.3 | -0.32 | Negligible | 22.9 | -12.73 | Moderate Beneficial | 21.7 | 24.9 | 24.7 | -0.23 | Negligible | 17.2 | -7.74 | Moderate Beneficial |
| **55** | 30.5 | 28.2 | 31.8 | 31.5 | -0.29 | Negligible | 21.5 | -10.29 | Moderate Beneficial | 19.9 | 22.3 | 22.1 | -0.20 | Negligible | 16.3 | -5.98 | Moderate Beneficial |
| **56** | 30.4 | 28.0 | 31.3 | 31.0 | -0.29 | Negligible | 21.5 | -9.85 | Moderate Beneficial | 19.7 | 21.9 | 21.7 | -0.20 | Negligible | 16.3 | -5.54 | Moderate Beneficial |

Exceedance of the NO2 annual mean AQO of 40 µgm-3 are presented in bold and greyed out.

Table D2 PM10 Annual Mean concentrations (µgm-3)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **2019 Baseline** | **2024**  **RC** | **2024**  **LP** | **2024**  **Zero emissions Buses** | **Zero emissions Buses**  **Change** | **IAQM impact** | **2024**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** | **2030 RC** | **2030**  **LP** | **2030**  **Zero emissions Buses** | **Zero emissions Buses Change** | **IAQM impact** | **2030**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** |
| **1** | 18.5 | 20.3 | 21.7 | 21.7 | <0.0 | Negligible | 21.4 | -0.31 | Negligible | 20.0 | 21.4 | 21.4 | <0.0 | Negligible | 21.2 | -0.25 | Negligible |
| **2** | 18.4 | 20.0 | 21.4 | 21.4 | <0.0 | Negligible | 21.2 | -0.29 | Negligible | 19.8 | 21.2 | 21.2 | <0.0 | Negligible | 21.0 | -0.23 | Negligible |
| **3** | 18.4 | 20.1 | 21.6 | 21.6 | <0.0 | Negligible | 21.3 | -0.29 | Negligible | 19.9 | 21.4 | 21.4 | <0.0 | Negligible | 21.1 | -0.23 | Negligible |
| **4** | 18.3 | 19.9 | 21.4 | 21.4 | <0.0 | Negligible | 21.1 | -0.27 | Negligible | 19.7 | 21.1 | 21.1 | <0.0 | Negligible | 20.9 | -0.21 | Negligible |
| **5** | 18.3 | 20.0 | 21.6 | 21.6 | <0.0 | Negligible | 21.3 | -0.26 | Negligible | 19.8 | 21.3 | 21.3 | <0.0 | Negligible | 21.1 | -0.20 | Negligible |
| **6** | 18.4 | 20.2 | 21.9 | 21.9 | <0.0 | Negligible | 21.6 | -0.25 | Negligible | 20.0 | 21.6 | 21.6 | <0.0 | Negligible | 21.4 | -0.19 | Negligible |
| **7** | 18.4 | 20.4 | 22.1 | 22.1 | <0.0 | Negligible | 21.8 | -0.24 | Negligible | 20.1 | 21.8 | 21.8 | <0.0 | Negligible | 21.6 | -0.17 | Negligible |
| **8** | 18.5 | 20.5 | 22.3 | 22.3 | <0.0 | Negligible | 22.1 | -0.23 | Negligible | 20.3 | 22.0 | 22.0 | <0.0 | Negligible | 21.9 | -0.17 | Negligible |
| **9** | 18.5 | 20.7 | 22.5 | 22.5 | <0.0 | Negligible | 22.3 | -0.23 | Negligible | 20.4 | 22.2 | 22.2 | <0.0 | Negligible | 22.1 | -0.16 | Negligible |
| **10** | 18.5 | 20.7 | 22.6 | 22.6 | <0.0 | Negligible | 22.4 | -0.23 | Negligible | 20.5 | 22.3 | 22.3 | <0.0 | Negligible | 22.2 | -0.16 | Negligible |
| **11** | 18.4 | 20.4 | 22.2 | 22.2 | <0.0 | Negligible | 22.0 | -0.22 | Negligible | 20.2 | 22.0 | 22.0 | <0.0 | Negligible | 21.8 | -0.15 | Negligible |
| **12** | 18.5 | 20.6 | 22.4 | 22.4 | <0.0 | Negligible | 22.2 | -0.22 | Negligible | 20.3 | 22.2 | 22.2 | <0.0 | Negligible | 22.0 | -0.15 | Negligible |
| **13** | 18.3 | 20.2 | 21.9 | 21.9 | <0.0 | Negligible | 21.7 | -0.21 | Negligible | 20.0 | 21.6 | 21.6 | <0.0 | Negligible | 21.5 | -0.14 | Negligible |
| **14** | 18.4 | 20.2 | 21.9 | 21.9 | <0.0 | Negligible | 21.7 | -0.21 | Negligible | 20.0 | 21.7 | 21.7 | <0.0 | Negligible | 21.5 | -0.14 | Negligible |
| **15** | 18.3 | 20.1 | 21.8 | 21.8 | <0.0 | Negligible | 21.6 | -0.22 | Negligible | 19.9 | 21.6 | 21.6 | <0.0 | Negligible | 21.4 | -0.15 | Negligible |
| **16** | 19.1 | 22.2 | 24.7 | 24.7 | <0.0 | Negligible | 24.5 | -0.29 | Negligible | 22.0 | 24.4 | 24.4 | <0.0 | Negligible | 24.2 | -0.20 | Negligible |
| **17** | 18.3 | 19.8 | 21.4 | 21.4 | <0.0 | Negligible | 21.2 | -0.29 | Negligible | 19.6 | 21.2 | 21.2 | <0.0 | Negligible | 20.9 | -0.23 | Negligible |
| **18** | 18.7 | 20.9 | 23.0 | 23.0 | <0.0 | Negligible | 22.6 | -0.35 | Negligible | 20.6 | 22.7 | 22.7 | <0.0 | Negligible | 22.4 | -0.29 | Negligible |
| **19** | 19.1 | 22.4 | 25.0 | 25.0 | <0.0 | Negligible | 24.7 | -0.27 | Negligible | 22.1 | 24.7 | 24.7 | <0.0 | Negligible | 24.5 | -0.20 | Negligible |
| **20** | 19.3 | 22.7 | 25.4 | 25.4 | <0.0 | Negligible | 25.2 | -0.28 | Negligible | 22.4 | 25.2 | 25.2 | <0.0 | Negligible | 25.0 | -0.21 | Negligible |
| **21** | 19.2 | 22.6 | 25.3 | 25.3 | <0.0 | Negligible | 25.0 | -0.27 | Negligible | 22.3 | 25.0 | 25.0 | <0.0 | Negligible | 24.8 | -0.20 | Negligible |
| **22** | 19.2 | 22.7 | 25.4 | 25.4 | <0.0 | Negligible | 25.2 | -0.27 | Negligible | 22.4 | 25.2 | 25.2 | <0.0 | Negligible | 25.0 | -0.20 | Negligible |
| **23** | 19.3 | 22.8 | 25.6 | 25.6 | <0.0 | Negligible | 25.3 | -0.28 | Negligible | 22.5 | 25.3 | 25.3 | <0.0 | Negligible | 25.1 | -0.20 | Negligible |
| **24** | 19.2 | 22.7 | 25.5 | 25.5 | <0.0 | Negligible | 25.2 | -0.27 | Negligible | 22.5 | 25.2 | 25.2 | <0.0 | Negligible | 25.0 | -0.20 | Negligible |
| **25** | 19.3 | 22.8 | 25.6 | 25.6 | <0.0 | Negligible | 25.4 | -0.27 | Negligible | 22.6 | 25.4 | 25.4 | <0.0 | Negligible | 25.2 | -0.20 | Negligible |
| **26** | 19.3 | 22.9 | 25.8 | 25.8 | <0.0 | Negligible | 25.5 | -0.27 | Negligible | 22.7 | 25.5 | 25.5 | <0.0 | Negligible | 25.3 | -0.20 | Negligible |
| **27** | 19.3 | 22.8 | 25.6 | 25.6 | <0.0 | Negligible | 25.4 | -0.27 | Negligible | 22.6 | 25.3 | 25.3 | <0.0 | Negligible | 25.1 | -0.20 | Negligible |
| **28** | 19.2 | 22.7 | 25.5 | 25.5 | <0.0 | Negligible | 25.2 | -0.27 | Negligible | 22.5 | 25.2 | 25.2 | <0.0 | Negligible | 25.0 | -0.20 | Negligible |
| **29** | 19.3 | 23.0 | 25.8 | 25.8 | <0.0 | Negligible | 25.6 | -0.27 | Negligible | 22.7 | 25.6 | 25.6 | <0.0 | Negligible | 25.4 | -0.20 | Negligible |
| **30** | 19.6 | 23.4 | 26.3 | 26.3 | <0.0 | Negligible | 26.0 | -0.29 | Negligible | 23.1 | 26.0 | 26.0 | <0.0 | Negligible | 25.8 | -0.22 | Negligible |
| **31** | 17.4 | 19.4 | 21.2 | 21.2 | <0.0 | Negligible | 20.9 | -0.22 | Negligible | 19.2 | 20.9 | 20.9 | <0.0 | Negligible | 20.7 | -0.17 | Negligible |
| **32** | 17.3 | 19.3 | 21.0 | 21.0 | <0.0 | Negligible | 20.8 | -0.22 | Negligible | 19.0 | 20.8 | 20.8 | <0.0 | Negligible | 20.6 | -0.17 | Negligible |
| **33** | 17.1 | 18.7 | 20.4 | 20.4 | <0.0 | Negligible | 20.2 | -0.21 | Negligible | 18.5 | 20.2 | 20.2 | <0.0 | Negligible | 20.0 | -0.16 | Negligible |
| **34** | 17.0 | 18.5 | 20.2 | 20.2 | <0.0 | Negligible | 20.0 | -0.20 | Negligible | 18.3 | 19.9 | 19.9 | <0.0 | Negligible | 19.8 | -0.15 | Negligible |
| **35** | 16.8 | 18.0 | 19.5 | 19.4 | <0.0 | Negligible | 19.3 | -0.18 | Negligible | 17.8 | 19.2 | 19.2 | <0.0 | Negligible | 19.1 | -0.13 | Negligible |
| **36** | 16.8 | 17.9 | 19.3 | 19.3 | <0.0 | Negligible | 19.2 | -0.17 | Negligible | 17.7 | 19.1 | 19.1 | <0.0 | Negligible | 19.0 | -0.12 | Negligible |
| **37** | 17.0 | 18.4 | 20.1 | 20.1 | <0.0 | Negligible | 19.9 | -0.16 | Negligible | 18.2 | 19.8 | 19.8 | <0.0 | Negligible | 19.7 | -0.11 | Negligible |
| **38** | 16.9 | 18.1 | 19.6 | 19.6 | <0.0 | Negligible | 19.4 | -0.15 | Negligible | 17.9 | 19.3 | 19.3 | <0.0 | Negligible | 19.2 | -0.11 | Negligible |
| **39** | 16.7 | 17.6 | 18.9 | 18.9 | <0.0 | Negligible | 18.8 | -0.14 | Negligible | 17.4 | 18.7 | 18.7 | <0.0 | Negligible | 18.6 | -0.10 | Negligible |
| **40** | 16.7 | 17.6 | 18.9 | 18.9 | <0.0 | Negligible | 18.8 | -0.14 | Negligible | 17.4 | 18.7 | 18.7 | <0.0 | Negligible | 18.6 | -0.11 | Negligible |
| **41** | 16.6 | 17.4 | 18.7 | 18.7 | <0.0 | Negligible | 18.5 | -0.14 | Negligible | 17.2 | 18.4 | 18.4 | <0.0 | Negligible | 18.3 | -0.10 | Negligible |
| **42** | 16.6 | 17.3 | 18.5 | 18.5 | <0.0 | Negligible | 18.4 | -0.14 | Negligible | 17.2 | 18.3 | 18.3 | <0.0 | Negligible | 18.2 | -0.10 | Negligible |
| **43** | 16.5 | 17.2 | 18.4 | 18.4 | <0.0 | Negligible | 18.3 | -0.13 | Negligible | 17.0 | 18.2 | 18.2 | <0.0 | Negligible | 18.1 | -0.10 | Negligible |
| **44** | 16.4 | 17.0 | 18.1 | 18.1 | <0.0 | Negligible | 18.0 | -0.12 | Negligible | 16.8 | 17.9 | 17.9 | <0.0 | Negligible | 17.8 | -0.09 | Negligible |
| **45** | 16.4 | 17.0 | 18.1 | 18.1 | <0.0 | Negligible | 17.9 | -0.12 | Negligible | 16.8 | 17.9 | 17.9 | <0.0 | Negligible | 17.8 | -0.08 | Negligible |
| **46** | 16.4 | 16.8 | 17.8 | 17.8 | <0.0 | Negligible | 17.7 | -0.11 | Negligible | 16.6 | 17.6 | 17.6 | <0.0 | Negligible | 17.5 | -0.08 | Negligible |
| **47** | 16.3 | 16.7 | 17.7 | 17.7 | <0.0 | Negligible | 17.6 | -0.11 | Negligible | 16.5 | 17.5 | 17.5 | <0.0 | Negligible | 17.4 | -0.08 | Negligible |
| **48** | 16.3 | 16.6 | 17.6 | 17.6 | <0.0 | Negligible | 17.5 | -0.10 | Negligible | 16.5 | 17.4 | 17.4 | <0.0 | Negligible | 17.3 | -0.07 | Negligible |
| **49** | 16.4 | 16.8 | 17.8 | 17.8 | <0.0 | Negligible | 17.7 | -0.11 | Negligible | 16.6 | 17.6 | 17.6 | <0.0 | Negligible | 17.5 | -0.07 | Negligible |
| **50** | 18.2 | 19.8 | 21.4 | 21.4 | <0.0 | Negligible | 21.2 | -0.19 | Negligible | 19.6 | 21.1 | 21.1 | <0.0 | Negligible | 21.0 | -0.13 | Negligible |
| **51** | 17.9 | 18.9 | 20.1 | 20.1 | <0.0 | Negligible | 20.0 | -0.15 | Negligible | 18.7 | 19.9 | 19.9 | <0.0 | Negligible | 19.8 | -0.10 | Negligible |
| **52** | 18.0 | 19.2 | 20.6 | 20.6 | <0.0 | Negligible | 20.4 | -0.18 | Negligible | 19.0 | 20.4 | 20.4 | <0.0 | Negligible | 20.3 | -0.12 | Negligible |
| **53** | 17.5 | 18.0 | 18.9 | 18.9 | <0.0 | Negligible | 18.7 | -0.14 | Negligible | 17.8 | 18.7 | 18.7 | <0.0 | Negligible | 18.6 | -0.10 | Negligible |
| **54** | 18.4 | 20.4 | 22.2 | 22.2 | <0.0 | Negligible | 22.0 | -0.18 | Negligible | 20.2 | 21.9 | 21.9 | <0.0 | Negligible | 21.8 | -0.12 | Negligible |
| **55** | 18.2 | 19.7 | 21.1 | 21.1 | <0.0 | Negligible | 21.0 | -0.16 | Negligible | 19.4 | 20.9 | 20.9 | <0.0 | Negligible | 20.8 | -0.10 | Negligible |
| **56** | 18.2 | 19.7 | 21.2 | 21.2 | <0.0 | Negligible | 21.1 | -0.16 | Negligible | 19.5 | 21.0 | 21.0 | <0.0 | Negligible | 20.9 | -0.10 | Negligible |

Table D3 PM2.5 Annual Mean concentrations (µgm-3)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **2019 Baseline** | **2024**  **RC** | **2024**  **LP** | **2024**  **Zero emissions Buses** | **Zero emissions Buses**  **Change** | **IAQM impact** | **2024**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** | **2030 RC** | **2030**  **LP** | **2030**  **Zero emissions Buses** | **Zero emissions Buses Change** | **IAQM impact** | **2030**  **Zero emissions HGV**  **LGV** | **Zero emissions HGV**  **LGV Change** | **IAQM impact** |
| **1** | 12.8 | 12.8 | 13.6 | 13.6 | <0.0 | Negligible | 13.3 | -0.15 | Negligible | 12.6 | 13.4 | 13.4 | <0.0 | Negligible | 13.2 | -0.23 | Negligible |
| **2** | 12.7 | 12.6 | 13.5 | 13.5 | <0.0 | Negligible | 13.2 | -0.11 | Negligible | 12.4 | 13.2 | 13.2 | <0.0 | Negligible | 13.0 | -0.21 | Negligible |
| **3** | 12.7 | 12.7 | 13.6 | 13.6 | <0.0 | Negligible | 13.3 | -0.35 | Negligible | 12.5 | 13.3 | 13.3 | <0.0 | Negligible | 13.1 | -0.21 | Negligible |
| **4** | 12.6 | 12.6 | 13.4 | 13.4 | <0.0 | Negligible | 13.2 | -0.29 | Negligible | 12.4 | 13.2 | 13.2 | <0.0 | Negligible | 13.0 | -0.19 | Negligible |
| **5** | 12.7 | 12.6 | 13.5 | 13.5 | <0.0 | Negligible | 13.3 | -0.28 | Negligible | 12.4 | 13.3 | 13.3 | <0.0 | Negligible | 13.1 | -0.19 | Negligible |
| **6** | 12.7 | 12.8 | 13.7 | 13.7 | <0.0 | Negligible | 13.4 | -0.28 | Negligible | 12.6 | 13.4 | 13.4 | <0.0 | Negligible | 13.3 | -0.18 | Negligible |
| **7** | 12.8 | 12.8 | 13.8 | 13.8 | <0.0 | Negligible | 13.5 | -0.25 | Negligible | 12.6 | 13.5 | 13.5 | <0.0 | Negligible | 13.4 | -0.17 | Negligible |
| **8** | 12.8 | 12.9 | 13.9 | 13.9 | <0.0 | Negligible | 13.7 | -0.25 | Negligible | 12.7 | 13.7 | 13.7 | <0.0 | Negligible | 13.5 | -0.16 | Negligible |
| **9** | 12.9 | 13.0 | 14.0 | 14.0 | <0.0 | Negligible | 13.8 | -0.24 | Negligible | 12.8 | 13.8 | 13.8 | <0.0 | Negligible | 13.6 | -0.16 | Negligible |
| **10** | 12.9 | 13.0 | 14.1 | 14.1 | <0.0 | Negligible | 13.8 | -0.23 | Negligible | 12.8 | 13.8 | 13.8 | <0.0 | Negligible | 13.7 | -0.16 | Negligible |
| **11** | 12.8 | 12.8 | 13.8 | 13.8 | <0.0 | Negligible | 13.6 | -0.23 | Negligible | 12.7 | 13.6 | 13.6 | <0.0 | Negligible | 13.5 | -0.15 | Negligible |
| **12** | 12.8 | 12.9 | 14.0 | 14.0 | <0.0 | Negligible | 13.7 | -0.23 | Negligible | 12.7 | 13.7 | 13.7 | <0.0 | Negligible | 13.6 | -0.15 | Negligible |
| **13** | 12.7 | 12.7 | 13.7 | 13.7 | <0.0 | Negligible | 13.5 | -0.22 | Negligible | 12.5 | 13.4 | 13.4 | <0.0 | Negligible | 13.3 | -0.14 | Negligible |
| **14** | 12.7 | 12.7 | 13.7 | 13.7 | <0.0 | Negligible | 13.5 | -0.21 | Negligible | 12.5 | 13.5 | 13.5 | <0.0 | Negligible | 13.3 | -0.14 | Negligible |
| **15** | 12.7 | 12.7 | 13.6 | 13.6 | <0.0 | Negligible | 13.4 | -0.22 | Negligible | 12.5 | 13.4 | 13.4 | <0.0 | Negligible | 13.3 | -0.15 | Negligible |
| **16** | 13.4 | 13.9 | 15.3 | 15.3 | <0.0 | Negligible | 15.0 | -0.20 | Negligible | 13.6 | 15.0 | 15.0 | <0.0 | Negligible | 14.8 | -0.22 | Negligible |
| **17** | 12.6 | 12.5 | 13.5 | 13.5 | <0.0 | Negligible | 13.2 | -0.21 | Negligible | 12.3 | 13.2 | 13.2 | <0.0 | Negligible | 13.0 | -0.21 | Negligible |
| **18** | 13.0 | 13.2 | 14.3 | 14.3 | <0.0 | Negligible | 14.0 | -0.21 | Negligible | 12.9 | 14.1 | 14.1 | <0.0 | Negligible | 13.8 | -0.27 | Negligible |
| **19** | 13.5 | 13.9 | 15.4 | 15.4 | <0.0 | Negligible | 15.1 | -0.31 | Negligible | 13.7 | 15.1 | 15.1 | <0.0 | Negligible | 14.9 | -0.22 | Negligible |
| **20** | 13.6 | 14.1 | 15.6 | 15.6 | <0.0 | Negligible | 15.4 | -0.27 | Negligible | 13.9 | 15.4 | 15.4 | <0.0 | Negligible | 15.2 | -0.22 | Negligible |
| **21** | 13.5 | 14.0 | 15.5 | 15.5 | <0.0 | Negligible | 15.2 | -0.34 | Negligible | 13.8 | 15.3 | 15.3 | <0.0 | Negligible | 15.1 | -0.21 | Negligible |
| **22** | 13.6 | 14.1 | 15.6 | 15.6 | <0.0 | Negligible | 15.3 | -0.29 | Negligible | 13.9 | 15.4 | 15.4 | <0.0 | Negligible | 15.2 | -0.20 | Negligible |
| **23** | 13.6 | 14.2 | 15.7 | 15.7 | <0.0 | Negligible | 15.4 | -0.30 | Negligible | 13.9 | 15.5 | 15.5 | <0.0 | Negligible | 15.3 | -0.20 | Negligible |
| **24** | 13.6 | 14.1 | 15.7 | 15.7 | <0.0 | Negligible | 15.4 | -0.28 | Negligible | 13.9 | 15.4 | 15.4 | <0.0 | Negligible | 15.2 | -0.20 | Negligible |
| **25** | 13.6 | 14.2 | 15.7 | 15.7 | <0.0 | Negligible | 15.5 | -0.28 | Negligible | 14.0 | 15.5 | 15.5 | <0.0 | Negligible | 15.3 | -0.20 | Negligible |
| **26** | 13.6 | 14.2 | 15.8 | 15.8 | <0.0 | Negligible | 15.5 | -0.28 | Negligible | 14.0 | 15.5 | 15.5 | <0.0 | Negligible | 15.3 | -0.20 | Negligible |
| **27** | 13.6 | 14.2 | 15.7 | 15.7 | <0.0 | Negligible | 15.4 | -0.28 | Negligible | 13.9 | 15.5 | 15.5 | <0.0 | Negligible | 15.3 | -0.19 | Negligible |
| **28** | 13.5 | 14.1 | 15.6 | 15.6 | <0.0 | Negligible | 15.4 | -0.27 | Negligible | 13.9 | 15.4 | 15.4 | <0.0 | Negligible | 15.2 | -0.19 | Negligible |
| **29** | 13.6 | 14.2 | 15.8 | 15.8 | <0.0 | Negligible | 15.6 | -0.27 | Negligible | 14.0 | 15.6 | 15.6 | <0.0 | Negligible | 15.4 | -0.20 | Negligible |
| **30** | 13.9 | 14.6 | 16.2 | 16.2 | <0.0 | Negligible | 15.8 | -0.27 | Negligible | 14.3 | 15.9 | 15.9 | <0.0 | Negligible | 15.7 | -0.28 | Negligible |
| **31** | 12.4 | 12.5 | 13.5 | 13.5 | <0.0 | Negligible | 13.2 | -0.27 | Negligible | 12.3 | 13.2 | 13.2 | <0.0 | Negligible | 13.0 | -0.19 | Negligible |
| **32** | 12.3 | 12.4 | 13.4 | 13.4 | <0.0 | Negligible | 13.1 | -0.27 | Negligible | 12.2 | 13.1 | 13.1 | <0.0 | Negligible | 13.0 | -0.19 | Negligible |
| **33** | 12.1 | 12.1 | 13.0 | 13.0 | <0.0 | Negligible | 12.8 | -0.36 | Negligible | 11.9 | 12.8 | 12.8 | <0.0 | Negligible | 12.6 | -0.16 | Negligible |
| **34** | 12.0 | 12.0 | 12.9 | 12.9 | <0.0 | Negligible | 12.7 | -0.26 | Negligible | 11.8 | 12.7 | 12.7 | <0.0 | Negligible | 12.5 | -0.15 | Negligible |
| **35** | 11.8 | 11.7 | 12.5 | 12.5 | <0.0 | Negligible | 12.3 | -0.25 | Negligible | 11.5 | 12.3 | 12.3 | <0.0 | Negligible | 12.1 | -0.13 | Negligible |
| **36** | 11.8 | 11.6 | 12.4 | 12.4 | <0.0 | Negligible | 12.2 | -0.22 | Negligible | 11.5 | 12.2 | 12.2 | <0.0 | Negligible | 12.1 | -0.12 | Negligible |
| **37** | 12.0 | 11.9 | 12.8 | 12.8 | <0.0 | Negligible | 12.6 | -0.20 | Negligible | 11.7 | 12.6 | 12.6 | <0.0 | Negligible | 12.5 | -0.14 | Negligible |
| **38** | 11.9 | 11.7 | 12.5 | 12.5 | <0.0 | Negligible | 12.4 | -0.17 | Negligible | 11.5 | 12.3 | 12.3 | <0.0 | Negligible | 12.2 | -0.13 | Negligible |
| **39** | 11.7 | 11.5 | 12.2 | 12.2 | <0.0 | Negligible | 12.0 | -0.17 | Negligible | 11.3 | 12.0 | 12.0 | <0.0 | Negligible | 11.9 | -0.11 | Negligible |
| **40** | 11.7 | 11.4 | 12.2 | 12.2 | <0.0 | Negligible | 12.0 | -0.19 | Negligible | 11.3 | 12.0 | 12.0 | <0.0 | Negligible | 11.9 | -0.11 | Negligible |
| **41** | 11.6 | 11.3 | 12.0 | 12.0 | <0.0 | Negligible | 11.9 | -0.17 | Negligible | 11.2 | 11.8 | 11.8 | <0.0 | Negligible | 11.7 | -0.10 | Negligible |
| **42** | 11.6 | 11.3 | 12.0 | 11.9 | <0.0 | Negligible | 11.8 | -0.16 | Negligible | 11.1 | 11.8 | 11.8 | <0.0 | Negligible | 11.7 | -0.10 | Negligible |
| **43** | 11.5 | 11.2 | 11.9 | 11.9 | <0.0 | Negligible | 11.7 | -0.15 | Negligible | 11.1 | 11.7 | 11.7 | <0.0 | Negligible | 11.6 | -0.10 | Negligible |
| **44** | 11.4 | 11.1 | 11.7 | 11.7 | <0.0 | Negligible | 11.6 | -0.14 | Negligible | 10.9 | 11.5 | 11.5 | <0.0 | Negligible | 11.4 | -0.08 | Negligible |
| **45** | 11.4 | 11.1 | 11.7 | 11.7 | <0.0 | Negligible | 11.6 | -0.14 | Negligible | 10.9 | 11.5 | 11.5 | <0.0 | Negligible | 11.4 | -0.08 | Negligible |
| **46** | 11.3 | 11.0 | 11.5 | 11.5 | <0.0 | Negligible | 11.4 | -0.13 | Negligible | 10.8 | 11.4 | 11.4 | <0.0 | Negligible | 11.3 | -0.08 | Negligible |
| **47** | 11.3 | 10.9 | 11.5 | 11.5 | <0.0 | Negligible | 11.4 | -0.12 | Negligible | 10.8 | 11.3 | 11.3 | <0.0 | Negligible | 11.2 | -0.07 | Negligible |
| **48** | 11.3 | 10.9 | 11.4 | 11.4 | <0.0 | Negligible | 11.3 | -0.11 | Negligible | 10.7 | 11.2 | 11.2 | <0.0 | Negligible | 11.2 | -0.07 | Negligible |
| **49** | 11.3 | 11.0 | 11.5 | 11.5 | <0.0 | Negligible | 11.4 | -0.11 | Negligible | 10.8 | 11.3 | 11.3 | <0.0 | Negligible | 11.3 | -0.07 | Negligible |
| **50** | 12.6 | 12.5 | 13.4 | 13.4 | <0.0 | Negligible | 13.2 | -0.10 | Negligible | 12.3 | 13.2 | 13.2 | <0.0 | Negligible | 13.0 | -0.14 | Negligible |
| **51** | 12.2 | 12.0 | 12.7 | 12.7 | <0.0 | Negligible | 12.5 | -0.10 | Negligible | 11.8 | 12.5 | 12.5 | <0.0 | Negligible | 12.4 | -0.09 | Negligible |
| **52** | 12.3 | 12.2 | 13.0 | 12.9 | <0.0 | Negligible | 12.8 | -0.11 | Negligible | 12.0 | 12.7 | 12.7 | <0.0 | Negligible | 12.6 | -0.12 | Negligible |
| **53** | 11.9 | 11.5 | 12.0 | 12.0 | <0.0 | Negligible | 11.9 | -0.20 | Negligible | 11.3 | 11.8 | 11.8 | <0.0 | Negligible | 11.7 | -0.09 | Negligible |
| **54** | 12.7 | 12.8 | 13.8 | 13.8 | <0.0 | Negligible | 13.6 | -0.15 | Negligible | 12.6 | 13.6 | 13.6 | <0.0 | Negligible | 13.5 | -0.12 | Negligible |
| **55** | 12.5 | 12.4 | 13.2 | 13.2 | <0.0 | Negligible | 13.1 | -0.17 | Negligible | 12.2 | 13.0 | 13.0 | <0.0 | Negligible | 12.9 | -0.10 | Negligible |
| **56** | 12.5 | 12.4 | 13.2 | 13.2 | <0.0 | Negligible | 13.1 | -0.12 | Negligible | 12.3 | 13.1 | 13.0 | <0.0 | Negligible | 13.0 | -0.10 | Negligible |

# Appendix E: Source apportionment

As part of the Detailed Assessment1, a source apportionment exercise was initially carried out for year 2015 in line with Technical Guidance LAQM.TG16 Chapter 7. 56 sensitive residential receptors were selected to provide an overview of source contributions.

As part of developing this AQAP, the source apportionment exercise was updated using 2019 traffic data as provided by Sweco. Defra’s Emission Factor Toolkit (EFT v10.1)[[35]](#footnote-36) was used to determine emission source apportionment from the vehicle types listed above. Car emissions were further split between petrol and diesel using default emissions included within the EFT. The emission apportionment of the nearest road link for each of the 56 receptors was determined using EFT as presented in Table E1.

Table E1 Predicted NO2 2019 emission source contribution at the road link nearest to each receptor (output from the EFT) (µgm-3)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ID | Nearest road link | Petrol Cars (%) | Diesel Cars (%) | LGVs (%) | HGVs (%) | Buses/Coaches (%) |
| **1** | 26670\_junction | 5% | 33% | 18% | 42% | 2% |
| **2** | 26670\_junction | 5% | 33% | 18% | 42% | 2% |
| **3** | 26670\_ junction | 5% | 33% | 18% | 42% | 2% |
| **4** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **5** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **6** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **7** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **8** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **9** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **10** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **11** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **12** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **13** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **14** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **15** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **16** | 26670 | 9% | 51% | 27% | 13% | 1% |
| **17** | 26670\_ junction | 5% | 33% | 18% | 42% | 2% |
| **18** | 26670\_ junction | 5% | 33% | 18% | 42% | 2% |
| **19** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **20** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **21** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **22** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **23** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **24** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **25** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **26** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **27** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **28** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **29** | 132643 | 9% | 54% | 21% | 15% | 1% |
| **30** | 132643\_ junction | 5% | 33% | 13% | 47% | 2% |
| **31** | 27058\_ junction | 5% | 35% | 14% | 44% | 2% |
| **32** | 27058 | 10% | 55% | 21% | 14% | 1% |
| **33** | 27058 | 10% | 55% | 21% | 14% | 1% |
| **34** | 27058 | 10% | 55% | 21% | 14% | 1% |
| **35** | 27058 | 10% | 55% | 21% | 14% | 1% |
| **36** | 27058 | 10% | 55% | 21% | 14% | 1% |
| **37** | 27058\_ junction | 5% | 35% | 14% | 44% | 2% |
| **38** | 27058\_ junction | 5% | 35% | 14% | 44% | 2% |
| **39** | 27057\_ junction | 5% | 35% | 14% | 44% | 2% |
| **40** | 27057\_ junction | 5% | 35% | 14% | 44% | 2% |
| **41** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **42** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **43** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **44** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **45** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **46** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **47** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **48** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **49** | 27057 | 10% | 55% | 21% | 13% | 1% |
| **50** | 38679 | 8% | 48% | 33% | 9% | 2% |
| **51** | 38679 | 8% | 48% | 33% | 9% | 2% |
| **52** | 38679 | 8% | 48% | 33% | 9% | 2% |
| **53** | 38674 | 8% | 48% | 34% | 8% | 2% |
| **54** | 38674 | 8% | 48% | 34% | 8% | 2% |
| **55** | 38674 | 8% | 48% | 34% | 8% | 2% |
| **56** | 38674 | 8% | 48% | 34% | 8% | 2% |

Table E2 presents the predicted NO2 2019 annual mean concentrations split by vehicle type at each of the receptors. Table E3 presents the predicted NO2 2019 percentage source contribution by vehicle type at each of the receptors.

Table E2 Predicted NO2 2019 Annual Mean concentrations and source contribution (µgm-3)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Regional background** | **Local**  **Background** | **Petrol Cars** | **Diesel Cars** | **LGVs** | **HGVs** | **Buses and Coaches** | **Total** |
| **1** | 6.6 | 10.8 | 1.1 | 7.4 | 4.1 | 9.4 | 0.3 | 39.7 |
| **2** | 6.6 | 10.8 | 1.0 | 6.7 | 3.7 | 8.5 | 0.3 | 37.6 |
| **3** | 6.6 | 10.8 | 1.0 | 6.6 | 3.6 | 8.3 | 0.3 | 37.3 |
| **4** | 6.6 | 10.8 | 1.6 | 9.4 | 5.0 | 2.3 | 0.1 | 35.8 |
| **5** | 6.6 | 10.8 | 1.6 | 9.3 | 5.0 | 2.3 | 0.1 | 35.7 |
| **6** | 6.6 | 10.8 | 1.6 | 9.3 | 5.0 | 2.3 | 0.1 | 35.7 |
| **7** | 6.6 | 10.8 | 1.6 | 9.1 | 4.8 | 2.3 | 0.1 | 35.2 |
| **8** | 6.6 | 10.8 | 1.6 | 9.0 | 4.8 | 2.2 | 0.1 | 35.2 |
| **9** | 6.6 | 10.8 | 1.6 | 8.9 | 4.8 | 2.2 | 0.1 | 35.0 |
| **10** | 6.6 | 10.8 | 1.5 | 8.8 | 4.7 | 2.2 | 0.1 | 34.8 |
| **11** | 6.6 | 10.8 | 1.4 | 8.3 | 4.4 | 2.1 | 0.1 | 33.7 |
| **12** | 6.6 | 10.8 | 1.5 | 8.4 | 4.5 | 2.1 | 0.1 | 34.0 |
| **13** | 6.6 | 10.8 | 1.4 | 8.0 | 4.3 | 2.0 | 0.1 | 33.1 |
| **14** | 6.6 | 10.8 | 1.4 | 8.1 | 4.3 | 2.0 | 0.1 | 33.3 |
| **15** | 6.6 | 10.8 | 1.5 | 8.4 | 4.5 | 2.1 | 0.1 | 33.9 |
| **16** | 6.6 | 10.8 | 2.1 | 12.2 | 6.5 | 3.0 | 0.1 | **41.5** |
| **17** | 6.6 | 10.8 | 0.9 | 6.3 | 3.5 | 7.9 | 0.3 | 36.3 |
| **18** | 6.6 | 10.8 | 1.2 | 7.9 | 4.3 | 10.0 | 0.4 | **41.1** |
| **19** | 6.6 | 10.8 | 2.3 | 13.1 | 5.0 | 3.7 | 0.2 | **41.7** |
| **20** | 6.6 | 10.8 | 2.2 | 12.9 | 5.0 | 3.7 | 0.2 | **41.3** |
| **21** | 6.6 | 10.8 | 2.1 | 12.2 | 4.7 | 3.5 | 0.2 | 40.0 |
| **22** | 6.6 | 10.8 | 2.1 | 12.1 | 4.6 | 3.4 | 0.2 | 39.8 |
| **23** | 6.6 | 10.8 | 2.1 | 12.0 | 4.6 | 3.4 | 0.2 | 39.7 |
| **24** | 6.6 | 10.8 | 2.0 | 11.7 | 4.5 | 3.3 | 0.2 | 39.1 |
| **25** | 6.6 | 10.8 | 2.0 | 11.7 | 4.5 | 3.3 | 0.2 | 39.1 |
| **26** | 6.6 | 10.8 | 2.0 | 11.7 | 4.5 | 3.3 | 0.2 | 39.0 |
| **27** | 6.6 | 10.8 | 2.0 | 11.4 | 4.4 | 3.3 | 0.2 | 38.6 |
| **28** | 6.6 | 10.8 | 2.0 | 11.3 | 4.3 | 3.2 | 0.2 | 38.3 |
| **29** | 6.6 | 10.8 | 2.0 | 11.6 | 4.5 | 3.3 | 0.2 | 38.9 |
| **30** | 6.6 | 10.8 | 1.6 | 10.6 | 4.2 | 15.1 | 0.6 | **49.6** |
| **31** | 6.7 | 8.5 | 1.2 | 8.1 | 3.2 | 10.1 | 0.5 | 38.2 |
| **32** | 6.7 | 8.5 | 2.0 | 11.6 | 4.5 | 2.9 | 0.2 | 36.3 |
| **33** | 6.7 | 8.5 | 1.7 | 9.5 | 3.6 | 2.3 | 0.1 | 32.5 |
| **34** | 6.7 | 8.5 | 1.5 | 8.6 | 3.3 | 2.1 | 0.1 | 30.9 |
| **35** | 6.7 | 8.5 | 1.3 | 7.6 | 2.9 | 1.9 | 0.1 | 29.0 |
| **36** | 6.7 | 8.5 | 1.3 | 7.6 | 2.9 | 1.9 | 0.1 | 29.0 |
| **37** | 6.7 | 8.5 | 0.9 | 6.1 | 2.4 | 7.5 | 0.3 | 32.4 |
| **38** | 6.7 | 8.5 | 0.8 | 5.6 | 2.2 | 6.9 | 0.3 | 31.0 |
| **39** | 6.7 | 8.5 | 0.7 | 4.8 | 1.9 | 5.9 | 0.3 | 28.8 |
| **40** | 6.7 | 8.5 | 0.7 | 4.6 | 1.8 | 5.8 | 0.3 | 28.4 |
| **41** | 6.7 | 8.5 | 1.1 | 6.5 | 2.5 | 1.6 | 0.1 | 27.0 |
| **42** | 6.7 | 8.5 | 1.1 | 6.2 | 2.4 | 1.5 | 0.1 | 26.4 |
| **43** | 6.7 | 8.5 | 1.0 | 5.7 | 2.2 | 1.4 | 0.1 | 25.6 |
| **44** | 6.7 | 8.5 | 0.9 | 5.1 | 2.0 | 1.2 | 0.1 | 24.5 |
| **45** | 6.7 | 8.5 | 0.9 | 5.0 | 1.9 | 1.2 | 0.1 | 24.3 |
| **46** | 6.7 | 8.5 | 0.8 | 4.6 | 1.8 | 1.1 | 0.1 | 23.6 |
| **47** | 6.7 | 8.5 | 0.8 | 4.5 | 1.7 | 1.1 | 0.1 | 23.4 |
| **48** | 6.7 | 8.5 | 0.8 | 4.5 | 1.7 | 1.1 | 0.1 | 23.3 |
| **49** | 6.7 | 8.5 | 0.8 | 4.8 | 1.8 | 1.2 | 0.1 | 23.9 |
| **50** | 6.6 | 10.8 | 1.3 | 8.2 | 5.6 | 1.5 | 0.3 | 34.4 |
| **51** | 6.6 | 10.8 | 0.9 | 5.5 | 3.8 | 1.0 | 0.2 | 28.8 |
| **52** | 6.6 | 10.8 | 1.0 | 6.3 | 4.4 | 1.2 | 0.2 | 30.5 |
| **53** | 6.6 | 10.8 | 0.7 | 4.4 | 3.1 | 0.8 | 0.2 | 26.5 |
| **54** | 6.6 | 10.8 | 1.2 | 7.5 | 5.3 | 1.3 | 0.4 | 33.0 |
| **55** | 6.6 | 10.8 | 1.0 | 6.3 | 4.4 | 1.1 | 0.3 | 30.5 |
| **56** | 6.6 | 10.8 | 1.0 | 6.2 | 4.4 | 1.1 | 0.3 | 30.4 |

Exceedance of the NO2 annual mean AQO of 40 µgm-3 are presented in bold and greyed out.

Table E3 Predicted NO2 2019 Annual Mean concentrations and source contribution (%)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Regional background**  **(%)** | **Local**  **Background**  **(%)** | **Petrol Cars**  **(%)** | **Diesel Cars**  **(%)** | **LGVs**  **(%)** | **HGVs**  **(%)** | **Buses and Coaches**  **(%)** |
| **1** | 16.6% | 27.2% | 2.8% | 18.7% | 10.3% | 23.6% | 0.9% |
| **2** | 17.5% | 28.7% | 2.7% | 17.9% | 9.8% | 22.6% | 0.8% |
| **3** | 17.7% | 28.9% | 2.6% | 17.8% | 9.8% | 22.4% | 0.8% |
| **4** | 18.4% | 30.1% | 4.6% | 26.1% | 14.0% | 6.5% | 0.3% |
| **5** | 18.5% | 30.2% | 4.6% | 26.1% | 14.0% | 6.5% | 0.3% |
| **6** | 18.5% | 30.2% | 4.6% | 26.1% | 13.9% | 6.5% | 0.3% |
| **7** | 18.7% | 30.6% | 4.5% | 25.7% | 13.8% | 6.4% | 0.3% |
| **8** | 18.8% | 30.7% | 4.5% | 25.7% | 13.7% | 6.4% | 0.3% |
| **9** | 18.9% | 30.8% | 4.5% | 25.5% | 13.7% | 6.4% | 0.3% |
| **10** | 19.0% | 31.0% | 4.4% | 25.4% | 13.6% | 6.3% | 0.3% |
| **11** | 19.6% | 32.0% | 4.3% | 24.6% | 13.2% | 6.1% | 0.3% |
| **12** | 19.4% | 31.7% | 4.3% | 24.8% | 13.3% | 6.2% | 0.3% |
| **13** | 19.9% | 32.6% | 4.2% | 24.1% | 12.9% | 6.0% | 0.3% |
| **14** | 19.8% | 32.4% | 4.2% | 24.3% | 13.0% | 6.0% | 0.3% |
| **15** | 19.5% | 31.8% | 4.3% | 24.7% | 13.2% | 6.2% | 0.3% |
| **16** | 15.9% | 26.0% | 5.2% | 29.5% | 15.8% | 7.3% | 0.3% |
| **17** | 18.2% | 29.7% | 2.6% | 17.4% | 9.5% | 21.9% | 0.8% |
| **18** | 16.0% | 26.2% | 2.9% | 19.2% | 10.6% | 24.2% | 0.9% |
| **19** | 15.8% | 25.9% | 5.5% | 31.3% | 12.1% | 8.9% | 0.4% |
| **20** | 16.0% | 26.1% | 5.4% | 31.1% | 12.0% | 8.9% | 0.4% |
| **21** | 16.5% | 27.0% | 5.3% | 30.4% | 11.7% | 8.7% | 0.4% |
| **22** | 16.6% | 27.1% | 5.3% | 30.3% | 11.7% | 8.6% | 0.4% |
| **23** | 16.6% | 27.2% | 5.3% | 30.2% | 11.6% | 8.6% | 0.4% |
| **24** | 16.9% | 27.6% | 5.2% | 29.9% | 11.5% | 8.5% | 0.4% |
| **25** | 16.9% | 27.6% | 5.2% | 29.9% | 11.5% | 8.5% | 0.4% |
| **26** | 16.9% | 27.6% | 5.2% | 29.9% | 11.5% | 8.5% | 0.4% |
| **27** | 17.1% | 27.9% | 5.2% | 29.6% | 11.4% | 8.4% | 0.4% |
| **28** | 17.2% | 28.2% | 5.1% | 29.4% | 11.3% | 8.4% | 0.4% |
| **29** | 17.0% | 27.7% | 5.2% | 29.7% | 11.5% | 8.5% | 0.4% |
| **30** | 13.3% | 21.8% | 3.2% | 21.4% | 8.5% | 30.6% | 1.3% |
| **31** | 17.5% | 22.2% | 3.1% | 21.2% | 8.3% | 26.4% | 1.2% |
| **32** | 18.4% | 23.4% | 5.6% | 32.0% | 12.3% | 7.9% | 0.4% |
| **33** | 20.6% | 26.1% | 5.1% | 29.3% | 11.2% | 7.2% | 0.4% |
| **34** | 21.7% | 27.5% | 4.9% | 28.0% | 10.7% | 6.9% | 0.4% |
| **35** | 23.0% | 29.3% | 4.6% | 26.2% | 10.1% | 6.5% | 0.4% |
| **36** | 23.1% | 29.3% | 4.6% | 26.2% | 10.0% | 6.4% | 0.4% |
| **37** | 20.6% | 26.2% | 2.8% | 18.7% | 7.3% | 23.3% | 1.1% |
| **38** | 21.6% | 27.4% | 2.7% | 17.9% | 7.0% | 22.3% | 1.0% |
| **39** | 23.3% | 29.5% | 2.5% | 16.6% | 6.5% | 20.7% | 0.9% |
| **40** | 23.6% | 29.9% | 2.4% | 16.4% | 6.4% | 20.4% | 0.9% |
| **41** | 24.8% | 31.5% | 4.2% | 24.1% | 9.3% | 5.9% | 0.3% |
| **42** | 25.4% | 32.2% | 4.1% | 23.3% | 9.0% | 5.7% | 0.3% |
| **43** | 26.1% | 33.1% | 3.9% | 22.4% | 8.6% | 5.5% | 0.3% |
| **44** | 27.3% | 34.7% | 3.7% | 20.9% | 8.1% | 5.1% | 0.3% |
| **45** | 27.6% | 35.0% | 3.6% | 20.6% | 7.9% | 5.0% | 0.3% |
| **46** | 28.3% | 36.0% | 3.4% | 19.6% | 7.6% | 4.8% | 0.3% |
| **47** | 28.6% | 36.3% | 3.4% | 19.3% | 7.5% | 4.7% | 0.3% |
| **48** | 28.7% | 36.5% | 3.4% | 19.1% | 7.4% | 4.7% | 0.3% |
| **49** | 28.0% | 35.6% | 3.5% | 20.0% | 7.7% | 4.9% | 0.3% |
| **50** | 19.2% | 31.4% | 3.9% | 23.9% | 16.4% | 4.3% | 0.9% |
| **51** | 22.9% | 37.5% | 3.1% | 19.1% | 13.2% | 3.5% | 0.7% |
| **52** | 21.6% | 35.3% | 3.4% | 20.8% | 14.3% | 3.8% | 0.7% |
| **53** | 24.9% | 40.7% | 2.6% | 16.4% | 11.6% | 2.9% | 0.8% |
| **54** | 20.0% | 32.7% | 3.6% | 22.6% | 15.9% | 4.0% | 1.1% |
| **55** | 21.6% | 35.3% | 3.3% | 20.6% | 14.5% | 3.6% | 1.0% |
| **56** | 21.7% | 35.4% | 3.3% | 20.5% | 14.5% | 3.6% | 1.0% |

1. Air Quality Consultants. Detailed Assessment of Air Quality at Four Elms Hill, Chattenden for Medway Council, 2016. Available at: <https://democracy.medway.gov.uk/mgconvert2pdf.aspx?id=37497> [↑](#footnote-ref-2)
2. Medway Council. Air Quality Action Plan, 2015. Available at: <https://www.medway.gov.uk/downloads/file/1982/medway_air_quality_action_plan_2015> [↑](#footnote-ref-3)
3. <https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=157> [↑](#footnote-ref-4)
4. Environmental equity, air quality, socioeconomic status and respiratory health, 2010 [↑](#footnote-ref-5)
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