Waltham Forest Local Plan Part 1

Habitats Regulations Assessment

Air Quality Mitigation Strategy

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Executive Summary

This Air Quality Mitigation Strategy sets out measures to address a potential rise in emissions to air which could result from growth within the London Borough of Waltham Forest. An air quality impact assessment undertaken by Kairus Ltd (April 2021 and updated in March 2022) has identified that critical loads for habitats near to roads which pass through Epping Forest Special Area of Conservation (SAC) could be exceeded in the future resulting from growth proposed within the Waltham Forest Local Plan Part 1 (LP1).

The measures set out within this strategy will help to avoid exceedances of critical loads from occurring. The measures include schemes which are already underway to facilitate more walking, cycling and use of public transport within the Borough, and increased use of electric vehicles. These measures will also be implemented through strong LP1 policies which require car free and air quality neutral developments and contributions towards public transport and active travel infrastructure.

Sensitivity modelling has been undertaken using the same methodology as the air quality impact assessment. Justified assumptions have been made as to the anticipated reduction in petrol and diesel fuelled road transport over the LP1 plan period. It has been concluded that a reduction of 30% in traffic can be expected by 2030 resulting from the mitigation measures identified and modelling shows that this reduction will result in no significant impacts on Epping Forest SAC from air pollution resulting from the growth proposed in Waltham Forest LP1. The Waltham Forest Climate Emergency Commission report recommends a 30% reduction in road transport by 2030 and this target is supported by LP1 to be achieved during the plan period (2020-2035).

In addition to measures already underway and the policies within LP1, it is recommended that Construction Logistics Plans prepared for developments within Waltham Forest Borough seek to avoid routes which pass within 200m of Epping Forest SAC as far as possible.

When the next version of the Waltham Forest Air Quality Action Plan is prepared by the Council, it is recommended that consideration is given to how that action plan (which relates to air quality impacts on human health) can also integrate measures for the Epping Forest SAC in line with this mitigation strategy.

It is also recommended that the London Borough of Waltham Forest Council works in partnership with Natural England, the City of London Conservators of Epping Forest, and neighbouring authorities on the delivery and monitoring of this Air Quality Mitigation Strategy.

Monitoring of traffic levels, traffic composition and air pollution deposition is proposed in order to understand the effectiveness of the mitigation measures over the coming years. In order to monitor air pollution deposition affecting Epping Forest SAC, monitoring is recommended near to roads which are located within Epping Forest District.

This Air Quality Mitigation Strategy does not currently have a date for review. A review would be triggered by the findings of monitoring or a review of the Waltham Forest LP1 which may occur within the next 5 years. A review of the Air Quality Mitigation Strategy would ensure that mitigation addresses up to date predicted effects on air quality from growth proposed within Waltham Forest and surrounding areas.

This strategy has been updated in March 2022 following comments made by Natural England in relation to the strategy and the air quality impact assessment (April 2021). Amendments have been made to update the findings of the air quality impact assessment (March 2022) and to provide more information to Natural England.

Comments received from Natural England predominately related to the air quality impact assessment. However, specifically in relation to the mitigation strategy, Natural England requested that as well as 'soft' mitigation measures, as set out within the strategy, 'hard' mitigation measures should also be identified and modelled to identify their predicted efficacy in reducing the predicted impact of the Local Plan on the Epping Forest SAC from air pollution.

Having considered the potential for identifying hard mitigation measures within Waltham Forest Borough, it has been concluded that such measures would need to be implemented outside of the London Borough of Waltham Forest in order to be effective in reducing emissions from traffic on Epping Forest SAC. Such mitigation measure options within the power of the London Borough of Waltham Forest are therefore limited. Further hard mitigation measures have therefore not been modelled, however, it is recommended that the London Borough of Waltham Forest works with the Epping Forest District Council and the Conservators to identify and implement hard mitigation measures, such as the CAZ, should air quality monitoring indicate that they are necessary.

Natural England also suggested that a more detailed understanding be gained into the potential impacts of the Ultra Low Emissions Zone (ULEZ) which, from October 2021, extends further into Waltham Forest from the south, along with the introduction of a Clean Air Zone (CAZ) proposed by Epping Forest District Council as a means to reduce air pollution within the Epping Forest SAC should monitoring identify it as necessary. In order to understand the potential effects of these activities, detailed modelling would be required of predicted traffic movements within Waltham Forest Borough under these scenarios and this information is not currently available. Annual traffic surveys on key routes within Waltham Forest are included within the monitoring proposals of this strategy and this would provide data on the impact of the ULEZ. This is considered a more pragmatic approach to addressing this issue. Furthermore, within this strategy it has been assumed that the impact of the ULEZ within Waltham Forest will be that people will change their vehicles and this is supported by recent evidence of a rapid increase in EV ownership.

In order to respond to the concerns of Natural England, an additional Technical Note has been prepared by AWP transport consultants which is appended to this air quality mitigation strategy

(Appendix E). The note further considers traffic related impacts and, in particular, the potential mitigation options available in the event that Local Plan development-related impacts on the SAC are observed. This provides supporting information to this strategy and provides evidence of the additional work undertaken along with the air quality impact assessment amendments.

1 Introduction

ClearLead Consulting has prepared this air quality mitigation strategy on behalf of the London Borough of Waltham Forest Council, in support of the Waltham Forest Local Plan Part 1 (LP1). This mitigation strategy is required in order to address potential negative effects on habitats resulting from traffic emissions identified within technical work undertaken in support of a Habitats Regulations Assessment (HRA) of the Waltham Forest LP1.

In accordance with the Habitats and Species Regulations 2017[1], the London Borough of Waltham Forest Council is a competent authority with a duty to ensure that European sites are protected from adverse effects.

An air quality impact assessment undertaken by Kairus Ltd (April 2021 and updated in March 2022) has identified that critical loads for habitats near to roads which pass through Epping Forest Special Area of Conservation (SAC) could be exceeded in the future resulting from growth proposed within the Waltham Forest LP1. Habitats within the SAC are vulnerable to damage from certain types of air pollution which is emitted from vehicles.

This mitigation strategy sets out measures to address a potential rise in emissions to air which could result from growth within the London Borough of Waltham Forest. Sensitivity modelling has been undertaken in order to understand the effectiveness of the mitigation measures and a delivery framework and monitoring proposals are presented in later chapters.

The remaining sections of this document are structured as follows:

- **Chapter 2** describes the Waltham Forest LP1;
- **Chapter 3** provides information about the LP1 HRA assessment and the air quality impact assessment;
- **Chapter 4** discusses the potential impacts from the LP1 on air quality and Epping Forest SAC identified in the HRA and the air quality impact assessment;
- **Chapter 5** identifies what needs to be achieved to mitigate predicted effects on Epping Forest SAC and by when;
- **Chapter 6** presents the mitigation measures in Waltham Forest to increase active travel, manage traffic, parking, new impacts of developments and to improve air quality;

[1] Updated by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

- **Chapter 7** presents mitigation measures to specifically improve air quality within Epping Forest SAC;
- **Chapter 8** presents findings of modelling of the effectiveness of specific mitigation measures;
- **Chapter 9** presents the findings of further traffic analysis undertaken in response to Natural England comments;
- **Chapter 10** sets out the delivery framework for the air quality mitigation strategy;
- **Chapter 11** presents proposals for monitoring and review of this strategy; and
- **Chapter 12** presents conclusions.

This strategy has been updated in March 2022 following comments made by Natural England in relation to the strategy and the air quality impact assessment (April 2021). Amendments have been made to update the findings of the air quality impact assessment (March 2022) and to provide more information to Natural England.

Comments received from Natural England predominately related to the air quality impact assessment. However, specifically in relation to the mitigation strategy, Natural England requested that as well as 'soft' mitigation measures, as set out within this strategy, hard mitigation measures should also be identified and modelled to identify their predicted efficacy in reducing the predicted impact of the Local Plan on the Epping Forest SAC from air pollution.

Natural England also suggested that a more detailed understanding be gained into the potential impacts of the Ultra Low Emissions Zone (ULEZ) which, from October 2021, extends further into Waltham Forest from the south, along with the introduction of a Clean Air Zone (CAZ) proposed by Epping Forest District Council as a means to reduce air pollution within the Epping Forest SAC should monitoring identify it as necessary.

In order to respond to the concerns of Natural England, an additional Technical Note has been prepared by AWP transport consultants which is appended to this air quality mitigation strategy (Appendix E). The note further considers traffic related impacts and, in particular, the potential mitigation options available in the event that Local Plan development related impacts on the SAC are observed. This provides supporting information to this strategy and provide evidence of the additional work undertaken along with the air quality impact assessment amendments.

2 The Waltham Forest Local Plan

2.1 Introduction

A new Local Plan is needed to support the London Borough of Waltham Forest Council's (the Council's) aspirations for growth, including significant new housing and sustained economic growth, to provide jobs for local people and increase the supply of housing, including affordable units as well as delivering infrastructure.

A new Local Plan is also needed to address changes as a result of new legislation including the Localism Act (2011) and new national planning policy in the form of the National Planning Policy Framework (NPPF). The Proposed Submission Version of the Local Plan Part 1 (LP1) will therefore set out how the Borough will grow and develop in the future and is being delivered in stages.

The London Plan is the overarching spatial development strategy for London which provides the strategic, London-wide context within which all London boroughs must set their detailed local planning policies.

The content of the LP1 is based on the requirements of national planning policy, the Council's evidence base and outcome of the previous consultations.

LP1 sets out the Council's planning policy framework for the Borough. It sets out the level of growth which needs to be planned for in Waltham Forest for the next 15 years and identifies where that growth should be located and how it should be delivered. The policies set out in the Plan will be used to determine planning applications in Waltham Forest.

LP1 covers a range of matters including the number of new homes, and employment provision needed and where they should be located. It also sets out policies for the protection and enhancement of the natural and historic environment, the provision of supporting infrastructure for growth and other policies to manage change in local areas including town centres and the borough generally.

The Local Plan is being produced in two parts. LP1 is the overarching strategic policy document. It will be complemented by a Site Allocations Development Plan Document (DPD) representing Part 2 of the Local Plan (LP2). The Local Plan will also be supported by a series of Supplementary Planning Documents, Neighbourhood Plans (as may be prepared) and other guidance including masterplans and planning briefs. Once adopted, the Local Plan will replace the Core Strategy (2012), Development Management Policies Document (2013), Walthamstow Town Centre Area Action Plan (2014) and Blackhorse Lane Area Action Plan (2015).

2.2 Plan Vision and Objectives

The LP1 sets out the vision and strategic priorities for development of the borough over the next 15 years. These are reproduced in Boxes 2.1-2.3 below:

Box 2.1: Waltham Forest Local Plan Six Golden Threads

The Local Plan sets out the strategic priorities for development of the borough over the next 15 years. There are six golden threads that shape the Local Plan; these will deliver the priorities set out in Council's Creating Futures corporate strategy. These are as follows and are all considered to have equal value.

Six Golden Threads

- Increasing housing and affordable housing delivery. Creating liveable places
- Ensuring growth is sustainable and supported by infrastructure
- Building on the unique strengths of the borough and carrying forward its cultural legacy
- Promoting the economy to improve the life chances for all residents, students and workers
- Protecting and enhancing the natural environment
- Ensuring land optimisation and driving investment

Box 2.2: Waltham Forest Local Plan Vision

Waltham Forest in 2035

Waltham Forest is a key part of London and a rich resource for the growing capital city. Over the life of this plan, the Borough will be transformed. Building on its strengths as part of the capital and its outer fringe, by 2035, the Borough will be a network of enterprising, culturally rich, well designed sustainable neighbourhoods Building on the identities of our historic 8 town centres and the communities that have grown up around them. It will attract people from across London and further afield to enjoy its cultural, creative and heritage attractions, greenspaces and recreational opportunities.

Liveable Waltham Forest

Waltham Forest's vibrant network of distinctive and thriving town centres will be cultural community hubs, bringing the city to the suburbs and supporting creative, healthy and active lifestyles. A new vision of urban living is in place where all residents are able to meet most of their needs within a 15-minute walk or cycle from their homes. Building on the success of Enjoy Waltham Forest, the Borough's extensive network of green spaces including forest, open space, Green flagged parks, neighbourhood and pocket parks and urban space will help to connect these centres to new liveable neighbourhoods by integrated walking and cycling routes and improved public transport. These liveable neighbourhoods will include a choice and mix of genuinely affordable new homes, which along with an increasing number of local jobs will realise the Plan's ambitions to make the Borough the model of new metropolitan cultural suburbs.

Growing a creative, diverse and resilient economy in Waltham Forest

Attracting inward investment into Waltham Forest's dynamic economy is central to delivering transformational good growth and the success of this Plan. Successful growth in Waltham Forest will focus on improving life chances and job opportunities for its residents.

The Borough will maximise the advantages of its access to the most economically vibrant parts of London and its position in the UK Innovation Corridor (London-Stansted-Cambridge) to grow its own creative and cultural economy. Building on its growing and strongest sectors, Waltham Forest will be a leader in the capital's cultural, creative and digital economy, cementing its economic stability and resilience; extending its economic offer and helping residents to achieve their potential.

Waltham Forest as a place of leisure

Waltham Forest will be one of London's top locations for leisure and recreation. The Borough's diverse visitor attractions, (such as the William Morris Gallery, Walthamstow Wetlands and Victoria Halls) its places, cultural offer and green and blue assets which include access to Epping Forest, the Lee Valley Regional Park, reservoirs and marshland are for residents and all to enjoy.

A key ambition of this Plan is to promote the Borough as a vibrant place to live and visit. We aim to deliver a diverse and inclusive 24/7 economy in Waltham Forest's town centres (where appropriate) and culture venues, building a cultural legacy celebrating the creativity of the Borough's communities.

Box 2.3: Waltham Forest Local Plan Strategic Objectives

These strategic objectives that will deliver the vision for Waltham Forest by 2035:

1. Ensure a significant increase in the supply, choice and mix of high quality new homes, in particular delivering genuinely affordable homes to enable and encourage residents to stay in the Borough and strengthen communities.
2. Grow, promote and diversify Waltham Forest's economy, including its dynamic, cultural, creative and digital sectors and its role in the Upper Lee Valley and wider UK Innovation Corridor, by both supporting and nurturing indigenous growth as well as attracting inward investment.
3. Improve life chances by improving job opportunities, upskilling residents and providing access to new skills, training and apprenticeship opportunities locally and elsewhere, creating wealth in a successful metropolis.
4. Support Waltham Forest's network of thriving, safe and attractive town centres, maintaining the distinctive role of each and making them accessible to all, making sure that residents are able to meet their shopping, work, service, recreational and cultural needs within a 15-minute walk or cycle.
5. Ensure timely, strategic and local infrastructure investment and delivery to support good sustainable growth for communities both now and in the future, through working with partners, investors, developers and providers.
6. Ensure that the Borough's cultural legacy and creative economy flourish and grow and investment is secured to improve life chances, quality of life and well-being for all.
7. Improve the health and wellbeing of all who live, study and work in Waltham Forest.
8. Improve active and sustainable transport choices across the Borough and beyond building on the success of the 'Enjoy Waltham Forest programme', encouraging wider integrated walking and cycling routes.
9. Promote exemplary standards of design in place-making and the highest quality of development.
10. Ensure Waltham Forest's network of cultural, inclusive and sustainable neighbourhoods are safe and diverse, celebrating their locally distinctive character and heritage.
11. Develop a multi-functional network of green and blue infrastructure to deliver benefits for all, including, where appropriate, increased public access.
12. Protect, restore and enhance the Borough's natural environment to sustain biodiversity, habitats and species of conservation importance.
13. Work with partners to protect and enhance the adjoining areas of regional, national and international natural importance in Epping Forest and the Lee Valley Regional Park.
14. Waltham Forest builds its resilience through addressing sustainability, efficient waste management and the effects of climate change through all stages in the development process.
15. To preserve and enhance the historic built and natural environment and celebrate its locally distinctive character and heritage.

2.3 Overview of the Plan Area

Waltham Forest is an outer London borough in the North East of London and is one of the greenest boroughs in London. It is also one of the most diverse areas in the country with 48 per cent of residents from a minority ethnic background and is relatively small at approximately 3,880 hectares (ha). The Local Plan area is shown in Figure 2.1.

The North Circular Road (A406) divides the borough into two main areas. The London Borough of Waltham Forest was created in 1965 by bringing together the areas of Chingford,

Walthamstow and Leyton. These roughly align with the geographic areas of the Borough identified in the Proposed Submission LP1: South (Bakers Arms, Lea Bridge, Leyton, Leytonstone, Whipps Cross); Central (Blackhorse Lane, Forest Road Corridor, St James' Quarter, Walthamstow, Wood Street); and North (Chingford, Chingford Mount, Highams Park, North Circular Corridor, and Sewardstone Road).

The borough is a collection of neighbourhoods built up around busy high streets and stations, areas of industry and a total of 1,205ha of open space, parks and playing fields. The Green Belt in the borough is part of the Metropolitan Green Belt which surrounds London.

The Lee Valley Special Protection Area (SPA) and RAMSAR site (and Regional Park) and Epping Forest Special Area of Conservation (SAC) define its western and eastern boundaries and it sits alongside the Queen Elizabeth Olympic Park and the Stratford City development. As an area it provides a link between two major regeneration areas: The Thames Gateway and the UK Innovation Corridor (London-Stansted-Cambridge).

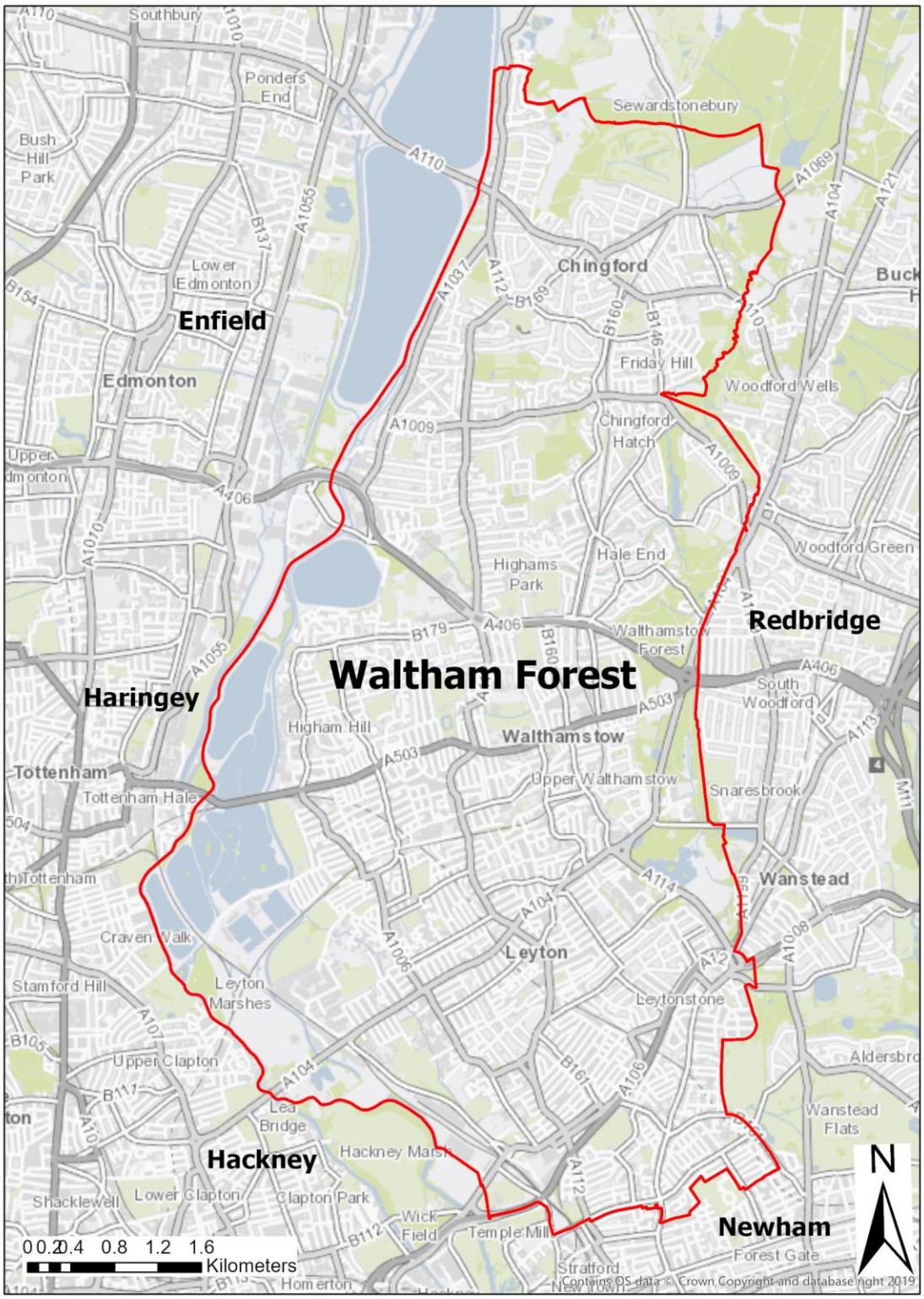

Figure 2.1 Waltham Forest Local Plan Boundary (shown in red)

2.4 Local Plan Part 1 Policies

The LP1 contains a number of strong policies which will continue the pioneering work undertaken within the Borough in recent years achieving a modal shift from cars to walking and cycling, creating 15 minute neighbourhoods in parts of the Borough (see Chapter 6 for further details).

The spatial strategy is shown on the LP1 Key Diagram reproduced in Figure 2.2. LP1 Policy 4 'Location of Growth' identifies the broad geographical areas where consolidated regeneration efforts will be applied to deliver growth. In these areas, new development will be expected to provide a well balanced mix of economic, social and environmental benefits to support the development of a network of well-connected, sustainable, high quality, attractive, locally distinctive and healthy places. Policy 4, together with other policies of the plan, steers most new development to those places that offer the best access to services and facilities (both now and for the foreseeable future). This is anticipated to reduce the need to travel, as well as making best use of existing infrastructure and previously developed land in built-up areas.

The spatial strategy directs most forms of new development and growth to the more sustainable locations, particularly the southern growth zone, which represents the largest and most transformative location for growth in the borough over the plan period. Other growth locations will also have an important role in creating a network of well connected, sustainable and locally distinctive and healthy places. They will act as the primary locations for growth and investment in homes and jobs with supporting infrastructure. These locations have been identified to optimise connectivity and access to services and jobs.

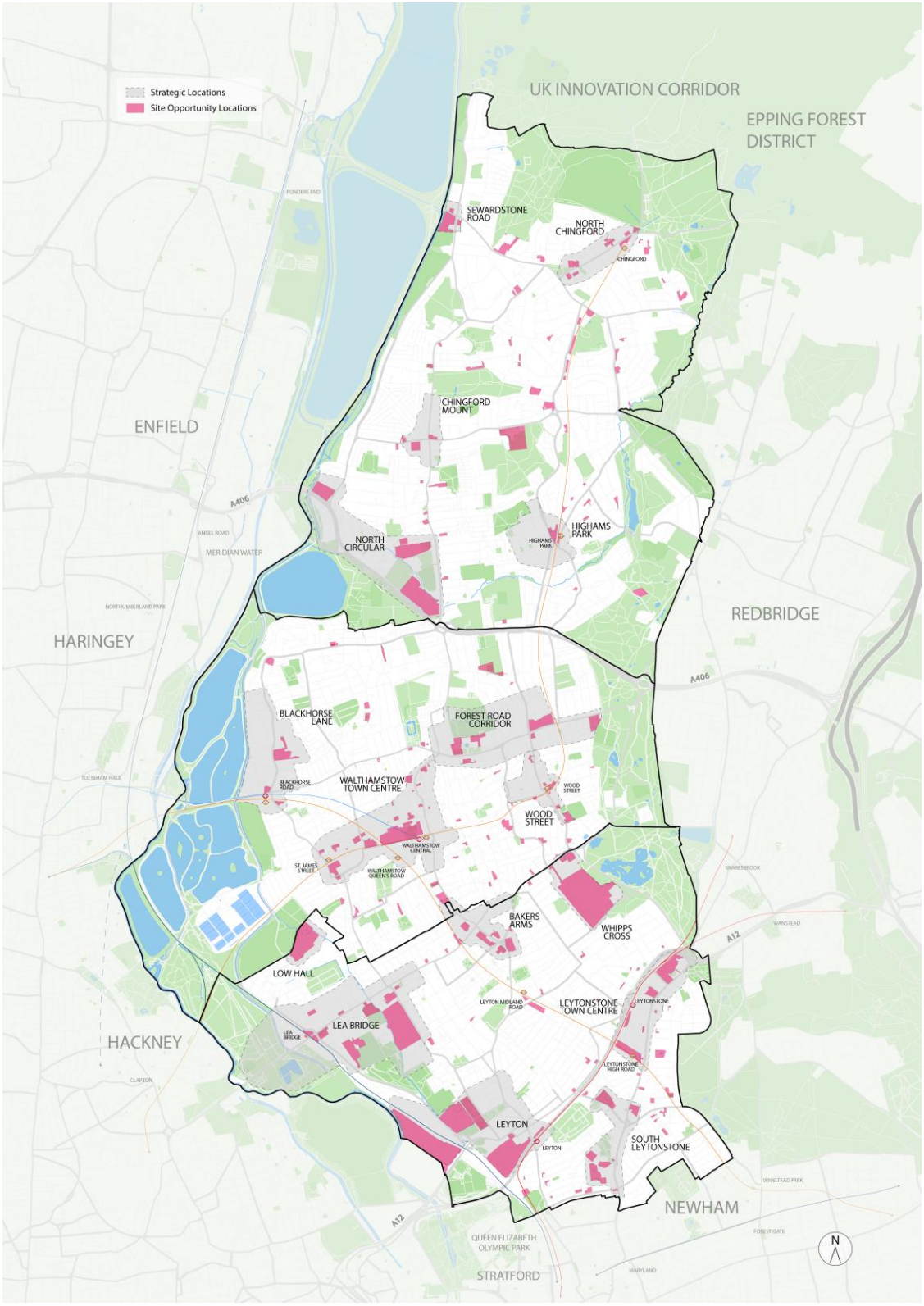

Figure 2.2 Waltham Forest LP1 Key Diagram

LP1 identifies 17 Strategic Locations. These are areas where substantial growth is expected to occur on larger sites or clusters of smaller sites to deliver the significant growth in housing, employment and infrastructure provision. Many of these areas encompass the designated centres of Walthamstow Town Centre, District Centre and Neighbourhood Centres and therefore represent a functional area within which a coordinated approach to redevelopment may be necessary to manage the cumulative impacts of growth in the area as whole and in the neighbouring areas.

The distribution of growth in the identified strategic locations builds on existing committed and pipeline development. Opportunities in these areas will allow new development in a range of sites (small, medium and large) spread throughout the borough. A broader range of sites will provide greater choice in the provision of different housing and employment types.

Focusing growth in the identified strategic locations will reduce the pressure for substantial incremental development in predominately established residential and more sensitive areas. By promoting synergy in clusters of sites/areas, more sustainable places and growth locations will be created. In these areas, new homes and jobs will be delivered close to community facilities and public transport and there will be enhanced opportunities for developing a unique sense of community and place.

The Key Diagram identifies a number of Site Opportunity Locations which are spread throughout the Borough. In the LP1 they represent indicative locations from which sites would be selected to support the key growth aspirations of the plan. Further guidance on these sites, those selected as 'strategic' or 'key sites' will be included in LP2 (Site Allocations DPD). It should be noted that the Site Opportunity Locations shown in Figure 2.2 are not site allocations.

A key objective of LP1 is to “improve active and sustainable transport choices across the Borough and beyond building on the success of the 'Enjoy Waltham Forest programme', encouraging wider integrated walking and cycling routes”. The LP1 contains a number of transport and spatial strategy policies to achieve this objective and they are discussed in Chapter 6.

3 The LP1 HRA assessment and air quality study

3.1 Introduction

This chapter describes the HRA of the LP1 and the technical work which has identified potential adverse effects relating to air quality.

3.2 Assessment Details

In order to assess the air quality part of the HRA, strategic traffic data was obtained from Transport for London (TfL) which predicted traffic increases within London's highway network. The data includes all committed schemes within London and is, therefore, considered to provide predicted data for traffic increases generated by the LP1 in-combination with increases from neighbouring plans. The data does not enable an assessment of predicted effects of traffic increases from the Waltham Forest LP1 on its own.

The data required some specialist analysis by transport consultants Awcock Ward Partnership (AWP). The analysis of data from the London Highway Assignment Model (LoHAM) has shown that there are a number of roads within Waltham Forest which pass within 200m of Epping Forest SAC on which traffic is predicted to increase by over 1000 Annual Average Daily Traffic (AADT) over the plan period. Following an accepted methodology within the Design Manual for Roads and Bridges[2], these predicted traffic increases are considered 'significant'. A further study was therefore required to assess whether air quality impacts, and the resulting impacts on the qualifying habitats of Epping Forest SAC, could be caused by the predicted traffic increases. Natural England guidance[3] states that this study should identify whether the change in pollutant concentrations due to 'in-combination' growth exceeds 1% of the Critical Load[4].

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[2] https://www.standardsforhighways.co.uk/dmrb/

[3] Natural England (2018). NEA001 Advising Competent Authorities on the assessment of road traffic emissions under the Habitat Regulations.

[4] Critical Loads are defined as: *" a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (Source: https://www.icpmapping.org/Definitions_and_abbreviations via the APIS website http://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis)

An air quality impact assessment[5] (Kairus, April 2021) has been undertaken by specialist air quality consultants. Their assessment used the Air Pollution Information System (APIS)[6] to identify the Critical Loads for nutrient deposition and acidification relevant to the qualifying habitats of Epping Forest SAC. These Critical Loads are shown in Tables 3.1 and 3.2.

Table 3.1: Critical Loads for Nutrient Deposition	
Habitat	**Critical Load (kg N/ha/yr)**
Atlantic Acidophilous Beach Forest with Ilex	10-20
North Atlantic Wet Heaths with Erica Tetralix	10-20
European Dry Heaths	10-20

Table 3.2: Critical Loads for Acidification	
Habitat	**Critical Load (keq N/ha/yr)**
Atlantic Acidophilous Beach Forest with *Ilex*	CLMinN 0.142 CLMaxN 1.73
North Atlantic Wet Heaths with *Erica Tetralix*	CLMinN 0.714 CLMaxN 1.59
European Dry Heaths	CLMinN 0.714 CLMaxN 1.59

[5] Kairus Ltd (April 2021) Air Quality Modelling To support Waltham Forest Local Plan Habitats Regulations Assessment Appendix 4 of the Waltham Forest Submission Local Plan Part 1 Habitats Regulations Assessment Report (ClearLead Consulting Ltd, April 2021) available here: https://www.walthamforest.gov.uk/content/local-plan

[6] www.apis.ac.uk

The critical levels for NO_x were used as set in the European Union (EU) Ambient Air Quality Directive[7] and transposed into law by the Air Quality standards regulations 2010[8], as amended. These levels are shown in Table 3.3.

Table 3.3: Critical Levels for Ecological Receptors		
Pollutant	**Averaging Period**	**Concentration (µg/m3)**
Oxides of Nitrogen (NOx)	Annual Mean	30
Ammonia (NH_3)	Annual Mean	3
	Annual Mean	1 (for lichens and bryophytes)

The air quality assessment found that the predicted NO_x levels adjacent to the Epping Forest SAC increased by less than 1% of the Critical Load during the LP1 period and are therefore insignificant. The assessment found that predicted NH_3, exceeded the 1% Critical Load at all the receptor locations along the roads adjacent to the Epping Forest SAC (see figures 3.1). The acid deposition critical load was also exceeded by more than 1% in the 2041 Local Plan period at receptor 1.

Further assessment of the impacts on the Epping Forest SAC was undertaken by predicting NH_3 concentrations and acid deposition at 20m intervals across a number of 200m transects within the SAC. The data showed that the 1% Critical Load was exceeded in future years within the SAC.

The report by Kairus Ltd recommended that, given the sensitivity of the habitats found within Epping Forest SAC to nutrient nitrogen and acid deposition, an Air Quality Mitigation Strategy is developed and implemented prior to approval of the Waltham Forest LP1.

This document is the Air Quality Mitigation Strategy. It provides a mechanism to mitigate for adverse effects on air quality within the SAC arising from traffic generated by the LP1 in-combination with growth in neighbouring areas.

[7] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[8] Air Quality Regulations 2010 – Statutory Instrument 2010 No. 1001

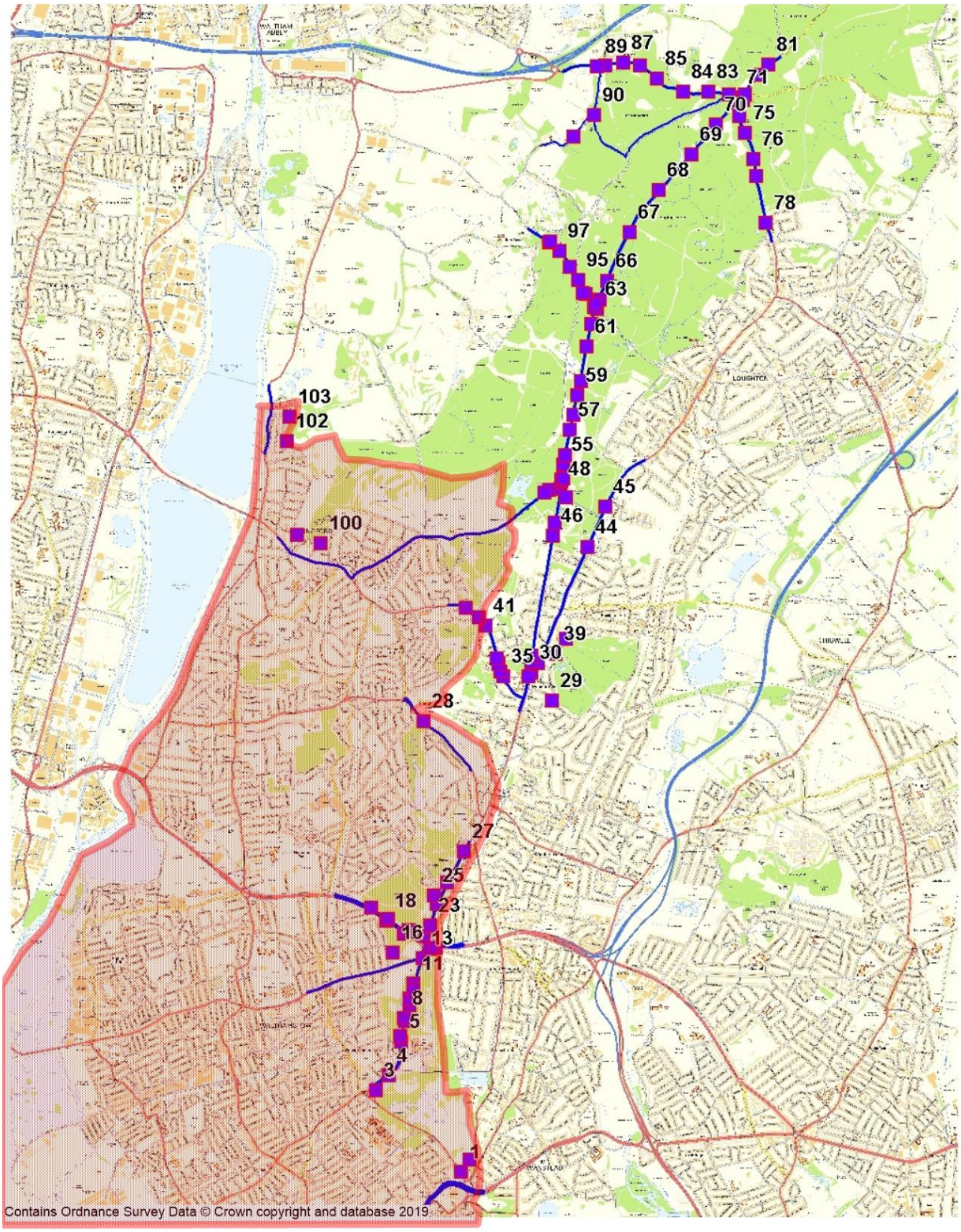

Figure 3.1: Location of all Receptors and Where Impacts on NH_3 are Potentially Significant

4 Potential impacts from the LP1 on air quality and Epping Forest SAC

4.1 Introduction

This chapter describes the potential ecological impacts on Epping Forest SAC with reference to the air quality assessment undertaken in support of the HRA (discussed in Chapter 3).

4.2 Potential Impacts

The air quality modelling shows that the screening criterion of 1% of the Critical Load[9] was exceeded in future years within the SAC. Natural England guidance states that the next step is to check that the qualifying habitats for which Epping Forest SAC is designated for (i.e. Atlantic acidophilous beech forests, Northern wet heaths or European dry heaths) are located within the parts of the SAC identified as predicted to 1% criterion.

The vegetation which comprises Atlantic acidophilous beech forests within Epping Forest SAC falls within the following three UK National Vegetation Classification (NVC) community types:

- W14 *Fagus sylvatica -Rubus fruticosus* woodland
- W15 *Fagus sylvatica – Deschampsia flexuosa* woodland
- W10 *Quercus robur – Pteridum aquilinum* -Rubus fruticosus

The vegetation which comprises Northern wet heaths within the Epping Forest SAC predominately comprises the following NVC community M16 *Erica tetralix - Sphagnum compactum* wet heath, whereas the European dry heaths community is H1 *Calluna vulgaris - Festuca ovina* heathland.

Although no NVC survey data is available for Epping Forest SAC, information on the general distribution of the qualifying habitats within the SAC was obtained by reviewing the following:

- aerial photography[10];

[9] used as advised within the IAQM document '*A guide to the assessment of air quality impacts on designated nature conservation sites'* to screen for potentially significant effects

[10] Google Earth Pro Version 7.3.3.7786

- information on the Natural England website[11] [12];
- the Priority Habitat Inventory datasets available on the MAGIC website;[13] and
- veteran tree and scarce species data from the Epping Forest Conservators.

This review found that the predicted exceedances are located within either 'Lowland Mixed Deciduous Woodland', 'Wood-Pasture and Parkland', or 'Lowland Heathland' Priority Habitats. These Priority Habitats include the Annex I beech woodland and heathland habitats for which the SAC is designated.

It is noted that these Priority Habitat categories include other woodland habitats types that are not qualifying SAC habitats. For instance, the previous surveys undertaken for Meridian Water[14] found that the habitat within 200m of the A406 was oak woodland which they concluded is not a qualifying feature of the SAC[15]. No veteran trees or scarce species were recorded within 200m of the A406 and it is likely that the vegetation for which the site is designated is limited within this part of the forest. However, veteran trees and/or scarce species are abundant elsewhere in the forest and Atlantic acidophilous beech forest habitat is the primary reason why this SAC was selected for designation. Therefore, it is likely that qualifying habitats occur in the majority of the predicted exceedance points elsewhere in the SAC.

Exceedance of the 1% criterion of Critical Loads for NH_3 concentrations, nutrient nitrogen and acid deposition could have a direct or indirect effect on qualifying habitats within the SAC. Direct effects arise when a pollutant is dispersed in the air and taken up by vegetation causing an adverse impact on plant health. Indirect effects occur when the pollutant settles onto the ground causing eutrophication or acidification of the soil. These effects can lead to changes in species

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[11] Natural England website: https://designatedsites.naturalengland.org.uk/sitegeneraldetail.aspx?SiteCode=UK0012720&SiteName=Epping%20Forest%20SAC&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAArea=

[12] Natural England website: https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1001814&ReportTitle=Epping%20Forest%20SSSI

[13] www.magic.defra.gov.uk

[14] Cited in Aecom 2020 New Enfield Local Plan 2041: Integrated Impact Assessment https://new.enfield.gov.uk/services/planning/integrated-impact-assessment-scoping-report-2020-planning.pdf

[15] Although it is noted that Natural England's Supplementary Advice on Epping Forest states that the oak woodland community W10 forms part of the H9120 Atlantic acidophilious beech forest. The NVC data on the Meridian water project cannot be sourced and therefore it was not possible to verify which woodland community the recorded adjacent the A406.

composition due to encroachment of plants that favour higher nitrogen levels. Without mitigation, the increase in air pollutants as a result of traffic generated by the LP1 in-combination with neighbouring plans is predicted to have an adverse effect on the integrity of the qualifying features within the SAC.

5 What needs to be achieved to mitigate predicted effects on habitats and by when?

5.1 Introduction

This chapter identifies what needs to be achieved in order to avoid a potential adverse effect on habitats within Epping Forest SAC and by when. Chapter 6 sets out the measures to be implemented in order to minimise emissions to air from development.

5.2 What needs to be achieved?

The air quality impact assessment completed by Kairus Ltd[16] predicts that in 2021 traffic generated by the LP1 will exceed 1% of the critical load for NH_3 at a number of receptor locations, however in 2031 and 2041, the 1% threshold will be exceeded at all locations. Traffic generated by the LP1 is also predicted to result in an increase in acid deposition above the 1% criteria at receptor 1 (see Figure 3.1) in 2041.

To mitigate the predicted effects, traffic related emissions of NH_3 need to be less than 1% of the critical load i.e. 0.01 µg/m^3.

5.3 Timescales

Based on the 2021 model results there needs to be a reduction in NH_3 emissions of up to 15% i.e. 0.15 µg/m^3. This increases to a 76% reduction under the 2031 assessment year (0.76 µg/m^3) and up to 79% reduction under the 2041 assessment year (0.79 µg/m^3).

In order to avoid increases in emissions as predicted by the air quality modelling, it is anticipated that the most effective measures to be implemented would be those that would result in both a reduction in petrol and diesel vehicle trips and an increase in the uptake of fully electric vehicles (EV).

To prevent a significant impact in 2026, a reduction in petrol/diesel vehicle trips of between 10-20% would need to be achieved (i.e. over the 10% reduction, which achieves the required

[16] Kairus Ltd (April 2021) Air Quality Modelling To support Waltham Forest Local Plan Habitats Regulations Assessment Appendix 4 of the Waltham Forest Submission Local Plan Part 1 Habitats Regulations Assessment Report (ClearLead Consulting Ltd, April 2021) available here: https://www.walthamforest.gov.uk/content/local-plan

reduction in emissions under the 2021 scenario but does not achieve the necessary reductions under the 2031 scenario).

To prevent a significant impact by 2036 a 30% reduction in petrol/diesel vehicle trips would need to be achieved.

6 Measures to Improve Air Quality Within Waltham Forest

6.1 Introduction

This chapter sets out the mitigation measures which are proposed to address emissions to air from new development within Waltham Forest. Some measures are already underway but due to the nature of the traffic modelling on which the air quality assessment has been based (using the LoHAM model), the benefits to air quality that these measures are achieving are not reflected in the predicted air quality in the traffic and air quality modelling. This chapter includes discussion of the policies within LP1. Links are provided to the relevant LP1 policies which are reproduced in Appendix D.

6.2 Increasing active travel and limiting traffic

Waltham Forest Council is committed to meeting the Mayor of London's Transport Strategy objectives to deliver a transport network that improves the health and wellbeing of all Londoners, and to achieve an 80% mode share for active and sustainable travel by 2041. A significant shift towards walking, cycling and public transport use is therefore needed over the next 20 years. In order to achieve this, the Council has been working to deliver '15-minute neighbourhoods'[17] as an effective way of creating healthier, active communities, and people-friendly places.

'15-minute neighbourhoods' give people the ability to meet most of their daily needs within a 15-minute walk or cycle from home, with safe cycling and local transport infrastructure. Development in the borough over the next 20 years will be expected to contribute to these aims by enhancing active and public local transport networks, and minimising the need to travel through good design and location.

Promoting sustainable transport, along with the TfL's Liveable Neighbourhoods programme approach, have also been at the forefront of the borough's 'Enjoy Waltham Forest' programme, which has delivered significant change in how people use their streets. Where street changes have been delivered to reallocate street space for people who travel by foot or by bicycle,

[17] In line with the Council's Public Service Strategy (2020) and the GLA High Streets – '15-minute cities'. Available at: https://www.london.gov.uk/coronavirus/londons-recovery-coronavirus-crisis/recovery-context/high-streets-15-minute-cities#acc-i-61474

residents spend an extra 32 minutes per week walking, or 9 minutes cycling[18] (see LP1 Policy 63 'Active Travel' for further details).

Wayfinding through the 'Enjoy Waltham Forest' programme is a key tool for enabling a modal shift towards walking, cycling, using active travel to access public transport; and providing real time information on services. The Council is committed to ensuring that new development contributions should improve the experience of walking and cycling, and the improvement of wayfinding to link key infrastructure, transport nodes, green spaces and canal towpaths where appropriate.

In the Borough, nearly 65% of Nitrogen Oxide (NOx) emissions come from road traffic[19]. Consistent with the Council's Climate Emergency Strategy, LP1 seeks to satisfy the target of a 30% further reduction in road transport[20] by 2030 and achieve the National Air Quality objective of reducing NOx emissions. The air quality in terms of NOx emissions is expected to improve between 2013 – 2020 based on forecasts for 2020 (GLA, 2016)[21]; and new developments are expected to contribute to and enhance sustainable transport initiatives (e.g. Car Club, Electric Vehicles and Bikes), safe road crossings where needed; and high quality placemaking with seating, signage and increased tree and vegetation coverage.

While Waltham Forest enjoys a higher than average mode share for active travel across outer London, there is significant potential to increase this number, and it is estimated by TfL that 240,700 more trips could be cycled every day in the borough, and 73,400 could be walked[22].

Waltham Forest Council is committed to creating people friendly streets and neighbourhoods that actively encourage walking, cycling and using public transport. Waltham Forest Council has

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[18] Aldred *et al*., (2019) Impacts of an active travel intervention with a cycling focus in a suburban context: One-year findings from an evaluation of London's in-progress mini-Hollands programme. Transportation Research Part A. Available at: https://reader.elsevier.com/reader/sd/pii/S0965856417314866?token=8CA31F6A69816909469AC0D148D8343CF17737593DA3C8C4B2072E9ECEC0C6B0D7853C0BE556443ECB97FA364B15163F&originRegion=eu-west-1&originCreation=20210420142811

[19] GLA (2013), Air Quality Data. London Atmospheric Emissions Inventory (LAEI). Available at: https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory-2013

[20] Waltham Forest Climate Emergency Commission recommendation in The Waltham Forest Climate Emergency Commission: A Call To Action report: https://www.walthamforest.gov.uk/sites/default/files/2021-11/Waltham%20Forest%20Climate%20Emergency%20Brochure.pdf

[21] GLA (2016), London Atmospheric Emissions Inventory (LAEI). Available at: https://data.london.gov.uk/air-quality/

[22] Analysis of Cycling Potential 2016 (2017) Policy Analysis Report March 2017. Transport for London. Available at: http://content.tfl.gov.uk/analysis-of-cycling-potential-2016.pdf

implemented multiple 'low traffic neighbourhoods' (LTNs), which are area-based interventions that remove through motor traffic from residential streets.

In the past two years the Council has been working with London Borough of Newham (LBN), developing and submitting funding bids to the Transport for London (TfL) Liveable Neighbourhoods programme for improvements in South Leytonstone, as well as Forest Gate and Maryland[23].

LP1 policies 63 'Active Travel' and 64 'Public Transport' promote walking and cycling and use of public transport in new developments and require developments to provide facilities and contributions as necessary.

Consistent with the aims of the TfL Walking and Cycling Action Plans, the borough is committed to delivering continued street improvements that enable people to build active travel into their everyday lives and achieve the Mayor of London's aim of 15 minutes of active travel each day by 2041. Central to achieving this aim is the removal of barriers that deter people from walking and cycling, including concerns around road danger, high traffic volumes and speeds, lack of dedicated infrastructure, and poor legibility to support journeys. As an example of this, in recent years, through the 'Enjoy Waltham Forest' programme the Council has evidenced the importance of prioritising in new developments the need to maintain road users away from cars, where appropriate. Figure 6.1 shows the benefits the Enjoy Waltham Forest programme has achieved by delivering high quality infrastructure, interventions and training, which provides strong evidence of increased residents' levels of cycling and walking. Further details of the Enjoy Waltham Forest programme are set out in Box 6.1.

[23] Enjoy Waltham Forest website: https://enjoywalthamforest.co.uk/about-mini-holland/

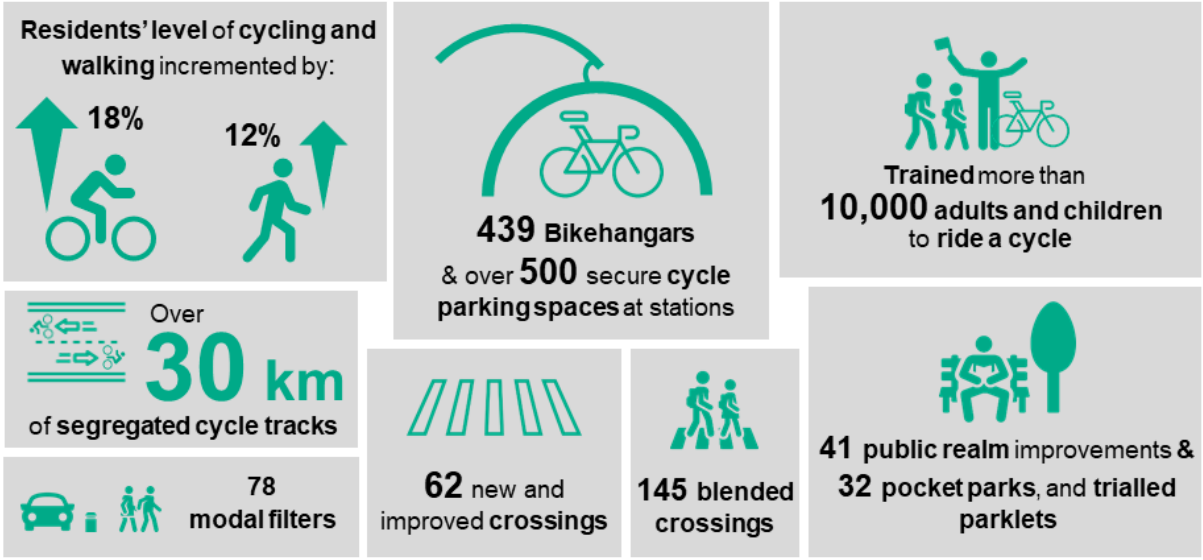

Figure 6.1 The 'Enjoy Waltham Forest' Programme Achievements[24]

A study by the University of Westminster (Goodman et al, 2020[25]) found that the numbers of cars and vans are falling in mini-Holland intervention areas, particularly those involving a low traffic neighbourhood. This adds to evidence that these interventions lead to traffic evaporation (London Borough of Waltham Forest, 2017) and a mode shift away from cars. The work and ethos of the Mini-Holland and Enjoy Waltham Forest programmes will be continued through the 15-minute neighbourhoods and low traffic neighbourhoods concepts within the Waltham Forest LP1, to ensure a multitude of benefits are delivered alongside, sustainable housing growth[26].

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[24] Walking and Cycling Account 2019. Available at: https://enjoywalthamforest.co.uk/wp-content/uploads/2020/05/Walking-and-Cycling-Account-2019.pdf Impacts of an active travel intervention with a cycling focus in a suburban context: One-year findings from an evaluation of London's in-progress mini-Hollands programme, Rachel Aldred, Joseph Croft and Anna Goodman, Transportation Research Part A: Policy and Practice, June 2018

[25] Goodman, Urban and Aldred (University of Westminster) (2020) The Impact of Low Traffic Neighbourhoods and Other Active Travel Interventions on Vehicle Ownership: Findings from the Outer London Mini-Holland Programme

[26] Transport Topic Paper: Supporting Waltham Forest's New Local Plan (February 2021) London Borough of Waltham Forest, Arup.

Box 6.1: Mini Holland / Enjoy Waltham Forest Case Study

The Mini-Holland programme began in 2013 and ran until March 2020[27]. It aimed to encourage increased sustainable travel through increased cycling and walking permeability. In 2015, the 'Enjoy Waltham Forest' programme was also set up as an extension of the Mini-Holland scheme[28]. Funding was secured from TfL and used to upgrade the road network, pedestrianise high streets and improve walking connectivity. Specific measures achieved include[28] [29]:

- Introduced over 29km of segregated cycle track;
- Installation of 40 modal filters to ensure safe pedestrian and cycle access;
- 15 new pocket parks and 700 new trees planted;
- 7 cycle hubs created at key stations, connecting tube and cycle routes for commuters;
- 1200+ bike stands and 300 bike hangers, to provide safe and secure overnight bike storage;
- 50 schools have engaged with the project, with an estimated 7,500 children trained in cycle safety;
- 37 public realm improvements.

Pocket Park on Grove Green Road, Leyton

The schemes have resulted in a network of cycling routes connecting the Borough as well as localised neighbourhood improvements in Village Schemes and Town Centre Schemes. Village Schemes are in Walthamstow Village, Blackhorse Village, and the Hoe Street, Wood Street area and Markhouse area. They are a series of highway and public realm improvements in the residential areas surrounding Walthamstow Town Centres. The aim of the Villages is to provide cleaner, healthier, greener and safer streets, encouraging residents to enjoy the area they live in. To achieve this modal filters, one-way systems, timed road closures, junction improvements, new and improved crossings, Sustainable Urban Drainage Systems (SUDS), public spaces and pocket parks with seating, trees and planting have all been introduced to enhance the public realm, reduce rat running and improve safety.

Lea Bridge Road bridge before and after the widening

[27] Case Study: London Mini Hollands (2020) Department for Transport. Available at: https://www.gov.uk/government/case-studies/london-mini-hollands

Box 6.1 continued: Mini Holland / Enjoy Waltham Forest Case Study

Town Centre Schemes have also been delivered in Leyton Town Centre, Leytonstone Town Centre, Chingford Town Centre and Highams Park Town Centre. By reducing through traffic and improving pedestrian and cycling infrastructure and accessibility, the schemes create thriving high streets, encouraging residents to make use of their local shops and amenities.

Community planting at Essex Road pocket park

The schemes have resulted in the implementation of 31 pocket parks across the borough. Pocket parks are small areas of contained planting or green space, which transform previously unused areas into pleasant places for residents to enjoy.

Figure 6.2 shows the Council's existing and future strategic cycle network as set out in the 2020 Vision for Cycling in Waltham Forest[30]. The network will provide a safe, attractive cycle network that meets the Mayor of London's aim for 70% of residents to live within 400 metres of the London-wide cycle network. Alongside the strategic network, the Council aims to deliver a permeable, low-traffic cycling network within residential areas. When combined, the network will provide comprehensive connections between homes, town centres, growth areas and employment areas, schools and the wider cycle network.

While the Borough has strong connections to Underground, Overground, National Rail, bus and active travel networks, significant improvements are needed to ensure infrastructure is able to support changing demands of residents, businesses and visitors. To support the Council's ambitious plans for regeneration and growth, the Council's Transport Infrastructure: Growth &

[28] About Enjoy Waltham Forest. Enjoy Waltham Forest. Available at: https://enjoywalthamforest.co.uk/about-mini-holland/

[29] London Borough of Waltham Forest (28 May 2020) Air Quality Annual Status Report for 2019

[30] 2020 Vision for Cycling in Waltham Forest https://www.readkong.com/page/cycling-in-the-london-borough-of-waltham-forest-enjoy-3083072

Investment Strategy (2018) and LIP3 (2019) has identified a number of major rail and bus projects to improve the local and London-wide connectivity. In addition the borough is set to benefit from its proximity to the Elizabeth Line and, in future, Crossrail 2 which will unlock development potential in the south and the west of the borough.

Priority measures for the Council include increasing capacity of existing public transport, as well as expanding the current network. It is also essential that the public transport network meets the needs of a changing population, delivering a fully accessible step-free network, and accessible links to public transport hubs across Waltham Forest. The Council will continue work with partners to reinstate the rail service at Hall Farm Curve. This short stretch of track could meet the increasing need to connect the Borough to Stratford City, the Olympic Park and other major regeneration areas in the Lower Lea Valley.

In accordance with LP1 Policy 64 'Public Transport', new development will be expected to mitigate the impact on local public transport services, as well as improving connectivity to areas that are under-served by public transport, in line the 'Planning a Smarter, Greener Bus Network' in the Council's Transport Infrastructure: Growth & Investment Strategy (2018) and with the Community Infrastructure Regulations (2010). This requirement will apply, for example, where there are no bus network routes or an area is underserved by public transport. The objective in this case should be to improve connectivity and operation of the bus network (including bus priority works, provision of new or extended bus routes, or increasing frequency of existing services).

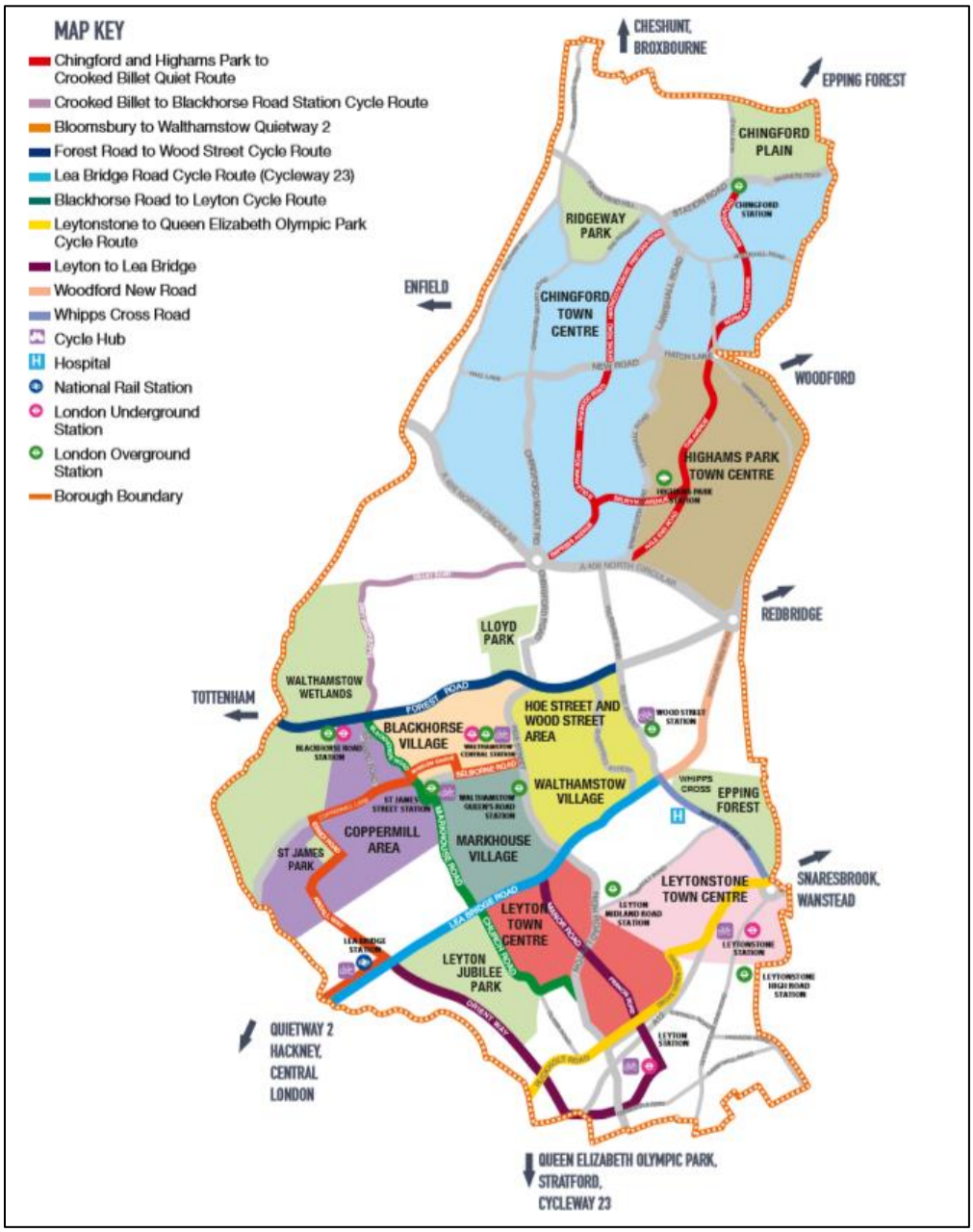

Figure 6.2 Waltham Forest Existing and Future Strategic Cycle Network[31]

[31] 2020 Vision for Cycling in Waltham Forest https://www.readkong.com/page/cycling-in-the-london-borough-of-waltham-forest-enjoy-3083072

6.2.1 Campaigns to raise awareness of air quality issues and the benefits of more sustainable travel

The Enjoy Waltham Forest programme has delivered a range of projects and campaigns to encourage walking and cycling in the Borough and reduce motorised vehicle use. Examples are listed in boxes 6.2 and 6.3.

Box 6.2: Waltham Forest Campaigns to Encourage Cycling and Walking by Residents

- **Wayfinding** around the borough that features walking and cycling directions, journey times and key destination information, to encourage walking and cycling to a destination as an attractive alternative. The wayfinding strategy is being rolled out across the entire network, which will improve the experience of walking and cycling in the Borough as well as providing real time information on public transport services.
- Waltham Forest Council launched a **staff e-bike pool scheme** with Freebike in December 2018. Over 175 Council staff from 24 departments have benefited from e-bikes to carry out their daily duties around the borough, including site visits, attending meetings and travelling between offices. After a successful trial, the Council and Freebike launched a public scheme in the south of the borough in September 2019. Over 50 bikes are available across Leyton, Leytonstone and Walthamstow to make short journeys by e-bike [32].
- Offering **free cycle training**, through Cycle Confident, to anybody who lives, works or studies in the Borough to ensure everyone can learn the skills needed to cycle confidently and safely. free Easter, October half term and Summer Cycling Schools are also provided to improve children's cycling skills and confidence.
- An **All Ability Cycling Club** ran in Lloyd Park in Waltham Forest in 2018 and 2019 but was halted in 2020 due to the Covid-19 pandemic. The sessions were led by trained instructors, who provide help with a range of cycles including relaxed tricycles, recumbents, wheelchair bikes, hand-cycles, and side-by-side bikes.
- Working in partnership with Bikeworks and NELFT (North East London Foundation Trust) the Enjoy Waltham Forest team developed the **Cycling for Health** programme which focused on referred residents with mental health problems. The programme invited 15 participants to join a 10 week scheme which taught them cycle skills, basic cycle maintenance and route planning. The programme incentivised attendance through offering a free cycle to anyone who attended eight or more sessions – 12 participants received a free cycle. The programme was due to continue into 2020.
- Regular **Dr Bike maintenance sessions** are also provided free of charge as well as free maintenance courses for residents and those who work and study in the borough.

[32] www.london.freebike.com

- Over **30 community bikes** are available for loan to anybody who lives, works or studies in the borough. For a small refundable deposit, the bikes are available to loan for one month. During the summer months the community cycle loan scheme was at full capacity in 2019[33].
- The **Community Walking and Cycling Fund** was set up by Waltham Forest Council to provide financial assistance to community groups who are working to encourage and facilitate residents of Waltham Forest to walk and cycle more. 10 community projects have been awarded up to £2,500 each including CarryMe Bikes – Baby Biking, Fatimah Elizabeth Cates & Cycle Sisters, Go Further Cycling – Epping Forest E-Bike Adventures, Higham Hill COG – BMX for All, London Playing Fields Foundation – Green Hearts, Walk and Talk for your Life, Queens Boundary Community, Salaam Peace, Waltham Forest Thamil Sangam, and StowSteppers.
- Community groups in the Borough hosted over 30 street parties over the **World Car Free Day** 2019.
- The Council supported over 75 individual **street party events** in 2019. Street parties are road closures agreed by the Council and organised by the local community.
- **STARS** is a pan-London TfL programme and in 2019 Waltham Forest had 57 STARS accredited schools. 52 primary schools from across Waltham Forest joined thousands of children across the country to celebrate the benefits of walking during the 2019 Walk to School Week.
- A **School Street** is an initiative to improve road safety, reduce congestion and lower air pollution outside of schools. The schemes make it easier and safer for pupils and their parents to walk and cycle to school and improve local air quality. To do this, one or more of the roads surrounding a school are temporarily closed to most vehicles for a short period at the start and end of the school day. In September 2019 Waltham Forest introduced its first two School Street schemes. These have benefitted over 1,500 pupils across four of the Borough's schools and the scheme was due to expansion in 2020.
- **Mini Tour de Waltham Forest** and **Teen Tour de Waltham Forest** events took place for children and teens within the Borough in 2019.
- **Creating safer streets** through the Enjoy Waltham Forest programme including infrastructural improvements and behaviour change programmes have been developed to improve road safety for all road users. This has also included cracking down on illegal, dangerous and careless behaviour that creates risk on the Borough's roads and delivering Community Roadwatch sessions.

[33] www.enjoywalthamforest.co.uk/cargo-bike

Box 6.3: Waltham Forest Measures to Encourage Cycling by Businesses

Waltham Forest is the first Council in the UK to facilitate the introduction of a Zero Emissions Delivery (ZED) service in its borough. The service primarily targets local businesses and Council services and utilises cargo bikes, trikes, and electric vehicles to courier goods within the borough and beyond. The scheme is currently delivering for over 50 local businesses ranging from coffee roasters, bakers and an organic farm to independent newspapers and magazines.

The Council itself is also embracing ZED, with the library service using it to deliver books between libraries and to housebound residents, as well as for the transfer of musical instruments for tuition classes, and for the delivery of educational tools to schools.

By 2019, ZED was working with over 50 local businesses, as well as the Council to deliver goods. By reducing the need for large vehicles and multiple vans to travel into and around the borough, ZED will be further contributing towards reduced congestion and pollution whilst improving road safety[34]. ZED is now working towards partnering up with a national parcel delivery service to provide a last mile delivery solution in Waltham Forest and neighbouring boroughs.

In addition to ZED, five cargo bikes are also available for hire to anybody who lives, works or studies in Waltham Forest. The cargo bikes are available for two to three weeks and is proving a popular scheme with long waiting lists[35].

6.3 Transport Assessments

LP1 Policy 65 'Development and Transport Impacts' requires the impacts of new developments on the transport network to be fully assessed and will ensure development contributes to encourage walking, cycling and public transport use. Transport Assessments, Travel Plans and Construction Logistics Plans will be required in support of planning applications.

[34] Enjoy Waltham Forest Walking and Cycling Account 2019 https://enjoywalthamforest.co.uk/about-mini-holland/attachment/walking-and-cycling-account-2019/

[35] www.enjoywalthamforest.co.uk/cargo-bike

6.4 Managing Parking

As outlined in the TfL's 'Healthy Streets for London' Report, effective management of parking and alternative transport options is essential to reducing private car travel and improving air quality. The Waltham Forest car parking standards (included in Appendix 1 of LP1) are intended to work towards the Mayor's 2041 target of 80% trips made by sustainable transport modes, reducing the level of car use and ownership by 12% and increasing the level of sustainable transport modes by 55%; and reducing the CO_2 emissions. These targets are also part of the Council's Transport Infrastructure: Growth & Investment Strategy (2018) and LIP3 (2019). Waltham Forest Council is committed to accelerating the London-wide trends towards car-free and low-car development, and have established a strong policy within LP1 to reflect this along with maximum car parking standards: Policy 68 Managing Vehicle Traffic states that all new residential developments (major and minor) in the borough should be car-free.

Between 2016 and 2018, 48 car-free developments in Waltham Forest were secured through Section 106 agreements, delivering an average parking ratio of 0.1 spaces per unit across 3,043 new homes. This follows an upwards shift in people travelling by foot, bicycle and public transport in Waltham Forest, and a 5% reduction in the number of car kilometres driven on Borough roads since 2016 (the third highest decrease across all London boroughs).

TfL's PTALs[36] scores and existing borough's Controlled Parking Zones (CPZs) show that the North of the Borough has a lower accessibility level to public transport, and a higher car dependence, where between 0%-37.5%[37] of the population do not have access to a private vehicle, compared with the South and Central Area with 50%-75% not having access to a private vehicle. The Council recognises that less-well connected areas may require some levels of car parking within new developments, and this will be reflected within robust assessments of relevant local factors including potential public transport provision, as required by LP1 Policy 68.

The vision for the North of the Borough within LP1 contains the following aspirations:

> *"North Waltham Forest will enhance its network of distinctive town centres where existing neighbourhoods and new developments integrate to create new liveable places. New development will contain a diverse mix of new homes featuring improved public realm, enhanced walking and cycle access and legibility and connectivity. The area will feature new*

[36] TfL's PTALs combine walk times from a chosen point to the network (stations and bus stops, for example) together with service frequency data at these locations. This provides an overall access index which can be allocated to nine accessibility levels between 0 and 6b Available at: https://tfl.gov.uk/info-for/urban-planning-and-construction/planning-with-webcat/webcat

[37] Office for National Statistics (ONS). Census, 2011. Percentage of all households at MSOA level without access to a car or van.

workspace, transport, social infrastructure and diversified town centre uses for the local community and visitors. The North forms the gateway to Epping Forest and its richly diverse ecology and contrasting natural landscapes. In this setting, the five centres will evolve into vibrant employment, cultural and retail hubs which will stitch the north of the borough into the vibrantly metropolitan fabric of Waltham Forest."

The strategy for the North of the Borough is to create more sustainable neighbourhoods where residents can meet their daily needs via walking and cycling and reduce the need to travel. This strategy should help to reduce car use within the North of Waltham Forest where at least 3,400 new homes are planned during the LP1 plan period.

LP1 Policy 11 'North Waltham Forest' sets out where investment is sought which will increase the sustainability of neighbourhoods across the North and which is supported by Waltham Forest's inward investment work. As well as new homes, 1,950 new jobs are planned for delivery in North Waltham Forest.

In North Chingford and South Chingford/Chingford Mount, developments which will contribute to regeneration of North Chingford Centre and to the development of a community hub focused at South Chingford District centre is supported, as well as contributing to connectivity, diversification of commercial space, new employment and enhancing public space.

In the Sewardstone Road Strategic Location, investment is sought in improving public realm, walking and cycling accessibility, connectivity, permeability and legibility to Ponders End, North Chingford District Centre and South Chingford / Chingford Mount, in addition to other identified routes. This area will also benefit from investment sought in the North Circular Strategic Location to provide opportunities to link to the neighbouring large scale regeneration and infrastructure investment at the adjoining Meridian Water, London Borough of Enfield which contains a new rail station. Investment in the North Circular Strategic Location is also supported which will strengthen the A406 corridor to improve the design of the area, making safer and better functioning connections with local places, activity hubs and communities.

6.5 Car Clubs

Car clubs provide an important role in supporting people to transition away from car ownership, especially when paired with wider incentives, such as management of residential parking, improvements in public transport, and new cycling and walking facilities. Research by ComoUK in 2018 showed that 58% of car club members based in London were less likely to purchase a private car after having joined a car club[38].

6.6 Electric Vehicles

The Government intends to end the sale of petrol and diesel cars by 2030[39]. New cars and vans are to be fully zero emissions (at tailpipe) from 2035. Hybrids would continue to be able to be sold between 2030 and 2035 "if they have the capability to drive a significant distance with zero emissions". This Government initiative is likely to increase the use of Electric Vehicles (EV) and should have a lasting positive effect on air quality in the longer term as diesel and petrol cars are phased out of use.

Waltham Forest Council has stated within the LP1 that accelerated uptake of electric and ultra-low emission vehicles is essential to delivering improvements to air quality and a zero-emission transport network in Waltham Forest. EV ownership in Waltham Forest is expected to rise by 500% by 2025 (411 to 2,457) and the Council aims to deliver full coverage of charging infrastructure by 2022. Although new development is expected to minimise vehicle travel, when it increases resident and servicing vehicles on the road network, development will be expected to contribute to the uptake of EVs, and delivery of charging infrastructure.

LP1 Policy 69 'Electric Vehicles (EV)' requires new developments to provide infrastructure for electric vehicle charging where it provides car parking or is predicted to increase vehicles on borough roads. Policy 69 also requires such developments to contribute to the borough's publicly accessible rapid charging and on-street charging network, especially where development is served by electric vehicles for taxis and deliveries and servicing.

Data shows that over 550 electric vehicles are currently registered in the borough and TfL's delivery plan predicts that this could increase to 6,500 by 2025.

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[38] ComoUK (2019) Car Club Annual Survey for London 2017/18. Available at: https://como.org.uk/wp-content/uploads/2019/09/London-Car-Club-Survey2017_18.pdf

[39] https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030

The numbers of EV registered within the postcode areas E4 and E17 covering LBWF has been identified from DVLA datasets as shown in Figure 2.2 below:

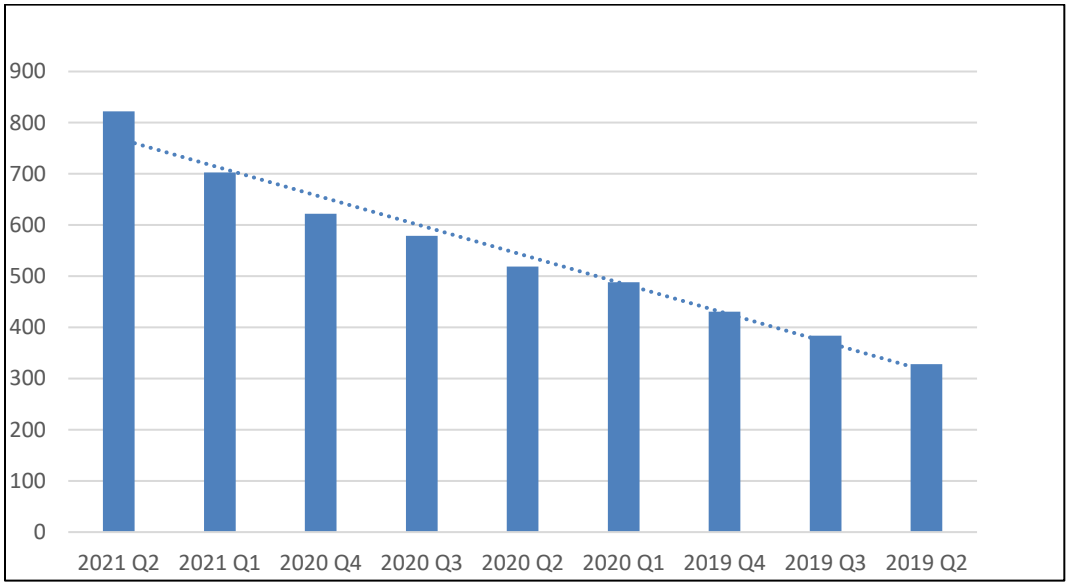

Figure 6.3: Licensed ULEV's in E4 and E17 Postcode

The most recent data (Figure 6.3) indicates growth of over 100 vehicles per quarter indicating that the high levels of uptake anticipated in the LBWF Local Plan and in the air quality model is likely to be achieved or exceeded.

London Borough of Waltham Forest Council recognises that as the majority of homes in the borough do not have access to off-street parking, a substantial number of on-street electric charging points are required to support the update of electric vehicles. The Council has therefore developed an Electric Vehicle Charging Point Strategy in order to meet demand and targets.

The Waltham Forest Electric Vehicle Charging Point Strategy sets out measures and targets to support electric vehicle recharging through to 2025[40]. The Strategy provides guidance on identifying the appropriate charging infrastructure, located in the right places, to support electric vehicle uptake by the growing population and meet future demand for charging facilities across the borough.

[40] London Borough of Waltham Forest Electric Vehicle Charging Point Strategy 2020 – 2025 accessible here: https://www.walthamforest.gov.uk/content/electric-vehicle-charging-points

The key objectives of the Electric Vehicle Charging Point Strategy are[41]:

- Continue to deliver an electric vehicle charging network that meets the demands of residents, businesses and visitors;
- Designing sites that take into consideration other road users, particularly pedestrians;
- Suitable coverage of the borough by 2025 (the target is for 80% of residents and businesses to be within 250m of a charging point by 2025);
- Ensure the charging network has capacity for further expansion;
- Encourage the uptake of electric vehicles through initiatives and public engagement; and
- Identify income opportunities that will lead to the provision and maintenance of charging points becoming cost neutral to the Borough.

As of March 2021, Waltham Forest Council has installed 206 public electric vehicle charging sockets in Waltham Forest. This includes 10 22kW dual-socket charging points, 31 7kW dual-socket charging points, 120 residential lamp column charging points and four 50kW+ rapid charging points[42].

The Mayor of London has also pledged that almost all cars and vans are to be zero emission by 2050[43]. This includes delivering central London and town centre zero emission zones from 2025, creating a zero emission zone in inner London by 2040 and a London-wide zone by 2050.

All new double-deck buses will be hybrid, electric or hydrogen. By 2037 at the latest, all 9,200 buses across London will be zero emission.

6.7 HGVs, Freight, Deliveries and Servicing

6.7.1 HGV Route Management

As discussed within the AWP traffic analysis technical paper in Appendix B, HGV route management aims to keep as much HGV traffic out of the Borough as possible. Vehicles of this nature are directed to use the following trunk roads so they cause as little impact on the Borough as possible and only make the part of their journey to their final destination using the Borough's road network:

[41] London Borough of Waltham Forest (28 May 2020) Air Quality Annual Status Report for 2019 accessible here: https://www.walthamforest.gov.uk/content/air-quality

[42] Waltham Forest Council website: https://www.walthamforest.gov.uk/content/electric-vehicle-charging-points

[43] https://www.london.gov.uk/what-we-do/transport/green-transport

- M25 – To the North of the Borough cutting through The Epping Forest at Bell Common (where it is in Tunnel). The preferred routing for HGV's is either to use the A10 or M11 to access the Borough;
- M11 – Drops down the eastern side of Waltham Forest Borough;
- A10 – Drops down the western side of Waltham Forest Borough:
- A406 (North Circular Road) runs east to west through the Borough dividing North and South linking up with the M11 and M25 to the East; and
- A12 Cuts across the South of the Borough; links with the M11, A406 and M25.

The Borough HGV routes are shown in figures 6.4 and 6.5 below:

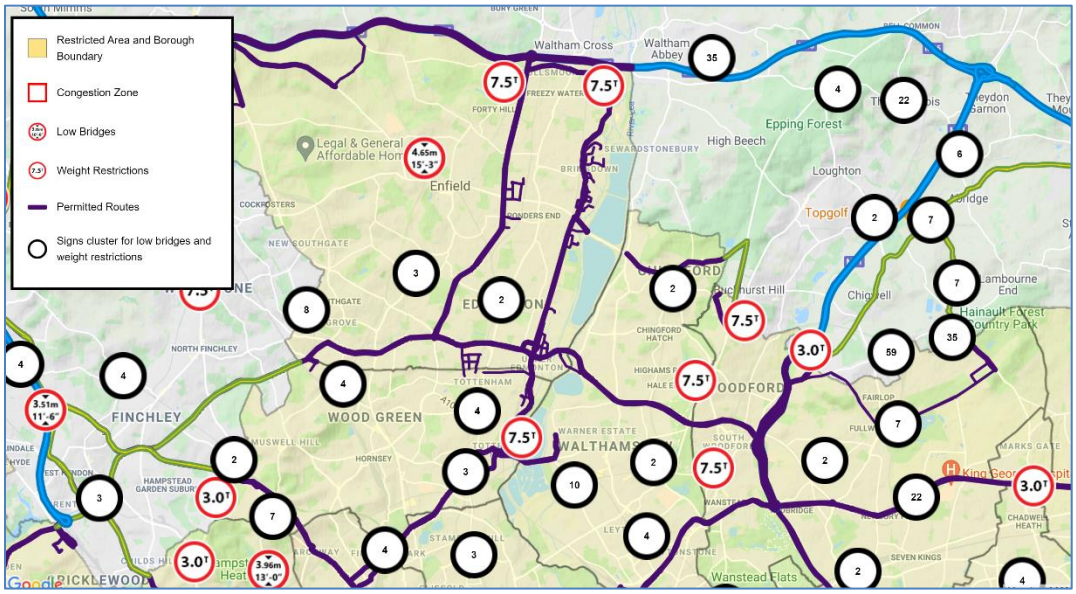

Figure 6.4 LBWF HGV Routes – wide area

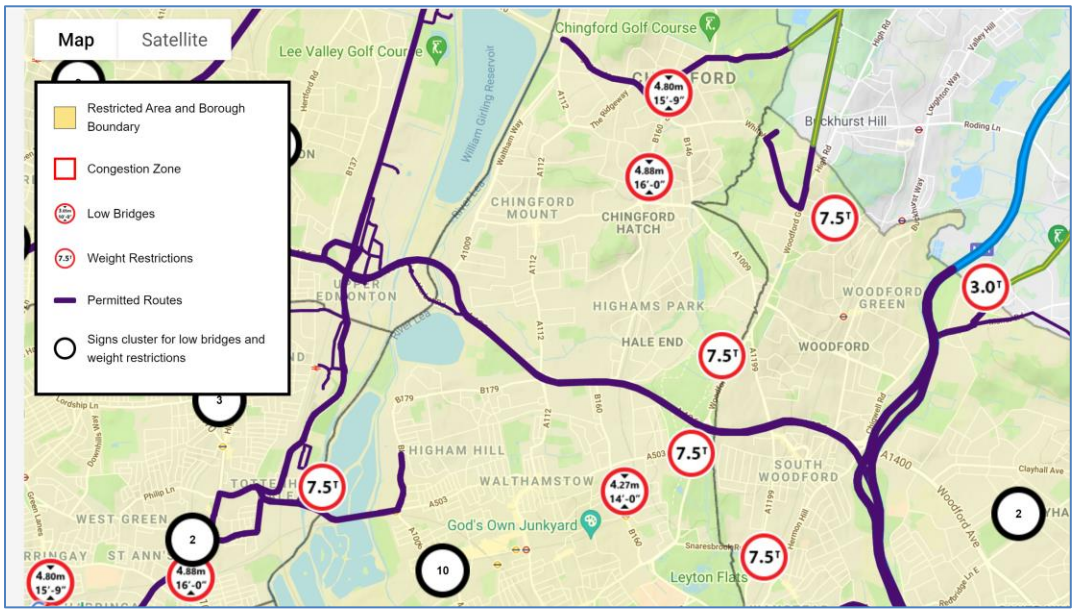

Figure 6.5 LBWF HGV Routes – central area

HGV route management ensures that high emitting HGV's are mainly kept away from the Epping Forest SAC and on routes such as the A406 North Circular Road, the A1055 and A10 to the West and the M11 to the East where more intensive traffic management can be implemented if required.

LP1 Policy 66 'Deliveries, Freight and Servicing' sets out the approach to deliveries, freight and servicing and includes encouragement for sustainable last mile services; support for freight consolidation arrangements and a requirement for operators to achieve FORS[44] Silver standard.

The receptors used in the air quality impact assessment (Kairus, April 2021) are located on roads within 200m of the Epping Forest SAC, as indicated on the receptor location plan in Figure 6.6 below.

Although there are a number of receptors within 200m of the SAC along the permitted HGV routes (e.g. 11, 13, 16, 35, 41, 100 etc), the permitted HGV routes avoid the majority of receptors and are therefore unlikely to be subject to significant increases in HGV traffic. HGV management should therefore contribute to the ongoing reduction in emitting vehicles impacting on the Epping Forest SAC.

[44] https://www.fors-online.org.uk/cms/silver/ The Fleet Operator Recognition Scheme (FORS) is a voluntary accreditation scheme for fleet operators which aims to raise the level of quality within fleet operations, and to demonstrate which operators are achieving exemplary levels of best practice in safety, efficiency, and environmental protection.

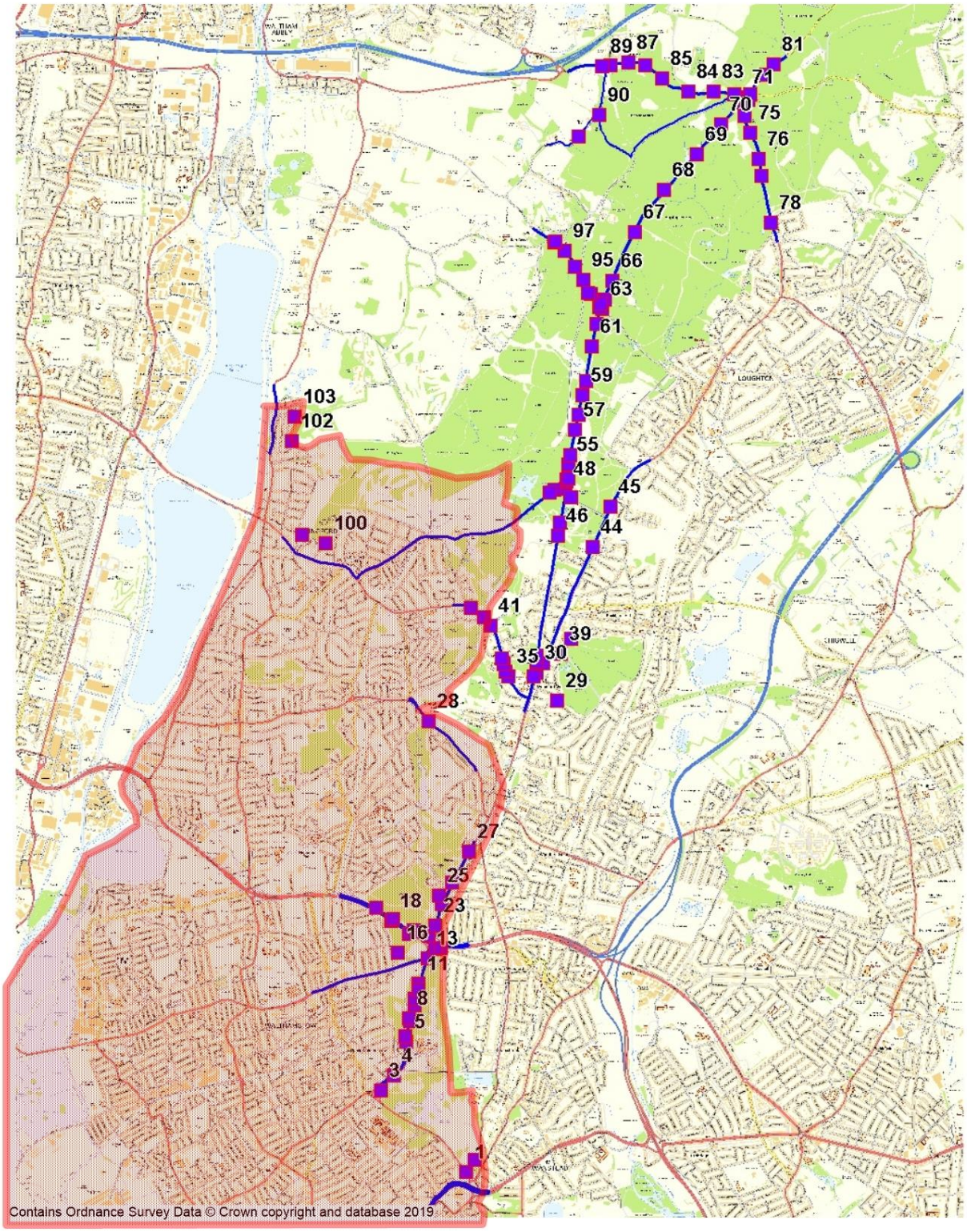

Figure 6.6 Air Quality HRA Modelling Receptors

6.7.2 Freight, Deliveries and Servicing

The previous section discusses the routing of HGVs, largely away from Epping Forest, but LCVs and HGVs make up 20% of traffic on roads within Waltham Forest Borough. While vehicle kilometres driven in Waltham Forest has reduced, the Department for Transport estimate that between 2013 and 2016 there was an increase of 23% in LCVs and HGVs.. The Borough is committed to working with developers and TfL to reduce the levels and impact of construction, servicing and delivery freight, utilising best practice guidance, such as in the TfL Freight and Servicing Action Plan.

LP1 Policy 66 sets out requirements of deliveries, freight and servicing to minimise the adverse impacts of deliveries, freight and servicing.

LP1 Policy 67 'Construction Logistic Plans (CLPs)' expects new development to apply innovation to change construction and operational practices around freight and deliveries, by reducing the need for large vehicles and multiple vans to travel into and around the borough. Examples of this already applied in Waltham Forest include reducing, consolidating and re-timing deliveries, installation of delivery lockers on sites, and waste consolidation to reduce the number of collection trips made to site; and promotion of Zero Emission Deliveries (ZED) [45] (see Box 6.3 for further details).

LP1 Policy 67 applies to all development. However, the Council accepts that judgement on a case by case basis is also required to determine whether a development proposal will generate a significant impact on the road network. Where appropriate, detailed Construction Logistics Plans will be required prior to commencement of the development. This will be required at sites that will or have the potential to impact on the highway network public transport services, sustainable transport, and which may affect nearby developments.

When applied, Construction Logistics Plans enable reduction of the volume and risk of construction movements, consolidation of vehicle movements, retiming of deliveries out of peak hours, avoid areas and times with high levels of vulnerable road users, shift road based deliveries towards other modes such as rail and water based modes and coordinate activities between nearby sites.

Detailed Construction Logistics Plans will be required from sites that are deemed to have the potential to detrimentally impact the highway network road safety, congestion, or the environment through construction access. This includes sites that:

- Will generate high levels of construction traffic to the site;

[45] Walking and Cycling Account 2019. Available at: https://enjoywalthamforest.co.uk/wp-content/uploads/2020/05/Walking-and-Cycling-Account-2019.pdf

- Will impact local and regional road capacity and congestion throughout the construction stages; and
- Increase the cumulative impact of construction traffic or movements within the local area.

In locations with high levels of development, area-wide Construction Logistics Plans will be developed by the Council. Development within areas covered by area-wide Construction Logistics Plans will be expected to adhere to these plans by developing site specific Construction Logistics Plans that conform to the area-wide Construction Logistics Plan, and where appropriate, contribute to their development. S106 requests will be made to enable monitoring of approved Construction Logistics Plans during the construction period, to ensure that development sites are using the agreed vehicle routes and Planned Measures.

6.8 London Ultra Low Emissions Zone

A 24 hour Ultra Low Emission Zone (ULEZ) operates seven days a week within central London as the Congestion Charge. From 25 October 2021, the ULEZ expanded to create a larger zone up to, but not including, the North Circular Road (A406) within Waltham Forest Borough as shown on Figure 6.7.

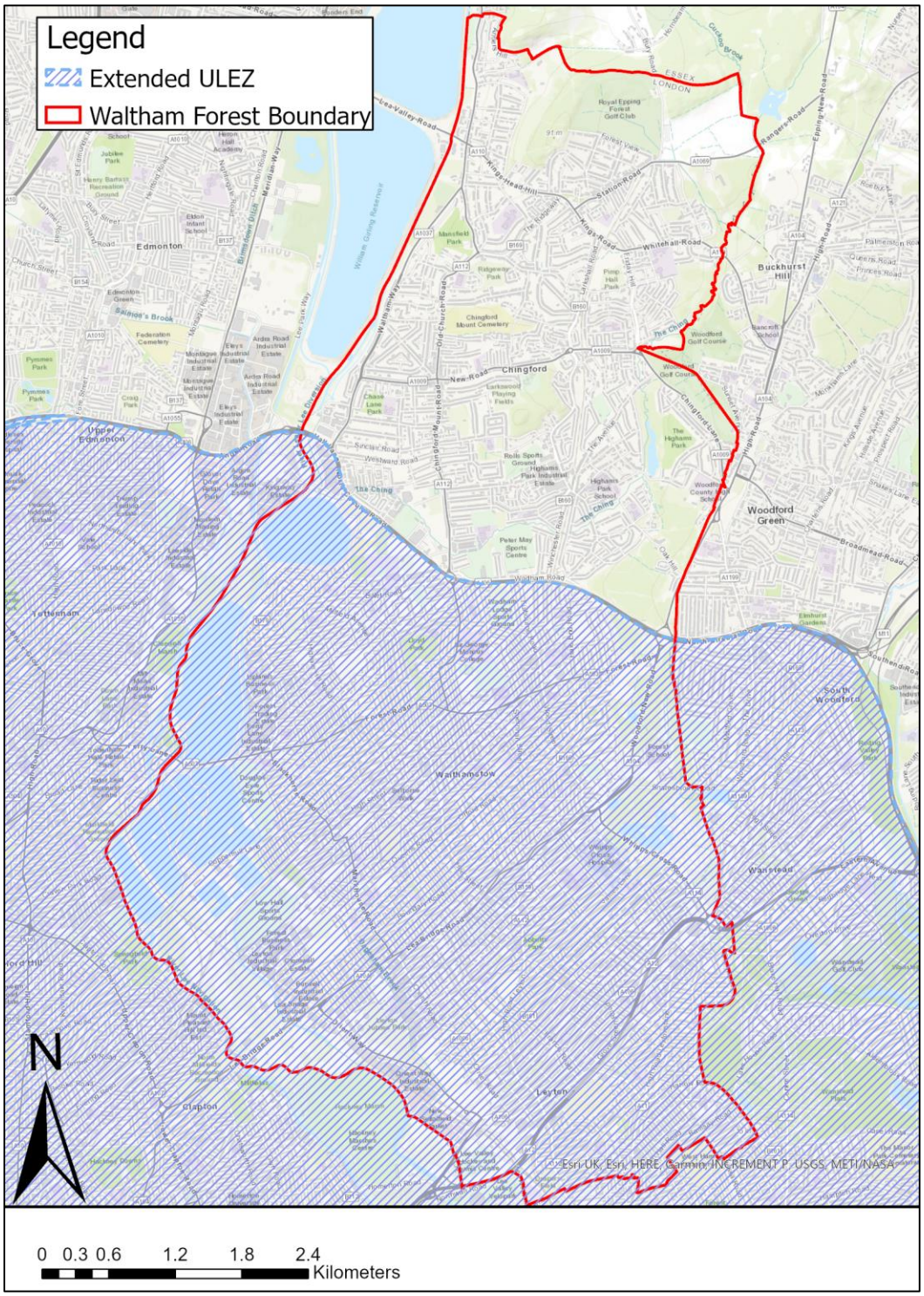

Figure 6.7: Expanded ULEZ Boundary Effective 25 October 2021

Most vehicles, including cars and vans, need to meet the ULEZ emissions standards or their drivers must pay a daily charge to drive within the zone:

- £12.50 for most vehicle types, including cars, motorcycles and vans (up to and including 3.5 tonnes)
- £100 for heavier vehicles, including lorries (over 3.5 tonnes) and buses/coaches (over 5 tonnes)

Currently Euro 4 petrol cars and Euro 6 diesel cars are exempt from charges. The ULEZ is enforced based on the declared emissions of the vehicle rather than the age. However:

- Petrol cars that meet the ULEZ standards are generally those first registered with the DVLA after 2005, although cars that meet the standards have been available since 2001; and
- Diesel cars that meet the standards are generally those first registered with the DVLA after September 2015.

The ULEZ car and motorcycle scrappage scheme[46], funded by The Mayor of London, helps low income and disabled Londoners scrap their older, more polluting vehicles in favour of cleaner ones and promotes greener forms of transport.

Between February 2017 and September 2019[47], there was a 32 ug m^{-3} reduction in roadside concentrations of nitrogen dioxide in the ULEZ, a reduction of 36%. Trend analysis shows that, for the period July to September 2019, NO_2 concentrations at roadside locations in central London were on average 24 ug m^{-3} lower, equating to a reduction of 29%, compared to a baseline scenario where there was no ULEZ. The report on the first six months of ULEZ scheme suggests that there was no increase in pollution around the ULEZ boundary; none of the air quality monitoring sites located on ULEZ boundary roads have measured an increase in NO_2 pollution levels since the scheme was introduced in April 2019.

In September 2019 the average compliance rate with the ULEZ standards was around 77% in a 24 hour period. This is much higher than 39% in February 2017 and the 61% in March 2019. From March to September 2019 there was also a large reduction in the number of older, more polluting, non-compliant vehicles detected in the zone: some 13,500 fewer on an average day, a reduction of 38%.

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[46] https://tfl.gov.uk/modes/driving/ultra-low-emission-zone/car-and-motorcycle-scrappage-scheme

[47] Mayor of London (October 2019) Central London Ultra Low Emission Zone – Six Month Report https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/central-london-ulez-six-month-report

A reduction in traffic flows in central London has been reported; a reduction of 3%-9% in May to September 2019 compared to 2018[48].

Based on the monitoring of the effectiveness of the central ULEZ, it is reasonable to assume that the extension of the ULEZ into the southern part of Waltham Forest Borough should result in an improvement in air quality within this zone, an improvement in the fleet within the Borough and the amount of car journeys undertaken.

6.9 Waltham Forest Air Quality Action Plan

The Waltham Forest Air Quality Action Plan (AQAP) 2018-2023[49] has been produced as part of the Borough Council's duty to address London Local Air Quality Management. It outlines the actions the Council will take to improve air quality in London Borough of Waltham Forest between 2018 -2023.

Concentrations of nitrogen dioxide and particulates ($PM_{2.5}$, PM_{10}) are currently of considerable concern and pose a significant threat to human health. Vehicle emissions are the primary pollution source of air pollution in Waltham Forest and pollutants are most heavily concentrated along major roads. The highest air pollution concentrations are seen on two of TfL's Strategic Road Network roads, the A12 and A406 North Circular Road, however pollution remains high on many local roads.

The actions are presented under six broad topics:

- Emissions from developments and buildings;
- Public health and awareness raising;
- Delivery servicing and freight;
- Borough Council fleet actions;
- Localised neighbourhood solutions; and
- Cleaner transport.

The action plan contains a large number of specific actions, some of which correspond to LP1 policies. The list of actions has recently been updated to indicate progress and this can be found in Appendix C.

[48] traffic flows may also have been influenced by other changes, such as the removal of the exemption for private hire vehicles from the congestion charge.

[49] Available at: https://www.walthamforest.gov.uk/content/air-quality

6.9.1 Control of Emissions from New Developments

Development that aims to improve upon air quality neutral standards will be strongly supported in accordance with LP1 Policy 90 'Air Pollution' and larger scale developments in particular will be expected to be air quality positive in line with the London Plan. Innovative design solutions, urban greening and other mitigation strategies will also be encouraged to improve air quality in all developments. In accordance with the London Plan, air quality assessments will be required for major developments, developments associated with sensitive uses/receptors and where considerable demolition will occur.

Air quality assessments will also be required where there is a potential for a significant increase in vehicular traffic and the use of more polluting technologies including the use of non-road mobile machinery (NRMM) in construction. This will help to identify any major sources of pollution and design strategies that could improve air quality.

6.9.2 Green planting to absorb pollutants

Green planting is a recognised means of addressing air pollution in urban areas. In order to address air pollution, it must take into account site characteristics and vegetation types that are suitable for the area[50], as detailed within Box 7.1.

Box 7.1: Green Planting

Vegetation can improve air quality through photosynthesis, transpiring water, dispersing pollutants, and aiding pollutant deposition. Green infrastructure (trees, hedges, and vegetated walls), can be used as semi-permeable obstacles that increase the distance from pollutant source to receptor[51]. For instance, a hedgerow used as a barrier between a heavily trafficked street and pathway can rebound vehicular pollutants causing them to disperse and in turn become less concentrated. In addition, a hedgerow has a larger surface area than a wall and offers higher rates of dry deposition of air pollutants.

It has been suggested that where green infrastructure acts on relatively small volumes of air and where ventilation rates are low, e.g. within a street canyon, the effects that enhanced dispersal and deposition have on ground level air quality can be significant. Additionally, trees can provide shade in streets, lowering the ambient air temperature and reducing the formation of ground level ozone.

[50] Barwise, Y. and Kumar, P., 2020. Designing vegetation barriers for urban air pollution abatement: a practical review for appropriate plant species selection. Npj Climate and Atmospheric Science, 3(1), pp.1-19.

[51] Hewitt, C.N., Ashworth, K. and MacKenzie, A.R., 2020. Using green infrastructure to improve urban air quality (GI4AQ). Ambio, 49(1), pp.62-73.

Tree shading has also been suggested to provide energy savings through their cooling effects in the summer and wind-chill protection in winter, reducing emission production at the source[52].

Box 7.1: Green Planting continued

One UK study found that in 2015 existing vegetation reduced the average annual surface concentration of $PM_{2.5}$ by 10%, PM_{10} by 6%, O_3 by 13%, NH_3 by 24%, SO_2 by 30%, but had no significant effects on NO_2[53].

Site assessments are required to determine where best to utilise green planting techniques so as to avoid any undesirable effects. For instance, if a dense canopy of trees is planted in a heavily polluted street canyon the air may not be able to move down a concentration gradient as it is blocked thus producing a pollution hotspot[54]. Conversely, in an open road environment a tree line can act as a barrier creating a 'wake zone' downwind where pollutant concentrations decrease[55]. Like site characteristics, vegetation type can influence air pollutant concentrations; trees with thick leaves have a lesser deposition rate than those with waxy or hairy leaves as they have a lower surface area. Similarly, seasonal variations may impact the effectiveness of vegetation in reducing air pollution, particularly in street canyon sites, as deciduous trees are found to trap pollutants more in the summer and evergreens more in the winter. Additionally, some trees produce natural volitive organic compounds that may worsen ground level air quality, however, this effect is not significant at the local street level and "only relevant when increasing the total urban tree population by more than 10%"[56].

Green planting can aid the improvement of other sustainability issues within the urban environment e.g. mitigating the urban heat island effect, buffering noise pollution, and assisting in stormwater management, as well as creating a more attractive and healthy environment.

LP1 Policy 90 requires development to be air quality positive in the identified air quality focus areas within the Borough and the supporting text of that policy recommends the use of urban greening by developers in order to achieve this.

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[52] Mullaney, J., Lucke, T. and Trueman, S.J., 2015. A review of benefits and challenges in growing street trees in paved urban environments. Landscape and Urban Planning, 134, pp.157-166.

[53] DEFRA, 2018. Impacts of Vegetation on Urban Air Pollution. Source: <https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf>

[54] Ferranti, E.J.S., MacKenzie, A.R., Ashworth, K. and Hewitt, C.N., 2018. First Steps in Air Quality for Built Environment Practitioners.

[55] Abhijith, K.V., Kumar, P., Gallagher, J., McNabola, A., Baldauf, R., Pilla, F., Broderick, B., Di Sabatino, S. and Pulvirenti, B., 2017. Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments–A review. Atmospheric Environment, 162, pp.71-86.

[56] Walking and Cycling Account 2019. Available at: https://enjoywalthamforest.co.uk/wp-content/uploads/2020/05/Walking-and-Cycling-Account-2019.pdf

Utilising green infrastructure within the Borough (the entirety of which is an AQMA) is likely to enhance the overall air quality within the Borough which could indirectly benefit the habitats within the Epping Forest SAC. This measure should be implemented with other measures to successfully mitigate the potential effects on Epping Forest SAC.

7 Measures to Improve Air Quality within Epping Forest

7.1 Introduction

This chapter discusses measures which are being implemented specifically in relation to Epping Forest SAC.

7.1.1 City of London Measures

The decision to introduce car parking charges in Epping Forest was made over three meetings of the Epping Forest and Commons Committee which acts as the Conservators of Epping Forest and came into force on 10 May 2021. There are four main aims of the car park charges:

- To better protect the Forest's ecologically sensitive areas by influencing where visitors visit;
- To encourage more sustainable access to the Forest, for example travel by public transport or bicycle, to reduce the impact of harmful vehicle emissions;
- To generate enough income to offset the significant cost of continued car park provision so that the charity's resources can be spent on protecting the Forest and improving the visitor experience; and
- To reduce the impact of non-Forest users on Forest car parks to free space for genuine Forest users.

The number of cars trying to access Forest car parks regularly exceeds the capacity available especially at peak periods. This is an issue where Forest car parks are located near other facilities with 'pay to park' arrangements such as train stations and healthcare provision.

The Conservators state that car use, particularly in the interior of the Forest, should be discouraged where possible, to improve air quality. There are around 270,000 homes within a short walking distance of the Forest and visitors have alternative means of accessing the Forest other than by car. At least 14 train/underground stations and 16 different bus services offer access points within a 12-minute walk.

Cycling is welcomed across most of the Forest and newly refurbished car parks include cycle parking points. The Conservators of Epping Forest would like to install more of these in other Forest car parks, which could be funded using revenue raised from car park charges[57].

[57] https://www.cityoflondon.gov.uk/things-to-do/green-spaces/epping-forest/car-parking-at-epping-forest

7.1.2 EFDC Local Plan Air Quality Mitigation Measures

An Epping Forest Interim Air Pollution Mitigation Strategy[58] has been prepared by Epping Forest District Council (EFDC) in order to manage the effects of air pollution on the Epping Forest SAC. Epping Forest SA is largely located within Epping Forest District, which lies to the North East of Waltham Forest Borough. The HRA of the emerging EFDC Local Plan[59] identified potential adverse effects on Epping Forest SAC from traffic growth within Epping Forest District.

The EFDC evidence base modelled a number of scenarios which assessed future development growth in the District 'in combination' with other plans and projects (i.e. the Local Plan plus growth in surrounding authorities). Two approaches were selected as being quantifiable in the air quality modelling and the most likely to be sufficiently effective in order to be able to reach a conclusion of no adverse effect on the integrity of the Epping Forest SAC. These were as follows:

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

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

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

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

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[58] Epping Forest District Council (December 2020) Epping Forest Interim Air Pollution Mitigation Strategy: Managing the Effects of Air Pollution on the Epping Forest Special Area of Conservation

[59] AECOM for Epping Forest District Council (January 2019) Habitats Regulations Assessment of Epping Forest District Local Plan Regulation 19

Similar to the London ULEZ, a CAZ covering the SAC from 2025 would involve charging drivers of certain types of vehicle based upon the age and type of their vehicle. The aim is to encourage people to replace older vehicles with newer vehicles compliant with the latest emissions standards, and in particular ULEVs.

Other measures included within the Epping Forest Interim Air Pollution Mitigation Strategy are:

- Provision of Electric Vehicle charging points in new developments through emerging Local Plan policy;
- An Awareness Raising Campaign across the District;
- Introducing a right-hand turn ban at the junction of the A121 (Honey Lane) into Forest Side;
- Initiatives to support walking, cycling and increased public transport use;
- HGV Route Management Strategies;
- Provision of Digital Communications Infrastructure through emerging Local Plan policy;
- Trialling new technologies including city trees and roadside pollution extraction systems; and
- Site specific initiatives to support species and veteran tree resilience.

Regular on site air quality and traffic monitoring are proposed within the EFDC Interim Air Pollution Mitigation Strategy so that data which is specific to the Epping Forest SAC can be used to understand the effectiveness of implemented mitigation measures or if alternative action is required. It is recommended that LBWF Council works in partnership with EFDC and the City of London Conservators of Epping Forest in relation to monitoring and information sharing. See proposed monitoring in Chapter 11 for further details.

8 Modelling of Specific Mitigation Measures

The air quality impact assessment undertaken to assess the impacts of the LBWF LP1[60] identified locations within the Epping Forest SAC where effects on NH_3 and acid deposition exceeded the 1% of Critical Load criterion, indicating a potentially significant impact on sensitive habitats within the forest. In order to prevent significant effects within the Epping Forest SAC as a result of LP1, traffic related emissions need to be reduced. The most effective approach to achieving this is through a reduction in overall trip rates associated with fuel driven vehicles.

In order to understand the effectiveness of the mitigation measures presented in Chapters 6-7 in reducing road traffic in future years, AWP transport consultants undertook further work on the LoHAM which provided data for input into the AQIA modelling of mitigation measures in this strategy. This provides a reality check of the future traffic projections used within the original traffic data set in conjunction with a review of the potential trip reductions that could be achieved through implementation of measures set out within this Air Quality Mitigation Strategy. The results of this work are set out within a Technical Note (reproduced in Appendix B) and have been used to inform revised air quality modelling to determine the potential reduction in effects as a result of implementing this mitigation strategy and to understand what level of trip reduction would be needed to ensure no significant effects on the Epping Forest SAC.

Table 8.1 demonstrates that the wide ranging and varied mitigation measures in this strategy are expected to achieve at least the 30% targeted reduction in traffic flows within the Waltham Forest Climate Emergency Commission report[61] . This target is supported by LP1 to be achieved during the plan period (2020-2035).

[60] Kairus Ltd (March 2022) Air Quality Modelling To support Waltham Forest Local Plan Habitats Regulations Assessment Appendix 4 of the Waltham Forest Submission Local Plan Part 1 Habitats Regulations Assessment Report (ClearLead Consulting Ltd, April 2021) available here: https://www.walthamforest.gov.uk/content/local-plan

[61] Waltham Forest Climate Emergency Commission recommendation in The Waltham Forest Climate Emergency Commission: A Call To Action report: https://www.walthamforest.gov.uk/sites/default/files/2021-11/Waltham%20Forest%20Climate%20Emergency%20Brochure.pdf

Table 8.1: Anticipated Traffic Reduction Effects of Mitigation Measures		
Measure	**Potential traffic reduction effect**	**Commentary**
Low Traffic Neighbourhoods (LTN) – reductions in traffic flows and traffic "evaporation"	11% to 56%	Most likely to have an effect in the immediate vicinity of allocations and within LBWF neighbourhoods and strategic routes in the Borough. General effect through overall reduced desire to travel.
Low Traffic Neighbourhoods – reduction in car ownership	6%	Reduction in LTN car ownership would be likely to have a wider effect across the whole borough and would impact traffic flows in SAC.
Travel Plan Implementation	10% - 60%	Good management of travel plan measures in new development can have a significant effect at the higher end of the identified range.
Electric vehicle uptake	8%	Since EV uptake removes emitting vehicles from creating impacts this is the most guaranteed of all measures
Other measures such as HGV route management, cycle and walking routes programmes; school travel programmes; bus enhancement programmes; last mile delivery programmes; vehicle fleet composition; car clubs / car sharing; potential ULEZ expansion.	10% - 20%	These other multiple measures reach across other Boroughs and so require cooperation but would have a wider regional impact than that associated solely with LBWF LP developments.
Total lowest potential traffic reduction	**45%**	

It was therefore proposed to undertake sensitivity testing in the air quality modelling based upon reductions in traffic flows of 10%, 20% and 30% to test the sensitivity of the links within the Epping Forest SAC to changes in traffic flows.

The original dispersion model used by Kairus Ltd in the air quality impact assessment (Kairus Ltd, April 2021, updated in March 2022) has been rerun to assess the following scenarios with the results discussed below:

- 10% reduction in petrol/diesel vehicle trips;
- 20% reduction in petrol/diesel vehicle trips; and
- 30% reduction in petrol/diesel vehicle trips.

The reductions in vehicle trips would be accounted for as an actual reduction in car journeys and the replacement of fuel driven vehicles by 100% Electric vehicles.

The full details of the modelling can be found in Appendix A. A reduction in trips of 10% across the network would be sufficient to reduce NH_3 effects to fall below the 1% criterion for NH_3, nutrient nitrogen and acid deposition at all locations under the 2021 scenario. Effects on acid deposition would also fall below the 1% criteria at receptor 1 with a 10% reduction in trips.

A 10% reduction in trips is not, however sufficient to reduce impacts to below 1% of the critical load for NH_3 under the 2031 and 2041 scenarios with effects on NH_3 exceeding the 1% criterion at all receptors considered within the Epping Forest SAC.

The modelled 20% reduction in trips would again significantly reduce NH_3 emissions within the Epping Forest SAC. Impacts at all receptors within the Epping Forest SAC would fall below the 1% criterion for NH_3 and acid deposition under the 2021 scenario.

Under the 2031 and 2041 scenarios, NH_3 impacts would fall below the 1% criterion for NH_3 and acid deposition across a large proportion of the Forest, however, there would remain an exceedance of the criterion for NH_3 at a number of significant locations, namely adjacent to Woodridden Hill, Forest Side, Cross Roads, A112 and close to the A12.

The modelled 30% reduction in trips shows a significant reduction in NH_3 emissions within the Epping Forest SAC with effects on annual mean NH_3 and acid deposition falling below the 1% criterion at all locations within the Epping Forest SAC. With a 30% reduction in trips, impacts within the Epping Forest SAC would not be significant. The AWP Technical Notes (Appendix B and Appendix E) describe how a 30% reduction in vehicle trips is considered achievable using the mitigation measures set out within Chapters 6-7 and as set out within the Delivery Framework in Chapter 10.

9 Further Traffic Analysis

9.1 Introduction

In order to provide information to address the comments from Natural England, an additional technical note (Appendix E) prepared by AWP transport consultants further considers the traffic related impacts and in particular the potential mitigation options available in the event that Local Plan development related impacts on the SAC are observed.

In addition to considering further soft measures to manage traffic flows in the Epping Forest SAC further strategic transport assessment work has been undertaken to consider the contribution made by proposed developments in Waltham Forest to the traffic on the routes in question within Epping Forest.

9.2 Conclusions of the further strategic traffic analysis

The further strategic analysis of census Travel to Work (TTW) data using two different methodologies indicates that a very small proportion of vehicles to/from the Waltham Forest LP2 proposed allocation sites might have an impact on links with air quality exceedances in the Epping Forest SAC, as identified within the air quality impact assessment (April 2021, updated in March 2022).

The predominant traffic through these links would be expected to be from within Epping Forest District and surrounding local authorities, and not Waltham Forest.

Further analysis of the traffic flow baseline used in the air quality modelling has been undertaken using Essex County Council traffic count data. The analysis indicates that resulting air quality impacts on Crossroads, High beech and Avey Lane may be significantly overstated within the Waltham Forest air quality impact assessment (April 2021, updated in March 2022).

The growth in the EV fleet within LBWF has been reviewed and the most recent DVLA data indicates growth of over 100 vehicles per quarter indicating that the high levels of uptake anticipated in the Waltham Forest Local Plan and in the air quality model is likely to be achieved or exceeded.

10 Recommendations and Framework for Delivery

10.1 Recommendations

It is recommended that Construction Logistic Plans, including any Council prepared area-wide plans, avoid routes which pass within 200m of Epping Forest SAC as far as possible.

It is recommended that the London Borough of Waltham Forest Council works in partnership with Natural England, the City of London Conservators of Epping Forest, Epping Forest District Council and other neighbouring authorities on the delivery and monitoring of this Air Quality Mitigation Strategy.

When the next version of the Waltham Forest Air Quality Action Plan is prepared by the Council, it is recommended that consideration is given to how that action plan (which relates to air quality impacts on human health) can also integrate measures for the Epping Forest SAC in line with this mitigation strategy.

10.2 Framework for Delivery

Table 10.1 presents a framework for the delivery of this Air Quality Mitigation Strategy, clearly identifying responsibilities, timeframes and mechanisms for delivery of measures.

Table 10.1: Framework for Delivery of Epping Forest SAC Air Quality Mitigation

Measures	Timing	Mechanism	Responsibility
LBWF			
Public Electric Vehicle Charging Points	Now and throughout LP1 plan period	LBWF Electric Charging Points Strategy 2018 - 2022	LBWF
Electric Vehicle Charging Points within developments	Now and throughout LP1 plan period	S106 agreements / securing financial contributions from relevant planning applications in accordance with LP1 Policy 69.	LBWF and developers

Table 10.1: Framework for Delivery of Epping Forest SAC Air Quality Mitigation			
Measures	**Timing**	**Mechanism**	**Responsibility**
Initiatives to support walking, cycling and increased public transport use.	Now and throughout LP1 plan period	Masterplanning and development design S106 agreements / securing financial contributions from relevant planning applications in accordance with LP1 policies 65 and 68.	LBWF and developers
Green planting	Now and throughout LP1 plan period	S106 agreements in accordance with LP1 Policy 90.	LBWF and developers
Transport Assessments	Now and throughout LP1 plan period	S106 agreements in accordance with LP1 Policy 65.	LBWF and developers
Construction Logistic Plans to avoid Epping Forest SAC	Throughout LP1 plan period	S106 agreements in accordance with LP1 Policy 65.	LBWF and developers
Controlled Parking Zones	Now and throughout plan period	S106 agreements and relevant traffic regulation orders.	LBWF
Public transport infrastructure delivery	Now and throughout plan period	LP1 Infrastructure Delivery Plan Securing financial contributions from relevant planning applications in accordance with LP1 policies 64 and 96.	LBWF and developers

Table 10.1: Framework for Delivery of Epping Forest SAC Air Quality Mitigation			
Measures	**Timing**	**Mechanism**	**Responsibility**
Partnership Working			
Traffic control and car impact reduction measures and monitoring, as part of Integrated Forest Transport Strategy (including physical management of car parks)	Now and ongoing	Via SAMMs contributions collected via S106.	City of London Conservators of Epping Forest
ULEZ Expansion into South Waltham Forest up to A406	October 2021	Central government funding	TfL
Improvements to public transport services	Now and ongoing	Securing financial contributions from relevant planning applications in accordance with LP1 Policy 64.	LBWF, TfL, Network Rail and Office of Rail and Road (ORR)RR
HGV routing	Now and ongoing	Ongoing enforcement of approved routes.	TfL
Government			
Ban of sale of petrol and diesel cars	2030	Legislation	Central government
Ban of sale of hybrid cars	2035	Legislation	Central government

11 Monitoring and Review

The effectiveness of the mitigation measures set out within Chapters 6-7 of this strategy will need to be monitored in order to understand how successful they are in preventing an increase in traffic and air pollution within Epping Forest SAC. This information will be needed to feed into the review of the LP1. Action to remedy issues identified in monitoring can then be taken during the plan review process.

Table 11.1 presents the recommended monitoring of the air quality baseline in Epping Forest SAC and the measures which will prevent air pollution affecting the SAC. The Epping Forest SAC working group currently chaired by Natural England provides an opportunity for LBWF Council to work in partnership with neighbouring authorities in relation to information sharing on air quality and traffic monitoring on the Epping Forest SAC.

Table 11.1: Proposed Air Quality Mitigation Strategy Monitoring

Indicator	Details	Frequency	Responsibility for Monitoring
Traffic levels on A406, Woodford New Road, A110, A1009, A114, A104 Epping New Road, A121 High Road, Goldings Hill, Woodridden Hill, Cross Roads, A112	24 hr Classified automatic traffic count for one week	Annual	LBWF
Delivery of 15-minute neighbourhoods in LBWF	Completion of infrastructure projects.	Annual	LBWF
Fleet mix in LBWF	ANPR survey linked to vehicle data	Annual	LBWF
Car ownership in LBWF	Registrations data	Annual registrations	LBWF
Electric car ownership in LBWF	Registrations data	Annual registrations	LBWF
Modal split	All mode annual traffic surveys on key links in LBWF	Annual	LBWF
Air quality monitoring within LBWF	This would include regular review of the existing monitoring undertaken by LBWF, which is already undertaken on an	Annual	LBWF

Table 11.1: Proposed Air Quality Mitigation Strategy Monitoring			
Indicator	**Details**	**Frequency**	**Responsibility for Monitoring**
	annual basis. The data could be assessed in conjunction with the data collected for the above measures to determine any correlation. Introduce ammonia monitoring at one or two roadside locations within the borough to gain data on background levels.		
Air quality in Epping Forest SAC	Undertake additional, specific NO_x and NH_3 roadside monitoring within Epping Forest SAC. This should be collated and reviewed on a regular basis and could be assessed in conjunction with data collected for other measures above to determine any correlation.	Ongoing or for a minimum of 6 months each year to get sufficient data for comparison against annual objectives and compare annually to see any changes.	EFDC and LBWF and all other local authorities with HRAs concluding that growth could affect air quality within the Epping Forest SAC.
Distribution of cushion moss (*Leucobryum* spp.) and nitrophyte lichens in Epping Forest SAC within 200m of the following roads: A406, Woodford New Road, A110, A1009, A114, A104 Epping New Road, A121 High Road, Goldings Hill, Woodridden Hill, Cross Roads, A112	Survey to map coverage and frequency within Epping Forest SAC within 200m of A406, Woodford New Road, A110, A1009, A114, A104 Epping New Road, A121 High Road, Goldings Hill, Woodridden Hill, Cross Roads, A112	Establish baseline and then monitor throughout LP1 plan period at periods agreed with Natural England and City of London Conservators of Epping Forest.	City of London Conservators of Epping Forest, LBWF and EFDC.

Monitoring of air quality within the Epping Forest SAC will help to understand whether predicted baseline assumptions regarding current levels of ammonia are accurate and whether ammonia is derived from traffic passing within 200m of sensitive habitat.

Monitoring for this Air Quality Mitigation Strategy should aim to identify if there is any correlation between air pollution concentrations decline and changes in trip data from surveys.

Table 11.2 below provides a commentary on each of the mitigation measures included within this strategy with regards to the likely effect of the measure on Epping Forest SAC and proposes remedial actions should monitoring identify action is necessary to protect the SAC.

Table 11.2: Traffic Reduction Effects of Mitigation Measures with Additional Mitigation Actions

Measure	Potential Traffic Reduction Effect	Commentary	Further Mitigation if Required by Monitoring
Low Traffic Neighbourhoods (LTN) – reductions in traffic flows and traffic "evaporation"	11% to 56%	Most likely to have an effect in the immediate vicinity of allocations and within LBWF neighbourhoods and strategic routes in the Borough. General effect through overall reduced desire to travel.	Additional LTN areas within LBWF to influence mode of travel to areas in SAC.
Low Traffic Neighbourhoods – reduction in car ownership	6%	Reduction in LTN car ownership would be likely to have a wider effect across the whole borough and would impact traffic flows in SAC.	Additional car clubs and non car mode options to reach and pass through EFSAC.
Travel Plan Implementation	10% - 60%	Good management of travel plan measures in new development can have a significant effect at the higher end of the identified range.	Further expansion on non car means to reach and pass through EFSAC.
EV uptake	8%	Since EV uptake removes emitting vehicles from creating impacts this is the most guaranteed of all measures	Increased opportunity for EV take up. Replacement of non EV car club vehicles with EV.

Table 11.2: Traffic Reduction Effects of Mitigation Measures with Additional Mitigation Actions			
Measure	**Potential Traffic Reduction Effect**	**Commentary**	**Further Mitigation if Required by Monitoring**
Other measures such as HGV route management, cycle and walking routes programmes; school travel programmes; bus enhancement programmes; last mile delivery programmes; vehicle fleet composition; car clubs / car sharing; potential ULEZ expansion.	10% - 20%	These other multiple measures reach across other Boroughs and so require cooperation but would have a wider regional impact than that associated solely with LBWF Local Plan developments.	Increased action with other authorities. Implementation of HGV banned routes in EFSAC.

Should monitoring identify that remedial action is required, in addition to those included within Table 11.2, other measures can also be implemented directly related to the locations where impacts are observed. Those further measures could be implemented outside of Waltham Forest by the responsible authority to assist in managing traffic impacts in Epping Forest, as presented in Table 11.3 below.

Table 11.3: Epping Forest SAC Potential Traffic Management Measures			
Measure	**Potential Traffic Reduction Effect**	**Commentary**	**Further Mitigation if Required by Monitoring**
Weight limits on all EFSAC routes to remove HGV content	10%	Would remove the highest emitting vehicles in the short term but would require implementation by others.	Widening the areas of weight limited routes and better enforcement.
Reduced Speed limits through areas of AQ impact	0%	The overall reduction in speeds through the forest would reduce the risk of congestion and queueing, providing more free flowing traffic resulting in lower emissions	Detailed traffic modelling of lowered speeds would provide evidence of predicted effect of this measure. Widening the areas of speed limited routes and better enforcement could result.
Relocation of car parking areas in EFSAC	10% - 60%	As part of a Management Plan to relocate areas of access away from air quality stressed areas to other parts of the SAC more able to cope.	Further relocation or reduction of car parking
Road Closures	100%	Closing roads to traffic in locations with greatest stress due to traffic related air quality.	Widening the areas of road closures.

A region wide approach is recommended to address traffic movements through Epping Forest SAC with potential highway mitigation measures to be promoted by the local highway authority Essex County Council.

In planning for the proposed level of growth, the Council recognises that long term forecasts may be susceptible to change. As projections are subject to uncertainty, forecasts may be subject to change to reflect emerging changes as and when new information becomes available. If, as a result of subsequent monitoring, growth forecasts need to be amended or policies cannot achieve the intended outcomes, this would trigger a review of the LP1.

As required by the National Planning Policy Framework and Regulation 10A of the Town and Country Planning (Local Planning) (England) Regulations 2012, London Borough of Waltham Forest Council, as Local Planning Authority, will initiate a full review of the plan within 5 years of adoption. The purpose of the review is to ensure the Borough's development framework takes account of changing circumstances affecting the area, or any relevant changes in national planning or plan making policy. Relevant strategic policies will need updating at least once every five years if the Boroughs local housing need figure has changed significantly or is expected to change significantly in the near future.

The LP1 has been produced at a time of uncertainty arising from the Covid-19 pandemic. The evidence base supporting LP1 was produced before the pandemic but the full effect of the pandemic is currently unknown and could take some time for new evidence to be become available and then modelled in future projections. Given that LP1 has been prepared during the Covid-19 pandemic, it is considered likely that a review of the plan will be initiated as soon as it is adopted.

LP1 currently factors in the following assumptions:

- The trend towards rising demand for housing will continue. Such demand is from population increase and housing shortages in London generally and in the Borough specifically;

- A reduction in commuting patterns to workplaces outside the Borough and the trend towards workplace mobility will reinvigorate a demand for flexible work spaces and local hubs; and

- There will be an increase in daytime working population in the Borough arising from a reduction in commuting patterns and as more agile working strategies are adopted.

It is recommended that when the LP1 is reviewed, further air quality modelling work is undertaken using up to date data available from TfL as well as actual traffic monitoring data in order to model outputs relating to growth planned. On the basis of the most up-to-date modelling outputs and evidence base the Council may be required to review the level and location of development across the Borough. It will also help to identify whether any changes to the mitigation measures set out in this strategy are required. If necessary, an updated Air Quality Mitigation Strategy would be published as part of a review of LP1.

12 Conclusions

This Air Quality Mitigation Strategy sets out measures to address a potential rise in emissions to air which could result from growth within the London Borough of Waltham Forest LP1, as identified in an air quality impact assessment (Kairus, April 2021 and updated in March 2022).

The measures set out within this strategy will help to avoid exceedances of critical loads from occurring. The measures include schemes which are already underway to facilitate more walking, cycling and use of public transport within the Borough, and increased use of electric vehicles. These measures will also be further implemented through strong LP1 policies which require car free and air quality neutral developments and contributions towards public transport and active travel infrastructure.

Sensitivity modelling has been undertaken using the same methodology as the air quality impact assessment. Justified assumptions have been made as to the anticipated reduction in petrol and diesel fuelled road transport over the LP1 plan period.

It is concluded that a reduction of 30% in traffic can be expected by 2030 resulting from the mitigation measures identified and modelling shows that this reduction will result in no significant impacts on Epping Forest SAC from air pollution resulting from the Waltham Forest LP1.

A 30% reduction in road traffic is a target identified by the Waltham Forest Climate Emergency Commission and a commitment to achieve this target is included within LP1. The findings of the modelling undertaken to support this Air Quality Mitigaiton Strategy therefore support the need for this target to be met by 2030 in order to avoid any adverse effects on the Epping Forest SAC as well as bring about the other desired outcomes including health and climate change. Traffic data used within the air quality modelling may not reflect current modal share, as identified within the AWP technical paper (Appendix B) and therefore the Borough is likely to have progressed some way towards this target already, as supported by findings of recent studies into the effectiveness of the 'Mini'Holland / Enjoy Waltham Forest' programme and Low Traffic Neighbourhoods.

The further strategic analysis indicates that a very small proportion of vehicles to/from Waltham Forest LP2 proposed allocation sites might have an impact on links with air quality exceedances in the Epping Forest SAC, as identified within the air quality impact assessment (April 2021, updated in March 2022). The predominant traffic through these links would be expected to be from within Epping Forest District and surrounding local authorities, and not Waltham Forest.

Further analysis of the traffic flow baseline used in the air quality modelling has been undertaken using Essex County Council traffic count data. The analysis indicates that resulting air quality impacts on Crossroads, High beech and Avey Lane may be significantly overstated within the Waltham Forest air quality impact assessment (April 2021, updated in March 2022).

The growth in the EV fleet within LBWF has been reviewed and the most recent DVLA data indicates growth of over 100 vehicles per quarter indicating that the high levels of uptake anticipated in the LBWF Plan and in the air quality model is likely to be achieved or exceeded.

Having considered the potential for identifying a hard mitigation measure within Waltham Forest Borough, as requested by Natural England, it has been concluded that such measure would need to be implemented outside of the London Borough of Waltham Forest in order to be effective in reducing emissions from traffic on Epping Forest SAC. Such mitigation measure options within the power of the London Borough of Waltham Forest are therefore limited. Further hard mitigation measures have therefore not been modelled.

Natural England also suggested that a more detailed understanding be gained into the potential impacts of the Ultra Low Emissions Zone (ULEZ) (from October 2021) which from October 2021 now extends further into Waltham Forest from the south, along with the introduction of a Clean Air Zone (CAZ) proposed by Epping Forest District Council as a means to reduce air pollution within the Epping Forest SAC should monitoring identify it as necessary.

In order to understand the potential effects of these activities, detailed modelling would be required of predicted traffic movements within Waltham Forest Borough under these scenarios and this information is not currently available. Annual traffic surveys on key routes within Waltham Forest are included within the monitoring proposals of this strategy and this would provide data on the impact of the ULEZ. This is considered a more pragmatic approach to addressing this issue. Furthermore, within this strategy it has been assumed that the impact of the ULEZ within Waltham Forest will be that people will change their vehicles and this is supported by recent evidence of a rapid increase in EV ownership.

In addition to measures already underway and the policies within LP1, it is recommended that Construction Logistics Plans prepared for developments within Waltham Forest Borough seek to avoid routes which pass within 200m of Epping Forest SAC as far as possible.

When the next version of the Waltham Forest Air Quality Action Plan is prepared by the Council, it is recommended that consideration is given to how that action plan (which relates to air quality impacts on human health) can also integrate measures for the Epping Forest SAC in line with this mitigation strategy.

It is recommended that the London Borough of Waltham Forest Council works in partnership with Natural England, the City of London Conservators of Epping Forest, and neighbouring authorities on the delivery and monitoring of this Air Quality Mitigation Strategy, in particular, to identify and implement hard mitigation measures, such as the CAZ, should air quality monitoring indicate that they are necessary.

This Air Quality Mitigation Strategy does not currently have a date for review. A review would be triggered by the findings of monitoring or a review of the Waltham Forest LP1 which may occur within the next 5 years. A review of the Air Quality Mitigation Strategy would ensure that mitigation

addresses up to date predicted effects on air quality from growth proposed within Waltham Forest and surrounding areas.

Appendix A – Kairus Air Quality Modelling Technical Note

AIR QUALITY TECHNICAL NOTE – Version 4

LBWF HRA Air Quality Assessment

02 March 2022

Prepared by Kairus Ltd

1 Introduction

This technical note sets out the results of revised air quality modelling to assess the impacts of reduced vehicle related traffic emissions on air quality within the Epping Forest SAC, anticipated through the implementation of the Air Quality Mitigation Strategy (AQMS) developed to support the LBWF Local Plan Part 1.

An initial air quality impact assessment (AQIA) to assess the impacts of the LBWF Local Plan Part 1 on the Epping Forest SAC (EFSAC) was undertaken in April 2021. The assessment included detailed modelling of traffic emissions to determine the impact of changes in vehicle related emissions as a result of the Local Plan policies and how this will impact on sensitive ecological receptors within the EFSAC.

The AQIA was updated on 1st March 2022 setting out the results of revised modelling undertaken to address comments received by Natural England. Details of the amendments carried out to the modelling are set out in the revised AQIA which should be read in conjunction with this technical note. The modelling undertaken to assess the impacts of reduced vehicle emissions, the subject of this technical note, has been revised according to the changes set out in the AQIA, the results of which are set out in this updated technical note.

The modelling assessment was based on traffic data supplied by Awcock Ward Partnership (AWP). The traffic data was taken from the London Highway Assignment Model (LoHAM, a strategic model representing routing and congestion of motorized highway trips using London's highway network).

The outputs from the updated AQIA identified potentially significant increases on ammonia (NH_3) and acid deposition rates within the EFSAC. Full details of the methodology employed for the modelling assessment and the areas found to experience significant impacts are set out in the updated AQIA.

To address the predicted significant impacts within the EFSAC an AQMS has been developed setting out measures to reduce vehicle emissions across the borough and within the EFSAC. Full details of these measures are set out within the AQMS, which should be read in conjunction within this technical note.

A number of sensitivity tests have been undertaken to determine the impact of expected reductions in vehicle trips/emissions through the implementation of measures set out in the AQMS. The measures within the AQMS aim to both encourage the use of alternative modes of transport across Waltham Forest Borough, thus reducing overall trip generation and increases in the uptake of electric vehicle use, thus reducing overall vehicle related emissions.

Revised modelling has been carried out to assess the following three scenarios:

- 10% reduction in vehicle trips;
- 20% reduction in vehicle trips;
- 30% reduction in vehicle trips.

AWP have undertaken further work on the LoHAM data, providing a reality check of the future traffic projections used in the original traffic data set used for the AQIA and the trip reductions that are expected as a result of measures already being implemented within LBWF and the surrounding boroughs and as a result of the LP1[1]. Data set out in the AWP Technical Note reports the potential for a reduction of up to 30% in traffic across the Borough as a result of measures being implemented by LBWF, providing justification for undertaking the above assessment scenarios. Further work has been carried out by AWP in February 2022 relating to the traffic impacts which is set out in 1102 LBWF Methodology Note and further addresses some of the comments made by NE[2].

Furthermore, the Waltham Forest Climate Emergency Commission report[3] recommends a 30% reduction in road transport by 2030 and this target is supported by LP1 to be achieved during the plan period (2020-2035).

2 Methodology

A number of sensitivity tests have been undertaken to assess the impact of trip reductions across the Borough as a result of mitigation measures set out within the AQMS, through implementation of targets set out within the LP1 and as a result of measures already being implemented within Waltham Forest (most of which are discussed within the AQS).

The modelling has assessed three scenarios representing a total trip reduction of 10, 20 and 30%. The reduction in trips is assumed to be made up of the following:

- An overall reduction in vehicle trips due to increased use of alternative, more sustainable modes of transport i.e. walking, cycling and the use of public transport;
- An increase in the take up of electric vehicles (accounted for as a trip reduction due to full EV vehicles having zero emissions of NO_x and NH_3).

Due to Government policy which will prevent the sale of new diesel and petrol vehicles by 2030 and for all new cars and vans to be fully zero emissions at the tailpipe from 2035[4], the number of EV vehicles within the fleet mix is expected to increase significantly. However, it is noted that hybrid vehicles will continue to contribute to local emissions, particularly emissions of NH_3, therefore the reduction in trips within the assessed scenarios accounts for an increase in full EV vehicles, not hybrid vehicles.

The methodology employed for the modelling follows the approach taken for the previous modelling work, updated in accordance with the revised AQIA.

The reduction in trips has been modelled for each of the future year scenarios previously considered within the AQIA i.e. 2021, 2031, 2041, which were dictated by the traffic data provided by TfL from the LoHAM, with impacts compared against those predicted under the existing 2019 scenario.

1 AWP, LBWF HRA Air Quality Assessment Traffic Data and Policy Review – Technical Note, 29 April 2021

2 AWP, LBWF HRS Air Quality Assessment, Traffic and AQ Monitoring Implementation Strategy – Technical Note 1102, February 2022

3 Waltham Forest Climate Emergency Commission recommendation in The Waltham Forest Climate Emergency Commission: A Call To Action report: https://www.walthamforest.gov.uk/sites/default/files/18428%20Waltham%20Forest%20Climate%20Emergency%20Brochure%20A4_VIS11%20-Spread.pdf

4 https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030

The receptors considered within the model remain the same as those assessed within the original AQIA. For ease, plans showing the location of these receptors are provided in Appendix A of this Technical Note.

The results of the AQIA showed an overall reduction in NO_x emissions in the future assessment years at all locations within the EFSAC. This is due to predicted declines in NO_x emissions as a result of improvements in vehicle emissions and anticipated changes in future year vehicle fleet mix. The assessed trip reductions that are the subject of this Technical Note would therefore result in further reductions in NO_x concentrations within the EFSAC. Impacts on NO_x within the EFSAC have not therefore been reported here. However, the predicted NO_x emissions have been used to calculate nutrient nitrogen and acid deposition rates The updated AQIA also shows no significant impact on nutrient nitrogen as a result of the Local Plan. Nutrient nitrogen have also, therefore, been excluded from this technical note and only impacts on NH_3 and acid deposition have been reported.

3 Impact Assessment

3.1 Impacts on Link 13

Modelling of emissions carried out within the AQIA identified significant impacts at receptors adjacent to Link 13 i.e. receptors 90 and 91 (see Figure 3.1).

Significant impacts have continued to remain under the sensitivity scenarios at receptors 90 and 91, including the most stringent scenario of a 30% reduction in vehicle trips.

Traffic flows on this link are relatively low under the 2019 base scenario with an AADT of less than 1000 being assigned to this link by the LoHAM. Further review of the traffic data used in the AQIA shows a significant increase in trips assigned to Link 13 under all three future year scenarios as follows:

- 2021 – increase of 38% from 894 AADT to 1243 AADT
- 2031 – increase of 91% from 894 AADT to 1715 AADT
- 2041 – increase of 241% from 894 AADT to 3052 AADT

Link 13 is a relatively minor road and is not part of the strategic road network. Consultation with AWP and LBWF has confirmed that any measures within the LP1 would not result in a significant change in trips along this road. This is further evidenced by there being no significant change in trips along the adjoining links Forest Side, Claypit Hill and Wellington Hill. It is therefore concluded that the increase in trips along Link 13 have been incorrectly assigned within the LoHAM.

Based on the above evidence and professional judgement is it concluded that incorrect traffic data has been assigned to Link 13 and Link 13 should not have been included within the original AQIA. Impacts on Receptors 90 and 91 are therefore considered to be incorrect and have been excluded from any further assessment of impacts within this technical note and the revised AQIA.

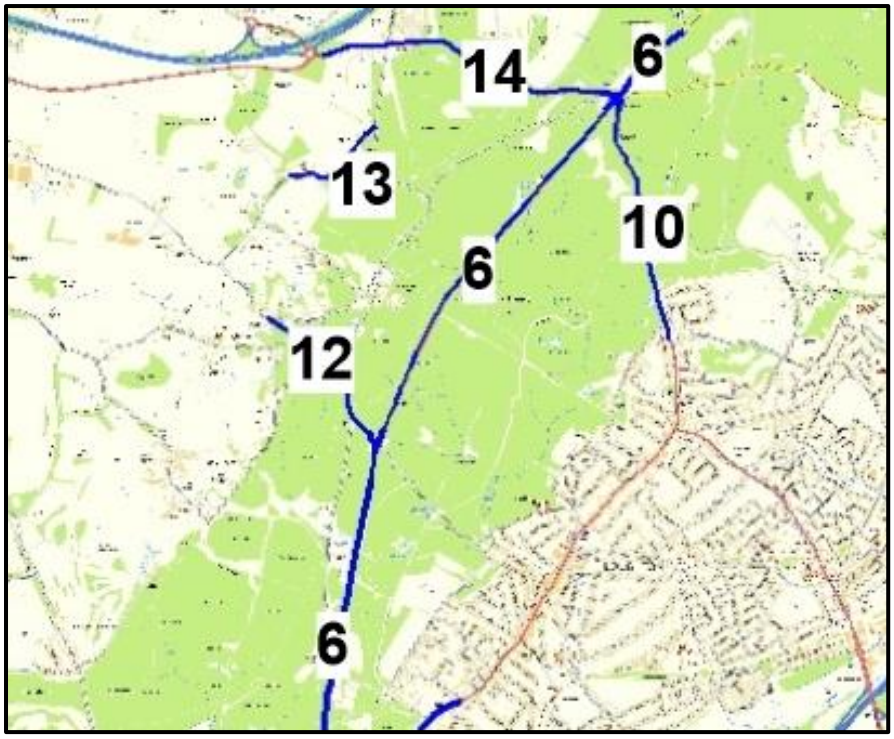


Figure 3.1: Location of Link 13

3.2 10% reduction in Trips

3.2.1 Airborne NH3

A summary of predicted ground level concentrations of NH_3 at the selected receptor locations as a result of a 10% reduction in trips is provided in Table B1, Appendix B.

The data shows a significant reduction in NH_3 concentrations as a result of a 10% reduction in trips. Under the 2021 assessment year there would be an overall decline in NH_3 concentrations at all receptor locations with the exception of two locations, receptors 90 and 91. However, as detailed in section 3.1, these two receptors are being excluded from further assessment.

Under the future 2031 and 2041 assessment years, although NH_3 concentrations are predicted to decline at a number of receptor locations, the modelling continues to predict an increase in NH_3 of more than 1% of the CL at 79 receptors and 96 receptors, respectively. The receptors where the impact cannot be classed as insignificant are shown in Table B1, Appendix B. For both 2031 and 2041, the receptors where the 1% threshold is exceeded are shown in Figures 3.2 and 3.3.

3.2.2 Acid Deposition

A summary of predicted ground level acid deposition rates at the selected receptor locations as a result of a 10% reduction in trips is provided in Table B2, Appendix B.

The data shows an overall reduction in acid deposition rates at the majority of receptors under the 2021, 2031 and 2041 assessment scenarios as a result of a 10% reduction in vehicle trips.

Under the 2021 and 2031 scenario, the modeling shows all impacts are less than the 1% threshold at all receptor locations. In 2041, the impact exceeds the 1% threshold at receptors 1 , adjacent to road links 8 & 15.

The results of the modelling therefore indicate that impacts cannot be deemed as insignificant at receptor 1 after a 10% reduction in vehicle trips.

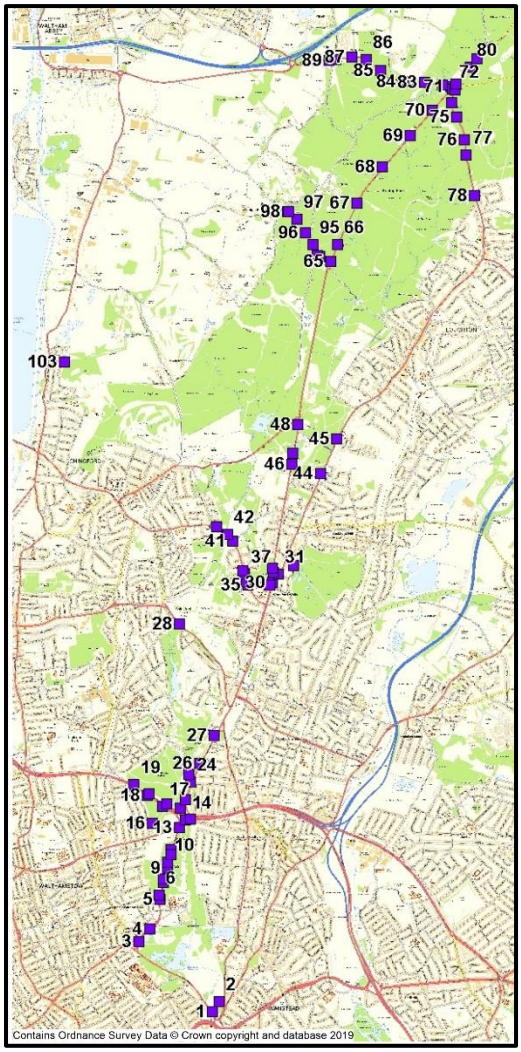


Figure 3.2: Receptors where 1% NH_3 Threshold is Exceeded with 10% reduction in Vehicle Trips in 2031

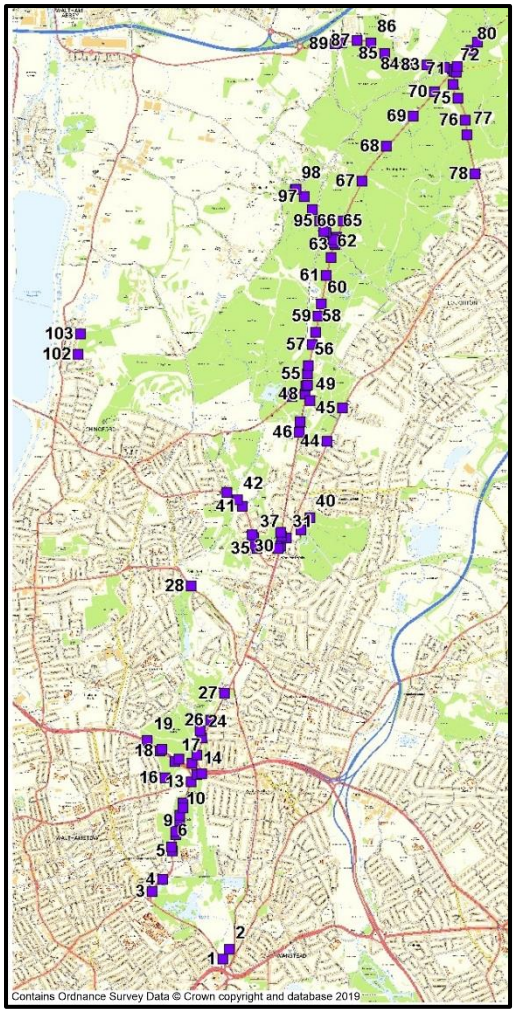


Figure 3.3: Receptors where 1% NH_3 Threshold is Exceeded with 10% reduction in Vehicle Trips in 2041

3.3 20% reduction in Trips

3.3.1 Airborne NH3

A summary of predicted ground level concentrations of NH_3 at the selected receptor locations as a result of a 20% reduction in trips provided in Table B3, Appendix B.

The data shows a significant reduction in NH_3 concentrations as a result of a 20% reduction in trips. Under the 2021 assessment year there would be an overall decline in NH_3 concentrations at all receptor locations, therefore the impact on NH_3 under the 2021 scenario would not be significant.

Under the 2031 scenario there remains an increase in NH_3 concentrations above 1% of the CL at 8 receptors locations (Receptors 82 to 89). The location of these are shown in Figure 3.4.

Under the 2041 scenario the increase in NH_3 exceeds the 1% threshold at 16 receptors (receptors 82 to 89, 93 to 99 and 103). The location of these are shown in Figure 3.5.

Under the 2031 and 2041 impacts on NH_3 remains significant with a 20% reduction in vehicle trips.

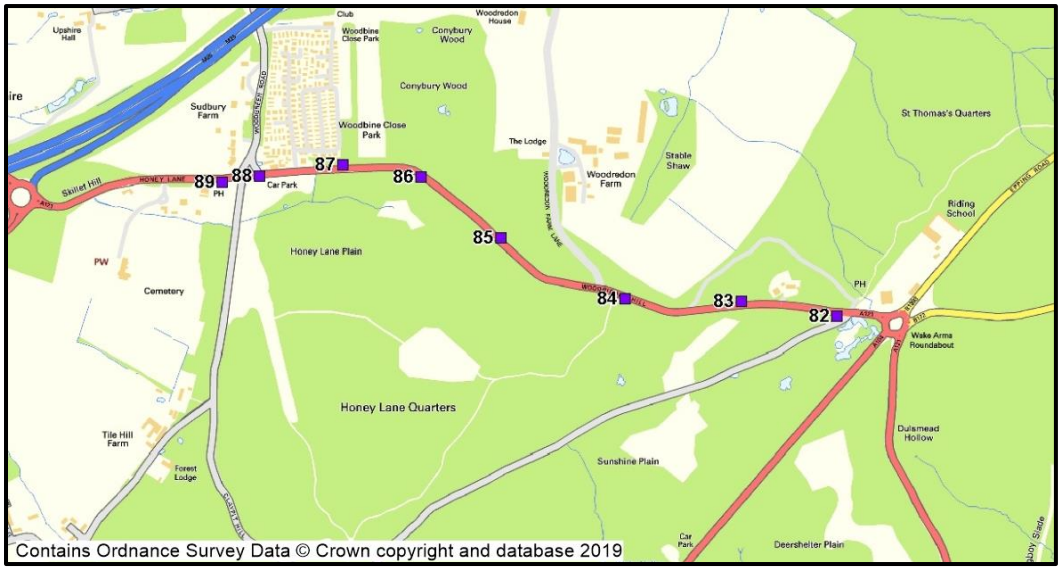


Figure 3.4: Receptors where 1% NH_3 Threshold is Exceeded with 20% reduction in Vehicle Trips in 2031

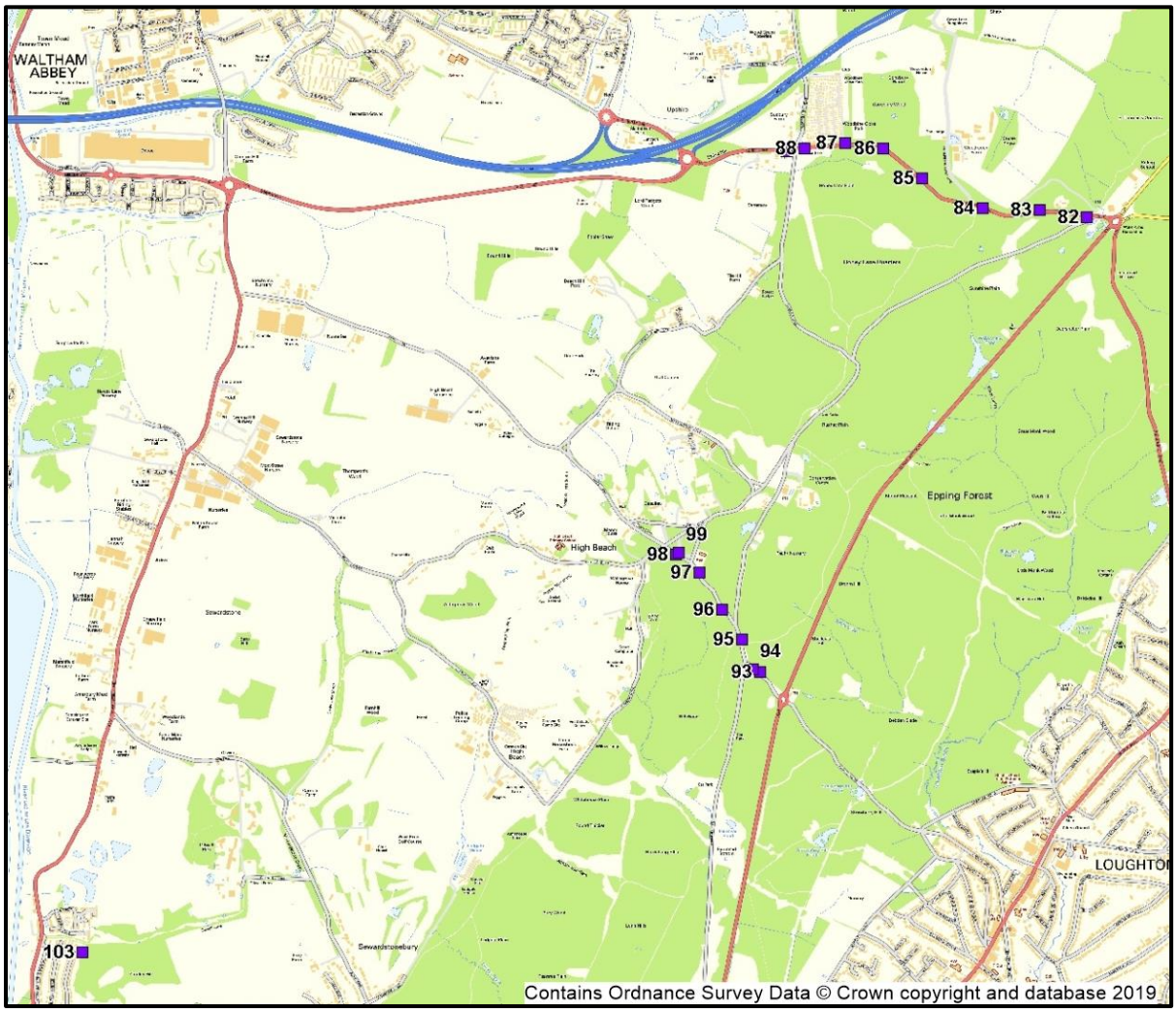


Figure 3.5: Receptors where 1% NH_3 Threshold is Exceeded with 20% reduction in Vehicle Trips in 2041

3.3.2 Acid Deposition

A summary of predicted ground level acid deposition rates at the selected receptor locations is provided in Table B4, Appendix B.

The data shows an overall reduction in acid deposition rates at all receptors under the 2021, 2031 and 2041 assessment scenario as a result of a 20% reduction in vehicle trips.

The impact on nutrient nitrogen following a 20% reduction in vehicle trips is concluded as being not significant within the EFSAC at all locations with the exception of receptor 1, where the impact remained above the 1% criteria.

3.4 30% reduction in Trips

3.4.1 Airborne NH3

A summary of predicted ground level concentrations of NH_3 at the selected receptor locations as a result of a 30% reduction in trips is provided in Table B5, Appendix B.

The data shows a reduction in NH_3 concentrations as a result of a 30% reduction in trips. Under all three assessment years there would be an overall decline in NH_3 concentrations at all receptor locations, therefore the impact on NH_3 would not be significant.

Following a reduction in trips of 30% the impact of the LBWF Local Plan Part 1 is concluded to be not significant on the EFSAC in relation to NH_3.

3.4.2 Acid Deposition

A summary of predicted ground level acid deposition rates at the selected receptor locations is provided in Table B6, Appendix B.

The data shows an overall reduction in acid deposition rates at all receptors under tall three assessment scenarios as a result of a 30% reduction in vehicle trips.

The impact on nutrient nitrogen following a 30% reduction in vehicle trips is concluded as being not significant within the EFSAC in relation to acid deposition.

4 Overall Summary of Impacts

As set out in Section 3.1, due to the expected incorrect assignment of traffic flows to Link 13, receptors 90 and 91 have been excluded from any further assessment.

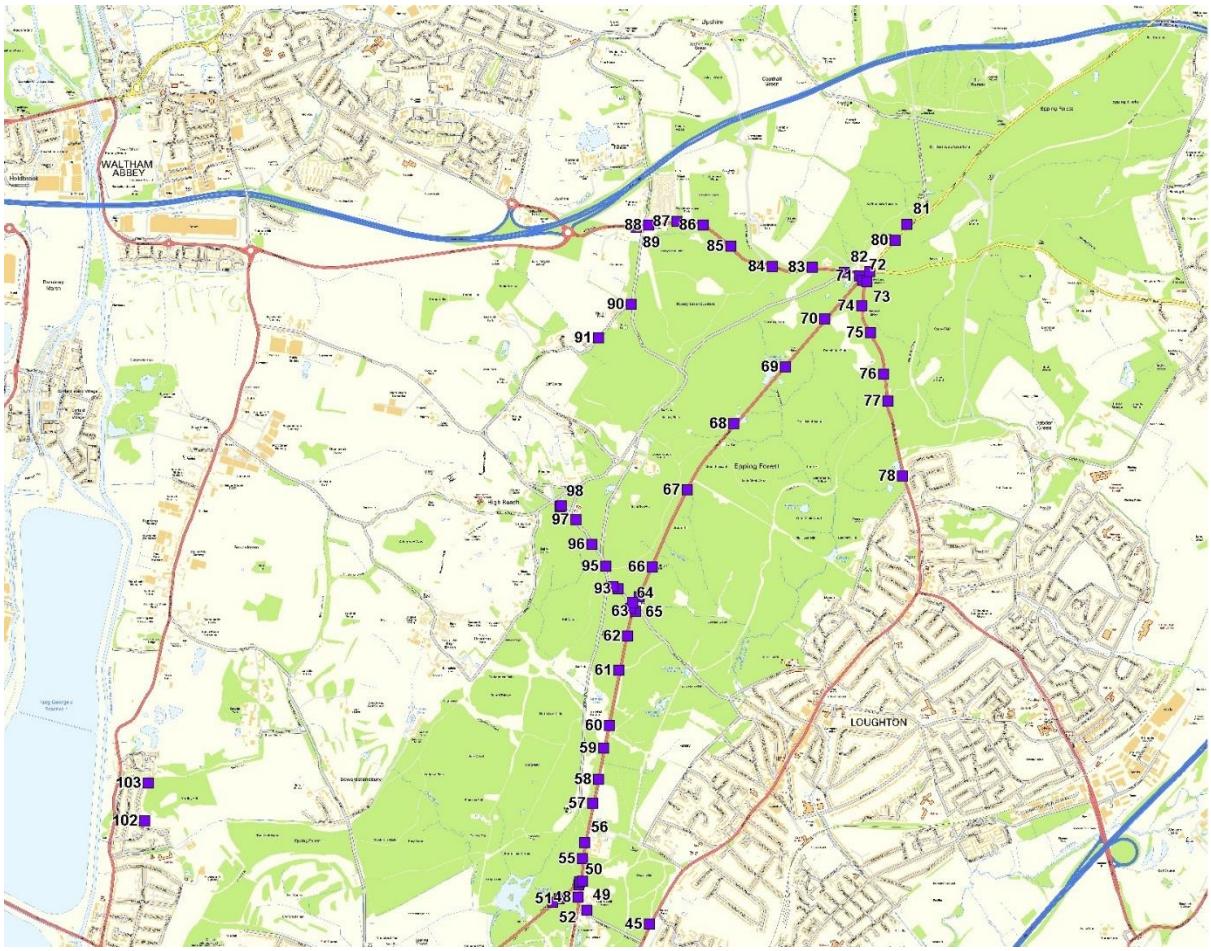
The modelling of a 10% reduction in vehicle trips across the LBWF results in a significant reduction in NH_3 emissions within the EFSAC. In 2021 the impacts on annual mean NH_3, nutrient nitrogen and acid deposition would not be significant, however there remains a significant impact under the 2031 and 2041 assessment scenarios.

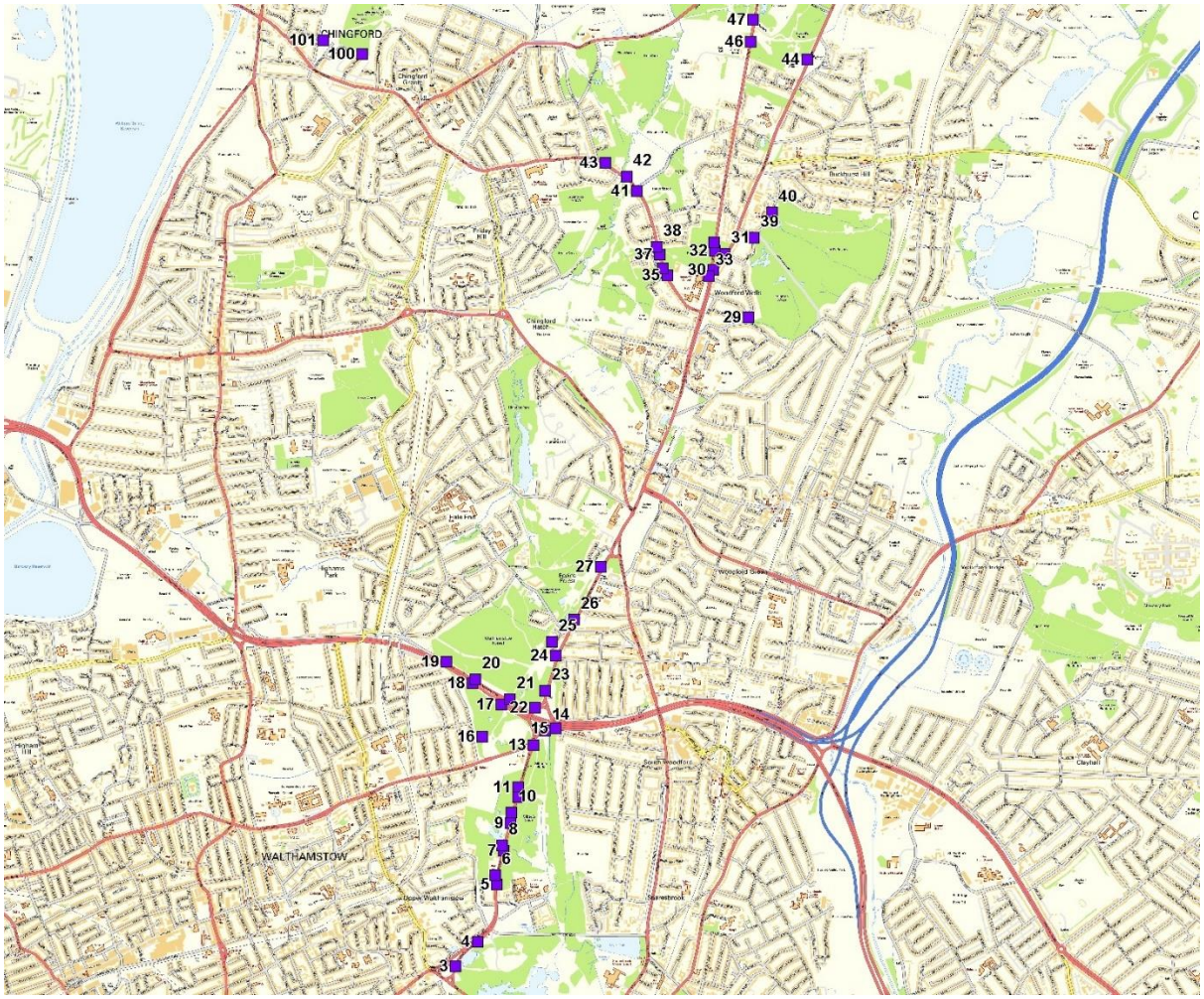
Impacts are further reduced with a 20% reduction in trips, however, there remains a significant impact on annual mean NH_3 at a number of receptors in both 2031 and 2041. Impacts on nutrient nitrogen and acid deposition would no longer be significant.

Following a further reduction in vehicle trips to 30%, NH_3 emissions are reduced sufficiently for no significant impacts to be identified within the EFSAC in relation to annual mean NH_3, nutrient nitrogen and acid deposition.

Based on the results of the additional modelling the AQMS concludes that a 30% reduction in traffic needs to be achieved by 2030 in order to avoid any adverse effects on the EFSAC. A number of the measures incorporated within the AQMS are already being implemented within LBWF and are supported by the LP1. However, up to date traffic data is unavailable at this time to determine whether the anticipated reduction in trips is being realized as a result of these measures. However, set out in the AWP technical note, a 30% reduction in trips across the Borough is considered achievable through the implementation of the AQMS.

Appendix A – Receptor Locations

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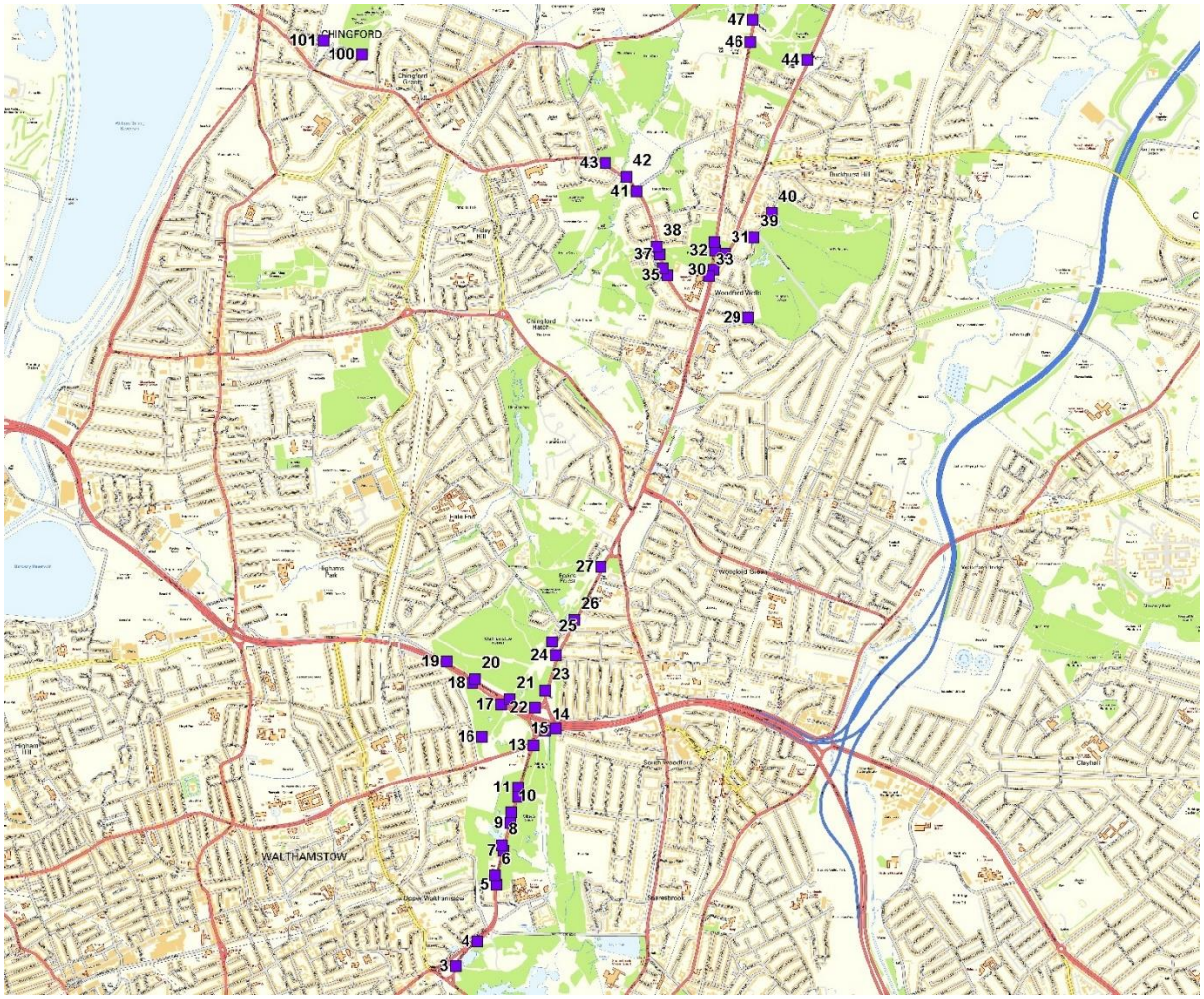
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Appendix B – Modelling Results

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	1	3.1	3.08	-0.03	-2.75	N	3.16	0.05	5.46	Y	3.18	0.07	7.13	**Y**
2	1	2.9	2.88	-0.01	-1.42	N	2.92	0.03	2.68	Y	2.93	0.04	3.52	**Y**
3	1	3.2	3.18	-0.07	-7.01	N	3.26	0.01	1.27	Y	3.29	0.04	4.07	**Y**
4	1	4.4	4.22	-0.22	-21.75	N	4.48	0.04	3.63	Y	4.56	0.12	12.30	**Y**
5	1	5.4	5.02	-0.33	-32.95	N	5.41	0.05	5.44	Y	5.54	0.19	18.56	**Y**
6	1	4.0	3.87	-0.17	-16.67	N	4.06	0.03	2.87	Y	4.13	0.09	9.49	**Y**
7	1	5.3	5.02	-0.33	-32.82	N	5.40	0.05	5.47	Y	5.53	0.19	18.53	**Y**
8	1	4.3	4.07	-0.19	-19.39	N	4.29	0.03	3.36	Y	4.37	0.11	11.03	**Y**
9	1	5.3	4.94	-0.32	-31.68	N	5.31	0.05	5.38	Y	5.44	0.18	17.95	**Y**
10	1	4.5	4.27	-0.22	-22.09	N	4.53	0.04	3.90	Y	4.61	0.13	12.62	**Y**
11	1	6.9	6.66	-0.21	-21.40	N	6.92	0.04	4.00	Y	7.00	0.12	12.37	**Y**
12	1	5.0	4.75	-0.29	-28.82	N	5.09	0.05	5.07	Y	5.21	0.16	16.47	**Y**
13	1	7.4	7.18	-0.24	-24.26	N	7.52	0.09	9.01	Y	7.62	0.19	19.08	**Y**
14	1	6.5	6.40	-0.15	-14.65	N	6.60	0.05	5.02	Y	6.63	0.08	8.25	**Y**
15	1	7.2	7.00	-0.20	-20.28	N	7.28	0.08	7.57	Y	7.30	0.10	9.89	**Y**

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
16	1	5.4	5.41	-0.03	-2.73	N	5.46	0.02	1.93	Y	5.47	0.03	2.65	**Y**
17	1	7.3	7.13	-0.21	-21.18	N	7.43	0.08	8.29	Y	7.44	0.10	9.90	**Y**
18	1	8.8	8.44	-0.35	-34.80	N	8.92	0.13	13.39	Y	8.94	0.16	15.54	**Y**
19	1	10.2	9.69	-0.48	-47.94	N	10.35	0.18	18.32	Y	10.38	0.21	21.09	**Y**
20	1	9.9	9.44	-0.45	-45.29	N	10.07	0.17	17.37	Y	10.09	0.20	20.08	**Y**
21	1	7.9	7.63	-0.26	-26.44	N	8.00	0.10	10.26	Y	8.02	0.12	12.17	**Y**
22	1	6.9	6.72	-0.18	-17.63	N	6.96	0.06	6.33	Y	6.98	0.09	8.87	**Y**
23	1	7.0	6.77	-0.22	-21.88	N	7.04	0.05	4.69	Y	7.11	0.12	12.17	**Y**
24	1	7.2	6.96	-0.25	-25.38	N	7.26	0.05	4.62	Y	7.35	0.14	14.25	**Y**
25	1	5.5	5.49	-0.05	-4.74	N	5.55	0.01	1.29	Y	5.56	0.03	2.72	**Y**
26	1	7.3	7.00	-0.26	-26.33	N	7.31	0.05	4.56	Y	7.41	0.15	14.79	**Y**
27	1	7.2	6.94	-0.26	-25.58	N	7.24	0.04	4.31	Y	7.34	0.14	14.36	**Y**
28	1	6.6	6.44	-0.15	-14.83	N	6.64	0.05	4.92	Y	6.71	0.11	11.22	**Y**
29	1	2.1	2.12	-0.01	-1.13	N	2.14	0.00	0.37	N	2.14	0.01	0.81	N
30	1	4.3	4.00	-0.25	-25.24	N	4.33	0.08	7.90	Y	4.43	0.17	17.44	**Y**
31	1	3.4	3.29	-0.15	-14.56	N	3.51	0.07	7.30	Y	3.56	0.12	12.40	**Y**
32	1	4.6	4.29	-0.31	-31.24	N	4.66	0.06	5.81	Y	4.78	0.18	18.18	**Y**

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
33	1	3.9	3.64	-0.22	-21.85	N	3.91	0.05	4.72	Y	3.99	0.13	13.31	**Y**
34	1	4.1	3.85	-0.25	-25.19	N	4.15	0.05	4.64	Y	4.25	0.15	14.65	**Y**
35	1	3.4	3.30	-0.12	-11.66	N	3.53	0.11	11.08	Y	3.57	0.15	15.35	**Y**
36	1	3.2	3.12	-0.10	-10.01	N	3.31	0.09	9.41	Y	3.35	0.13	13.10	**Y**
37	1	3.5	3.36	-0.12	-12.16	N	3.60	0.12	11.71	Y	3.65	0.16	16.17	**Y**
38	1	3.2	3.10	-0.10	-9.77	N	3.29	0.09	9.26	Y	3.32	0.13	12.86	**Y**
39	1	2.3	2.26	-0.03	-2.75	N	2.30	0.01	1.08	Y	2.31	0.02	2.12	**Y**
40	1	2.2	2.21	-0.02	-2.10	N	2.23	0.01	0.81	N	2.24	0.02	1.62	**Y**
41	1	3.2	3.12	-0.10	-9.91	N	3.32	0.10	9.60	Y	3.35	0.13	13.26	**Y**
42	1	6.5	6.42	-0.12	-11.93	N	6.66	0.12	11.75	Y	6.70	0.16	16.13	**Y**
43	1	6.6	6.44	-0.12	-12.12	N	6.69	0.12	12.00	Y	6.73	0.16	16.45	**Y**
44	1	3.3	3.19	-0.13	-12.66	N	3.39	0.08	7.59	Y	3.44	0.12	12.01	**Y**
45	1	2.8	2.67	-0.13	-13.29	N	2.88	0.08	7.97	Y	2.93	0.13	12.70	**Y**
46	1	4.8	4.45	-0.34	-33.88	N	4.84	0.05	5.44	Y	4.98	0.19	19.06	**Y**
47	1	3.9	3.67	-0.23	-23.00	N	3.94	0.04	3.53	Y	4.03	0.13	12.95	**Y**
48	1	3.4	3.19	-0.24	-24.19	N	3.45	0.02	2.20	Y	3.56	0.13	13.33	**Y**
49	1	1.9	1.85	-0.05	-5.45	N	1.91	0.00	0.29	N	1.94	0.03	3.08	**Y**

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
50	1	3.2	3.02	-0.21	-20.68	N	3.14	-0.09	-8.98	N	3.32	0.09	9.50	**Y**
51	1	2.4	2.29	-0.09	-8.73	N	2.35	-0.02	-2.25	N	2.38	0.00	0.27	N
52	1	2.2	2.17	-0.07	-7.49	N	2.23	-0.02	-1.90	N	2.25	0.00	0.16	N
53	1	3.6	3.34	-0.25	-25.03	N	3.26	-0.33	-32.55	N	3.70	0.12	11.81	**Y**
54	1	3.4	3.19	-0.24	-23.90	N	3.06	-0.37	-36.97	N	3.56	0.13	12.55	**Y**
55	1	3.5	3.29	-0.26	-25.78	N	3.02	-0.53	-53.35	N	3.69	0.14	14.38	**Y**
56	1	3.9	3.58	-0.30	-29.95	N	3.25	-0.63	-63.03	N	4.05	0.17	16.75	**Y**
57	1	3.9	3.57	-0.30	-29.82	N	3.24	-0.63	-63.28	N	4.04	0.17	16.71	**Y**
58	1	4.0	3.66	-0.31	-31.05	N	3.31	-0.66	-66.09	N	4.14	0.17	17.39	**Y**
59	1	3.7	3.45	-0.28	-28.17	N	3.14	-0.60	-59.92	N	3.89	0.16	15.81	**Y**
60	1	4.1	3.81	-0.33	-33.24	N	3.44	-0.71	-70.93	N	4.33	0.19	18.63	**Y**
61	1	3.5	3.22	-0.25	-24.80	N	2.94	-0.53	-52.54	N	3.60	0.14	14.00	**Y**
62	1	4.2	3.87	-0.34	-34.02	N	3.49	-0.72	-72.07	N	4.40	0.19	19.23	**Y**
63	1	2.6	2.47	-0.14	-14.17	N	2.38	-0.24	-23.98	N	2.71	0.09	9.12	**Y**
64	1	2.5	2.37	-0.12	-12.32	N	2.37	-0.13	-12.55	N	2.60	0.11	10.54	**Y**
65	1	4.1	3.81	-0.33	-32.96	N	4.16	0.02	2.28	Y	4.34	0.20	19.99	**Y**
66	1	4.4	4.01	-0.36	-35.99	N	4.43	0.05	5.13	Y	4.58	0.21	20.69	**Y**

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
67	1	4.3	3.93	-0.35	-34.78	N	4.33	0.05	5.44	Y	4.47	0.20	19.72	**Y**
68	1	3.9	3.63	-0.31	-30.56	N	3.98	0.05	4.90	Y	4.11	0.17	17.36	**Y**
69	1	4.6	4.17	-0.38	-38.17	N	4.62	0.06	6.25	Y	4.77	0.22	21.73	**Y**
70	1	3.8	3.54	-0.29	-29.07	N	3.88	0.05	5.15	Y	4.00	0.17	17.04	**Y**
71	1	3.1	2.98	-0.17	-16.56	N	3.26	0.11	11.31	Y	3.35	0.20	20.23	**Y**
72	1	3.3	3.12	-0.21	-20.78	N	3.42	0.09	8.54	Y	3.50	0.17	17.00	**Y**
73	1	3.0	2.88	-0.16	-16.13	N	3.13	0.09	9.06	Y	3.19	0.15	15.49	**Y**
74	1	2.6	2.50	-0.12	-11.58	N	2.68	0.07	6.80	Y	2.72	0.11	11.06	**Y**
75	1	3.3	3.09	-0.18	-17.84	N	3.38	0.11	11.22	Y	3.45	0.17	17.39	**Y**
76	1	2.6	2.52	-0.12	-11.57	N	2.71	0.07	7.24	Y	2.75	0.11	11.27	**Y**
77	1	2.9	2.76	-0.14	-14.20	N	2.99	0.09	8.93	Y	3.04	0.14	13.84	**Y**
78	1	2.4	2.26	-0.09	-8.79	N	2.41	0.05	5.45	Y	2.44	0.09	8.55	**Y**
79	1	3.6	3.32	-0.24	-23.74	N	3.64	0.08	8.11	Y	3.75	0.19	18.73	**Y**
80	1	3.4	3.20	-0.24	-24.26	N	3.49	0.04	4.50	Y	3.59	0.14	14.49	**Y**
81	1	3.3	3.10	-0.23	-22.92	N	3.37	0.04	4.10	Y	3.46	0.13	13.49	**Y**
82	1	2.7	2.62	-0.06	-6.36	N	2.86	0.18	17.52	Y	2.95	0.27	26.88	**Y**
83	1	3.1	3.07	-0.07	-6.63	N	3.41	0.27	27.31	Y	3.54	0.40	39.98	**Y**

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
84	1	3.0	2.91	-0.06	-5.72	N	3.22	0.25	24.91	Y	3.33	0.36	36.35	**Y**
85	1	3.5	3.42	-0.07	-7.38	N	3.84	0.34	34.24	Y	3.99	0.50	49.75	**Y**
86	1	3.1	3.06	-0.06	-6.01	N	3.40	0.28	28.03	Y	3.53	0.41	40.73	**Y**
87	1	2.9	2.88	-0.05	-5.32	N	3.19	0.25	24.94	Y	3.30	0.36	36.25	**Y**
88	1	3.3	3.25	-0.07	-6.66	N	3.63	0.31	31.48	Y	3.78	0.46	45.81	**Y**
89	1	2.6	2.56	-0.04	-4.15	N	2.80	0.19	19.39	Y	2.89	0.28	28.26	**Y**
90	1	1.6	1.57	0.01	1.01	Y	1.62	0.06	6.19	Y	1.72	0.16	15.96	**Y**
91	1	1.6	1.58	0.01	1.33	Y	1.64	0.07	7.22	Y	1.75	0.18	18.48	**Y**
92	1	2.6	2.44	-0.13	-12.76	N	2.56	-0.01	-0.67	N	2.71	0.14	13.99	**Y**
93	1	2.3	2.24	-0.09	-8.51	N	2.41	0.08	8.26	Y	2.52	0.20	19.78	**Y**
94	1	2.2	2.16	-0.08	-7.57	N	2.31	0.07	7.41	Y	2.41	0.18	17.71	**Y**
95	1	2.3	2.19	-0.08	-7.84	N	2.36	0.09	8.66	Y	2.47	0.19	19.45	**Y**
96	1	2.1	2.00	-0.06	-5.83	N	2.13	0.06	6.48	Y	2.21	0.14	14.48	**Y**
97	1	2.5	2.41	-0.10	-9.98	N	2.63	0.12	12.02	Y	2.78	0.26	26.14	**Y**
98	1	2.3	2.19	-0.08	-7.61	N	2.35	0.09	9.12	Y	2.46	0.20	19.88	**Y**
99	1	2.2	2.17	-0.07	-7.50	N	2.34	0.09	9.00	Y	2.45	0.20	19.58	**Y**
100	1	5.2	5.17	-0.01	-0.65	N	5.18	0.00	0.46	N	5.18	0.01	0.79	N

Table B1: Predicted Annual Mean NH_3 Concentrations with 10% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
101	1	5.2	5.17	-0.01	-0.68	N	5.18	0.01	0.53	N	5.19	0.01	0.88	N
102	1	1.8	1.84	0.00	-0.32	N	1.86	0.01	0.76	N	1.86	0.01	1.39	**Y**
103	1	1.9	1.86	0.00	-0.38	N	1.87	0.01	1.10	Y	1.88	0.02	1.92	**Y**

[1] Data includes process contribution (i.e. emissions from vehicles) and background concentrations from relevant assessment year. For 2031 and 2041 background concentrations have been taken from the 2030 background data.

[2] this is the change due to the PC only for the relevant assessment year and doesn't take account of the anticipated reduction in background concentrations between the assessment year and the 2019 base year

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	0.142	1.73	3.05	3.01	-0.042	-29.68	N	3.01	-0.042	-29.50	N	3.02	-0.031	-22.07	Y
2	0.142	1.73	2.88	2.86	-0.022	-15.22	N	2.86	-0.022	-15.39	N	2.86	-0.017	-11.64	Y
3	0.142	1.73	3.51	3.33	-0.182	-127.83	N	3.18	-0.332	-233.45	N	3.20	-0.309	-217.62	N
4	0.142	1.73	4.99	4.50	-0.489	-344.31	N	4.11	-0.877	-617.65	N	4.18	-0.810	-570.36	N
5	0.142	1.73	5.90	5.25	-0.649	-457.30	N	4.76	-1.137	-800.86	N	4.86	-1.039	-732.01	N
6	0.142	1.73	4.27	3.99	-0.276	-194.59	N	3.75	-0.523	-368.02	N	3.80	-0.473	-332.90	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
7	0.142	1.73	5.89	5.24	-0.648	-456.07	N	4.76	-1.135	-799.41	N	4.85	-1.038	-730.91	N
8	0.142	1.73	4.55	4.21	-0.335	-236.00	N	3.92	-0.626	-440.74	N	3.98	-0.568	-399.94	N
9	0.142	1.73	6.03	5.32	-0.704	-495.86	N	4.76	-1.264	-890.31	N	4.86	-1.168	-822.36	N
10	0.142	1.73	4.97	4.53	-0.431	-303.25	N	4.15	-0.820	-577.50	N	4.21	-0.753	-529.96	N
11	0.142	1.73	6.61	6.19	-0.419	-295.01	N	5.81	-0.799	-562.95	N	5.88	-0.734	-517.16	N
12	0.142	1.73	5.74	5.10	-0.644	-453.54	N	4.59	-1.157	-814.67	N	4.68	-1.069	-752.97	N
13	0.142	1.73	7.60	6.94	-0.664	-467.43	N	6.34	-1.261	-887.99	N	6.42	-1.180	-831.16	N
14	0.142	1.73	6.17	5.82	-0.352	-247.88	N	5.53	-0.647	-455.40	N	5.56	-0.620	-436.38	N
15	0.142	1.73	6.82	6.36	-0.458	-322.42	N	5.99	-0.832	-586.14	N	6.01	-0.811	-571.30	N
16	0.142	1.73	4.79	4.73	-0.063	-44.50	N	4.66	-0.126	-88.87	N	4.67	-0.120	-84.73	N
17	0.142	1.73	6.88	6.45	-0.421	-296.38	N	6.07	-0.801	-563.98	N	6.09	-0.785	-552.79	N
18	0.142	1.73	8.44	7.76	-0.686	-483.23	N	7.14	-1.304	-918.28	N	7.16	-1.281	-902.44	N
19	0.142	1.73	10.07	9.01	-1.058	-745.40	N	8.16	-1.901	-1338.68	N	8.19	-1.871	-1317.82	N
20	0.142	1.73	9.76	8.76	-1.002	-705.35	N	7.96	-1.799	-1266.62	N	7.99	-1.770	-1246.43	N
21	0.142	1.73	7.54	6.95	-0.590	-415.32	N	6.48	-1.059	-746.08	N	6.50	-1.040	-732.56	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
22	0.142	1.73	6.51	6.10	-0.409	-288.19	N	5.77	-0.740	-521.00	N	5.79	-0.717	-505.21	N
23	0.142	1.73	6.91	6.40	-0.515	-362.98	N	5.94	-0.975	-686.28	N	6.00	-0.914	-643.62	N
24	0.142	1.73	6.87	6.40	-0.474	-333.79	N	6.02	-0.856	-603.09	N	6.09	-0.784	-552.08	N
25	0.142	1.73	4.91	4.81	-0.102	-71.63	N	4.73	-0.179	-126.21	N	4.74	-0.168	-118.31	N
26	0.142	1.73	6.95	6.45	-0.495	-348.67	N	6.06	-0.887	-624.53	N	6.14	-0.810	-570.62	N
27	0.142	1.73	6.87	6.38	-0.484	-340.55	N	6.01	-0.862	-607.25	N	6.08	-0.787	-554.38	N
28	0.142	1.73	6.14	5.87	-0.276	-194.54	N	5.57	-0.579	-407.88	N	5.61	-0.532	-374.90	N
29	0.142	1.73	2.43	2.40	-0.026	-18.24	N	2.38	-0.047	-32.93	N	2.39	-0.043	-30.58	N
30	0.142	1.73	5.24	4.63	-0.610	-429.24	N	4.12	-1.121	-789.55	N	4.19	-1.047	-737.52	N
31	0.142	1.73	4.19	3.81	-0.381	-268.22	N	3.48	-0.714	-502.74	N	3.52	-0.674	-474.66	N
32	0.142	1.73	5.38	4.76	-0.623	-438.88	N	4.28	-1.097	-772.43	N	4.38	-1.005	-707.51	N
33	0.142	1.73	4.59	4.17	-0.419	-295.25	N	3.77	-0.820	-577.73	N	3.83	-0.754	-530.90	N
34	0.142	1.73	4.71	4.27	-0.441	-310.49	N	3.90	-0.817	-575.60	N	3.97	-0.742	-522.79	N
35	0.142	1.73	3.96	3.67	-0.294	-206.80	N	3.42	-0.538	-378.75	N	3.46	-0.506	-356.11	N
36	0.142	1.73	3.68	3.47	-0.208	-146.36	N	3.26	-0.416	-293.12	N	3.29	-0.388	-273.55	N
37	0.142	1.73	4.04	3.73	-0.306	-215.58	N	3.48	-0.561	-395.13	N	3.51	-0.528	-371.58	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
38	0.142	1.73	3.64	3.44	-0.201	-141.73	N	3.24	-0.404	-284.68	N	3.27	-0.377	-265.57	N
39	0.142	1.73	2.61	2.55	-0.062	-43.56	N	2.50	-0.111	-78.22	N	2.51	-0.103	-72.67	N
40	0.142	1.73	2.54	2.49	-0.046	-32.64	N	2.45	-0.083	-58.42	N	2.46	-0.077	-54.13	N
41	0.142	1.73	3.69	3.47	-0.219	-154.32	N	3.26	-0.427	-300.59	N	3.29	-0.399	-281.28	N
42	0.142	1.73	6.12	5.82	-0.303	-213.51	N	5.57	-0.553	-389.60	N	5.60	-0.520	-366.36	N
43	0.142	1.73	6.15	5.84	-0.308	-217.18	N	5.59	-0.563	-396.38	N	5.62	-0.529	-372.77	N
44	0.714	1.594	3.54	3.30	-0.232	-32.50	N	3.06	-0.480	-67.21	N	3.08	-0.455	-63.76	N
45	0.714	1.594	2.50	2.26	-0.243	-34.10	N	2.00	-0.504	-70.63	N	2.02	-0.478	-66.98	N
46	0.714	1.73	3.97	3.40	-0.570	-79.78	N	2.87	-1.107	-154.99	N	2.94	-1.032	-144.56	N
47	0.142	1.73	4.41	4.03	-0.380	-267.31	N	3.72	-0.694	-488.73	N	3.79	-0.625	-440.00	N
48	0.142	1.73	4.24	3.83	-0.407	-286.61	N	3.49	-0.751	-528.93	N	3.57	-0.672	-472.95	N
49	0.714	1.594	1.64	1.55	-0.096	-13.43	N	1.46	-0.188	-26.30	N	1.47	-0.173	-24.29	N
50	0.142	1.73	4.12	3.71	-0.407	-286.80	N	3.30	-0.824	-580.14	N	3.41	-0.707	-497.85	N
51	0.142	1.73	3.10	2.89	-0.209	-147.06	N	2.68	-0.427	-300.82	N	2.69	-0.409	-288.03	N
52	0.142	1.73	2.95	2.77	-0.179	-126.18	N	2.58	-0.368	-259.10	N	2.60	-0.353	-248.61	N
53	0.142	1.73	4.55	4.05	-0.495	-348.90	N	3.43	-1.110	-781.92	N	3.70	-0.847	-596.41	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
54	0.142	1.73	4.33	3.86	-0.465	-327.40	N	3.28	-1.045	-735.65	N	3.57	-0.753	-530.32	N
55	0.142	1.73	4.36	3.94	-0.423	-297.98	N	3.27	-1.094	-770.57	N	3.66	-0.699	-492.59	N
56	0.142	1.73	4.75	4.25	-0.503	-354.57	N	3.46	-1.288	-907.03	N	3.93	-0.824	-579.93	N
57	0.714	1.73	3.49	3.04	-0.447	-62.57	N	2.32	-1.168	-163.58	N	2.64	-0.850	-119.11	N
58	0.714	1.594	3.64	3.12	-0.521	-72.92	N	2.37	-1.274	-178.44	N	2.70	-0.943	-132.09	N
59	0.714	1.594	3.36	2.94	-0.419	-58.73	N	2.26	-1.101	-154.16	N	2.56	-0.800	-112.05	N
60	0.714	1.594	3.81	3.26	-0.557	-77.96	N	2.45	-1.364	-191.01	N	2.80	-1.009	-141.30	N
61	0.714	1.594	3.10	2.73	-0.363	-50.89	N	2.13	-0.963	-134.83	N	2.40	-0.698	-97.79	N
62	0.714	1.594	3.88	3.31	-0.572	-80.16	N	2.48	-1.400	-196.08	N	2.85	-1.038	-145.35	N
63	0.714	1.594	2.60	2.27	-0.329	-46.06	N	1.85	-0.755	-105.81	N	1.98	-0.618	-86.56	N
64	0.714	1.594	2.41	2.17	-0.243	-33.99	N	1.82	-0.593	-83.10	N	1.92	-0.491	-68.79	N
65	0.142	1.73	5.79	4.95	-0.834	-587.05	N	4.22	-1.564	-1101.21	N	4.36	-1.432	-1008.74	N
66	0.142	1.73	5.39	4.71	-0.672	-473.54	N	4.21	-1.174	-826.45	N	4.33	-1.061	-747.25	N
67	0.142	1.73	5.26	4.61	-0.647	-455.75	N	4.14	-1.124	-791.42	N	4.24	-1.020	-718.12	N
68	0.714	1.594	3.60	3.10	-0.505	-70.78	N	2.61	-0.990	-138.64	N	2.68	-0.922	-129.12	N
69	0.714	1.594	4.21	3.57	-0.640	-89.65	N	2.96	-1.246	-174.49	N	3.05	-1.161	-162.65	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
70	0.714	1.594	3.51	3.02	-0.488	-68.37	N	2.56	-0.955	-133.73	N	2.62	-0.890	-124.59	N
71	0.714	1.594	3.27	2.81	-0.459	-64.30	N	2.33	-0.937	-131.21	N	2.39	-0.881	-123.40	N
72	0.714	1.594	3.48	2.95	-0.521	-73.01	N	2.43	-1.049	-146.99	N	2.48	-0.996	-139.49	N
73	0.714	1.594	3.12	2.69	-0.423	-59.22	N	2.25	-0.869	-121.75	N	2.29	-0.830	-116.23	N
74	0.714	1.594	2.36	2.14	-0.216	-30.21	N	1.90	-0.458	-64.16	N	1.92	-0.434	-60.74	N
75	0.714	1.594	3.04	2.67	-0.366	-51.19	N	2.30	-0.743	-104.03	N	2.33	-0.708	-99.14	N
76	0.714	1.594	2.35	2.16	-0.199	-27.86	N	1.91	-0.443	-62.01	N	1.93	-0.420	-58.81	N
77	0.714	1.594	2.67	2.38	-0.290	-40.67	N	2.07	-0.592	-82.85	N	2.10	-0.564	-78.98	N
78	0.142	1.73	3.04	2.88	-0.160	-112.93	N	2.72	-0.320	-225.07	N	2.74	-0.296	-208.74	N
79	0.714	1.594	3.78	3.18	-0.596	-83.41	N	2.58	-1.201	-168.22	N	2.64	-1.136	-159.09	N
80	0.714	1.594	3.16	2.74	-0.421	-59.02	N	2.34	-0.816	-114.26	N	2.40	-0.760	-106.50	N
81	0.142	1.73	4.18	3.75	-0.435	-306.01	N	3.43	-0.754	-530.96	N	3.50	-0.685	-482.28	N
82	0.142	1.73	3.64	3.36	-0.281	-197.81	N	3.10	-0.536	-377.21	N	3.18	-0.462	-325.63	N
83	0.142	1.73	4.22	3.86	-0.359	-252.71	N	3.53	-0.692	-487.55	N	3.62	-0.593	-417.85	N
84	0.142	1.73	3.98	3.67	-0.308	-217.18	N	3.37	-0.608	-428.41	N	3.46	-0.519	-365.75	N
85	0.142	1.73	4.69	4.26	-0.432	-304.05	N	3.86	-0.835	-588.02	N	3.98	-0.713	-502.37	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
86	0.142	1.73	4.18	3.85	-0.327	-230.27	N	3.52	-0.658	-463.25	N	3.62	-0.559	-393.56	N
87	0.142	1.73	3.96	3.64	-0.313	-220.48	N	3.35	-0.606	-426.66	N	3.44	-0.517	-364.22	N
88	0.142	1.73	4.46	4.07	-0.393	-276.85	N	3.70	-0.762	-536.92	N	3.81	-0.651	-458.11	N
89	0.142	1.73	3.52	3.28	-0.244	-171.55	N	3.05	-0.471	-331.73	N	3.12	-0.401	-282.73	N
90	0.142	1.73	2.16	2.15	-0.013	-9.22	N	2.14	-0.021	-14.99	Y	2.22	0.058	40.72	Y
91	0.142	1.73	2.15	2.14	-0.005	-3.55	Y	2.14	-0.004	-2.84	Y	2.23	0.081	56.77	Y
92	0.142	1.73	3.56	3.23	-0.334	-235.11	N	2.92	-0.642	-452.46	N	3.02	-0.539	-379.87	N
93	0.142	1.73	3.05	2.86	-0.192	-135.51	N	2.72	-0.329	-231.88	N	2.81	-0.244	-171.60	N
94	0.142	1.73	1.97	1.84	-0.136	-95.47	N	1.69	-0.285	-200.93	N	1.74	-0.228	-160.86	N
95	0.142	1.73	2.98	2.81	-0.176	-123.79	N	2.68	-0.298	-210.05	N	2.76	-0.218	-153.46	N
96	0.142	1.73	2.71	2.60	-0.110	-77.12	N	2.51	-0.200	-141.01	N	2.57	-0.140	-98.88	N
97	0.142	1.73	3.27	3.04	-0.225	-158.72	N	2.89	-0.380	-267.31	N	3.00	-0.274	-192.76	N
98	0.142	1.73	2.96	2.80	-0.162	-113.97	N	2.68	-0.280	-197.42	N	2.76	-0.200	-140.86	N
99	0.142	1.73	2.95	2.78	-0.170	-119.95	N	2.67	-0.286	-201.11	N	2.75	-0.206	-144.87	N
100	0.142	1.73	4.50	4.47	-0.022	-15.41	N	4.46	-0.034	-23.89	N	4.46	-0.032	-22.21	N
101	0.142	1.73	4.50	4.48	-0.023	-16.47	N	4.47	-0.036	-25.13	N	4.47	-0.033	-23.38	N

Table B2: Predicted Acid Deposition with 10% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
102	0.142	1.73	2.26	2.25	-0.009	-6.30	N	2.24	-0.015	-10.65	N	2.25	-0.011	-7.44	N
103	0.142	1.73	2.27	2.26	-0.011	-7.80	N	2.25	-0.019	-13.04	N	2.26	-0.012	-8.76	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m^3)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	1	3.1	3.03	-0.07	-7.30	N	3.11	0.00	0.00	N	3.12	0.01	1.47	**Y**
2	1	2.9	2.85	-0.04	-3.72	N	2.89	0.00	-0.07	N	2.90	0.01	0.67	N
3	1	3.2	3.12	-0.13	-12.63	N	3.19	-0.05	-5.25	N	3.22	-0.03	-2.78	N
4	1	4.4	4.05	-0.39	-39.01	N	4.28	-0.16	-16.40	N	4.35	-0.09	-8.74	N
5	1	5.4	4.76	-0.59	-59.08	N	5.10	-0.25	-24.95	N	5.22	-0.13	-13.29	N
6	1	4.0	3.74	-0.30	-29.98	N	3.91	-0.13	-12.60	N	3.97	-0.07	-6.73	N
7	1	5.3	4.76	-0.59	-58.90	N	5.10	-0.25	-24.85	N	5.21	-0.13	-13.25	N
8	1	4.3	3.91	-0.35	-34.89	N	4.11	-0.15	-14.67	N	4.18	-0.08	-7.85	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
9	1	5.3	4.69	-0.57	-56.94	N	5.02	-0.24	-23.92	N	5.13	-0.13	-12.81	N
10	1	4.5	4.09	-0.40	-39.83	N	4.32	-0.17	-16.67	N	4.40	-0.09	-8.98	N
11	1	6.9	6.49	-0.39	-38.78	N	6.72	-0.16	-16.15	N	6.79	-0.09	-8.76	N
12	1	5.0	4.52	-0.52	-51.96	N	4.82	-0.22	-21.76	N	4.92	-0.12	-11.70	N
13	1	7.4	6.95	-0.47	-47.42	N	7.25	-0.18	-17.80	N	7.34	-0.09	-8.90	N
14	1	6.5	6.26	-0.29	-29.10	N	6.43	-0.12	-11.59	N	6.46	-0.09	-8.74	N
15	1	7.2	6.79	-0.41	-41.38	N	7.04	-0.17	-16.61	N	7.06	-0.15	-14.57	N
16	1	5.4	5.38	-0.06	-6.19	N	5.42	-0.02	-2.04	N	5.42	-0.01	-1.41	N
17	1	7.3	6.91	-0.44	-43.77	N	7.17	-0.18	-17.56	N	7.18	-0.16	-16.14	N
18	1	8.8	8.06	-0.72	-71.86	N	8.49	-0.29	-29.01	N	8.51	-0.27	-27.11	N
19	1	10.2	9.18	-0.99	-98.93	N	9.77	-0.40	-40.04	N	9.79	-0.38	-37.58	N
20	1	9.9	8.96	-0.93	-93.49	N	9.51	-0.38	-37.79	N	9.54	-0.35	-35.39	N
21	1	7.9	7.35	-0.55	-54.57	N	7.68	-0.22	-21.95	N	7.69	-0.20	-20.26	N
22	1	6.9	6.54	-0.36	-35.62	N	6.75	-0.14	-14.31	N	6.78	-0.12	-12.07	N
23	1	7.0	6.59	-0.40	-40.45	N	6.82	-0.17	-16.78	N	6.89	-0.10	-10.18	N
24	1	7.2	6.75	-0.46	-46.01	N	7.02	-0.19	-19.27	N	7.10	-0.11	-10.78	N
25	1	5.5	5.44	-0.09	-9.05	N	5.50	-0.04	-3.67	N	5.51	-0.02	-2.41	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
26	1	7.3	6.79	-0.47	-47.47	N	7.07	-0.20	-19.94	N	7.16	-0.11	-10.92	N
27	1	7.2	6.73	-0.46	-45.99	N	7.00	-0.19	-19.35	N	7.09	-0.10	-10.48	N
28	1	6.6	6.30	-0.30	-29.77	N	6.47	-0.12	-12.19	N	6.53	-0.07	-6.62	N
29	1	2.1	2.11	-0.02	-2.17	N	2.13	-0.01	-0.81	N	2.13	0.00	-0.45	N
30	1	4.3	3.78	-0.47	-47.13	N	4.08	-0.18	-17.64	N	4.16	-0.09	-9.19	N
31	1	3.4	3.15	-0.29	-28.56	N	3.34	-0.09	-9.10	N	3.39	-0.05	-4.59	N
32	1	4.6	4.04	-0.56	-56.34	N	4.37	-0.23	-23.39	N	4.48	-0.12	-12.41	N
33	1	3.9	3.46	-0.40	-39.76	N	3.70	-0.16	-16.10	N	3.78	-0.09	-8.51	N
34	1	4.1	3.65	-0.45	-45.42	N	3.91	-0.19	-18.87	N	4.00	-0.10	-10.01	N
35	1	3.4	3.16	-0.26	-25.80	N	3.36	-0.06	-5.56	N	3.40	-0.02	-1.78	N
36	1	3.2	3.00	-0.22	-22.11	N	3.17	-0.05	-4.80	N	3.20	-0.02	-1.56	N
37	1	3.5	3.22	-0.27	-26.98	N	3.43	-0.06	-5.74	N	3.47	-0.02	-1.80	N
38	1	3.2	2.98	-0.22	-21.61	N	3.15	-0.05	-4.66	N	3.18	-0.01	-1.49	N
39	1	2.3	2.23	-0.05	-5.30	N	2.27	-0.02	-1.85	N	2.28	-0.01	-0.97	N
40	1	2.2	2.19	-0.04	-4.06	N	2.21	-0.01	-1.42	N	2.22	-0.01	-0.74	N
41	1	3.2	3.00	-0.22	-22.04	N	3.17	-0.05	-4.65	N	3.21	-0.01	-1.44	N
42	1	6.5	6.27	-0.27	-26.61	N	6.48	-0.06	-5.53	N	6.52	-0.02	-1.66	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
43	1	6.6	6.30	-0.27	-27.06	N	6.51	-0.06	-5.59	N	6.55	-0.02	-1.67	N
44	1	3.3	3.06	-0.26	-25.54	N	3.24	-0.07	-7.34	N	3.28	-0.04	-3.62	N
45	1	2.8	2.54	-0.27	-26.85	N	2.73	-0.08	-7.65	N	2.77	-0.04	-3.76	N
46	1	4.8	4.18	-0.61	-60.75	N	4.53	-0.26	-25.67	N	4.65	-0.14	-13.69	N
47	1	3.9	3.49	-0.41	-41.27	N	3.73	-0.17	-17.43	N	3.81	-0.09	-9.31	N
48	1	3.4	2.99	-0.44	-43.50	N	3.24	-0.19	-18.61	N	3.33	-0.10	-10.15	N
49	1	1.9	1.81	-0.10	-9.90	N	1.86	-0.04	-4.20	N	1.88	-0.02	-2.32	N
50	1	3.2	2.85	-0.38	-38.15	N	3.05	-0.18	-17.91	N	3.12	-0.11	-11.32	N
51	1	2.4	2.19	-0.18	-18.04	N	2.26	-0.12	-11.51	N	2.27	-0.10	-10.03	N
52	1	2.2	2.09	-0.16	-15.52	N	2.15	-0.10	-9.96	N	2.16	-0.09	-8.73	N
53	1	3.6	3.13	-0.46	-45.99	N	3.37	-0.21	-21.32	N	3.45	-0.13	-13.24	N
54	1	3.4	3.00	-0.43	-43.28	N	3.24	-0.19	-19.03	N	3.32	-0.11	-10.88	N
55	1	3.5	3.09	-0.46	-46.24	N	3.35	-0.20	-19.64	N	3.44	-0.11	-10.54	N
56	1	3.9	3.35	-0.54	-53.67	N	3.66	-0.23	-22.75	N	3.76	-0.12	-12.16	N
57	1	3.9	3.34	-0.53	-53.41	N	3.65	-0.23	-22.62	N	3.75	-0.12	-12.05	N
58	1	4.0	3.41	-0.56	-55.60	N	3.73	-0.24	-23.54	N	3.84	-0.13	-12.54	N
59	1	3.7	3.23	-0.50	-50.44	N	3.52	-0.21	-21.34	N	3.62	-0.11	-11.35	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
60	1	4.1	3.55	-0.60	-59.51	N	3.89	-0.25	-25.19	N	4.01	-0.13	-13.40	N
61	1	3.5	3.02	-0.44	-44.42	N	3.28	-0.19	-18.76	N	3.36	-0.10	-9.93	N
62	1	4.2	3.60	-0.61	-60.91	N	3.95	-0.26	-25.72	N	4.07	-0.14	-13.58	N
63	1	2.6	2.36	-0.26	-25.55	N	2.51	-0.10	-10.36	N	2.57	-0.05	-4.84	N
64	1	2.5	2.27	-0.23	-22.58	N	2.41	-0.08	-8.18	N	2.47	-0.02	-2.25	N
65	1	4.1	3.55	-0.59	-59.21	N	3.90	-0.24	-24.49	N	4.02	-0.12	-12.14	N
66	1	4.4	3.73	-0.64	-64.49	N	4.10	-0.27	-27.10	N	4.23	-0.14	-14.10	N
67	1	4.3	3.65	-0.62	-62.29	N	4.01	-0.26	-26.28	N	4.14	-0.14	-13.85	N
68	1	3.9	3.39	-0.55	-54.76	N	3.70	-0.23	-23.08	N	3.81	-0.12	-12.16	N
69	1	4.6	3.87	-0.68	-68.42	N	4.27	-0.29	-28.81	N	4.40	-0.15	-15.17	N
70	1	3.8	3.31	-0.52	-52.30	N	3.61	-0.22	-21.79	N	3.72	-0.11	-11.31	N
71	1	3.1	2.81	-0.34	-33.59	N	3.06	-0.09	-9.26	N	3.14	-0.01	-0.89	N
72	1	3.3	2.94	-0.39	-39.38	N	3.19	-0.14	-13.94	N	3.27	-0.06	-5.80	N
73	1	3.0	2.72	-0.32	-31.99	N	2.94	-0.10	-9.69	N	3.00	-0.04	-3.88	N
74	1	2.6	2.38	-0.23	-23.20	N	2.54	-0.07	-6.78	N	2.58	-0.03	-3.08	N
75	1	3.3	2.91	-0.36	-36.11	N	3.17	-0.10	-10.16	N	3.22	-0.05	-4.80	N
76	1	2.6	2.40	-0.23	-23.44	N	2.57	-0.07	-6.58	N	2.60	-0.03	-3.14	N

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
77	1	2.9	2.62	-0.29	-28.78	N	2.82	-0.08	-8.06	N	2.87	-0.04	-3.86	N
78	1	2.4	2.17	-0.18	-17.83	N	2.30	-0.05	-5.00	N	2.33	-0.02	-2.41	N
79	1	3.6	3.11	-0.45	-44.53	N	3.40	-0.16	-16.28	N	3.49	-0.07	-6.79	N
80	1	3.4	3.01	-0.44	-43.75	N	3.26	-0.18	-18.11	N	3.35	-0.09	-9.30	N
81	1	3.3	2.92	-0.41	-41.24	N	3.16	-0.17	-17.16	N	3.24	-0.09	-8.88	N
82	1	2.7	2.49	-0.19	-19.38	N	2.70	0.02	1.91	Y	2.79	0.10	10.17	**Y**
83	1	3.1	2.89	-0.25	-24.66	N	3.19	0.06	5.58	Y	3.31	0.17	16.78	**Y**
84	1	3.0	2.75	-0.22	-21.93	N	3.02	0.05	5.36	Y	3.12	0.15	15.47	**Y**
85	1	3.5	3.20	-0.29	-29.31	N	3.57	0.08	7.74	Y	3.71	0.21	21.48	**Y**
86	1	3.1	2.88	-0.24	-23.94	N	3.19	0.06	6.37	Y	3.30	0.18	17.62	**Y**
87	1	2.9	2.72	-0.21	-21.25	N	2.99	0.06	5.69	Y	3.09	0.16	15.72	**Y**
88	1	3.3	3.05	-0.27	-26.70	N	3.39	0.07	7.23	Y	3.52	0.20	19.94	**Y**
89	1	2.6	2.44	-0.17	-16.53	N	2.65	0.04	4.42	Y	2.73	0.12	12.28	**Y**
90	1	1.6	1.56	0.00	-0.35	N	1.61	0.04	4.28	Y	1.69	0.13	12.94	**Y**
91	1	1.6	1.57	0.00	-0.14	N	1.62	0.05	5.12	Y	1.72	0.15	15.10	**Y**
92	1	2.6	2.33	-0.24	-23.79	N	2.50	-0.07	-7.49	N	2.57	0.00	-0.01	N
93	1	2.3	2.15	-0.17	-17.30	N	2.31	-0.02	-1.66	N	2.41	0.08	7.84	**Y**

Table B3: Predicted Annual Mean NH_3 Concentrations with 20% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
94	1	2.2	2.08	-0.15	-15.42	N	2.22	-0.01	-1.45	N	2.30	0.07	7.05	**Y**
95	1	2.3	2.11	-0.16	-16.12	N	2.26	-0.01	-1.14	N	2.35	0.08	8.14	**Y**
96	1	2.1	1.94	-0.12	-11.98	N	2.05	-0.01	-0.84	N	2.12	0.06	6.06	**Y**
97	1	2.5	2.31	-0.21	-20.69	N	2.50	-0.01	-1.01	N	2.63	0.11	11.41	**Y**
98	1	2.3	2.10	-0.16	-15.78	N	2.25	-0.01	-0.79	N	2.35	0.09	8.65	**Y**
99	1	2.2	2.09	-0.16	-15.54	N	2.24	-0.01	-0.78	N	2.33	0.09	8.53	**Y**
100	1	5.2	5.16	-0.01	-1.42	N	5.17	0.00	-0.36	N	5.17	0.00	-0.13	N
101	1	5.2	5.16	-0.01	-1.49	N	5.18	0.00	-0.35	N	5.18	0.00	-0.11	N
102	1	1.8	1.84	-0.01	-0.81	N	1.85	0.00	0.22	N	1.85	0.01	0.70	N
103	1	1.9	1.85	-0.01	-1.02	N	1.86	0.00	0.36	N	1.87	0.01	1.03	**Y**

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	0.1	1.7	3.05	2.97	-0.076	-53.57	N	2.97	-0.076	-53.48	N	2.98	-0.067	-46.90	N
2	0.1	1.7	2.88	2.84	-0.039	-27.29	N	2.84	-0.039	-27.46	N	2.84	-0.034	-24.15	N
3	0.1	1.7	3.51	3.26	-0.251	-177.05	N	3.13	-0.385	-271.12	N	3.15	-0.365	-256.93	N
4	0.1	1.7	4.99	4.30	-0.689	-485.08	N	3.96	-1.034	-728.01	N	4.02	-0.974	-685.72	N
5	0.1	1.7	5.90	4.97	-0.927	-653.07	N	4.53	-1.364	-960.43	N	4.62	-1.276	-898.73	N
6	0.1	1.7	4.33	3.85	-0.479	-337.36	N	3.63	-0.698	-491.25	N	3.68	-0.653	-459.83	N
7	0.1	1.7	5.89	4.97	-0.925	-651.33	N	4.53	-1.361	-958.61	N	4.62	-1.274	-897.23	N
8	0.1	1.7	4.61	4.05	-0.560	-394.51	N	3.79	-0.819	-576.45	N	3.84	-0.767	-539.96	N
9	0.1	1.7	6.03	5.04	-0.988	-695.95	N	4.53	-1.491	-1050.07	N	4.62	-1.405	-989.24	N
10	0.1	1.7	5.03	4.33	-0.699	-492.41	N	3.98	-1.047	-737.29	N	4.04	-0.987	-694.81	N
11	0.1	1.7	6.68	6.00	-0.682	-480.36	N	5.66	-1.022	-719.51	N	5.71	-0.964	-678.60	N
12	0.1	1.7	5.74	4.84	-0.905	-637.12	N	4.38	-1.365	-961.11	N	4.46	-1.286	-905.92	N
13	0.1	1.7	7.60	6.66	-0.945	-665.31	N	6.13	-1.476	-1039.58	N	6.20	-1.404	-988.72	N
14	0.1	1.7	6.17	5.67	-0.509	-358.10	N	5.40	-0.771	-543.14	N	5.43	-0.747	-526.17	N
15	0.1	1.7	6.82	6.15	-0.672	-473.01	N	5.81	-1.007	-708.98	N	5.83	-0.988	-695.81	N
16	0.1	1.7	4.80	4.69	-0.107	-75.63	N	4.63	-0.163	-114.96	N	4.64	-0.158	-111.33	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
17	0.1	1.7	6.92	6.23	-0.695	-489.20	N	5.89	-1.034	-728.41	N	5.90	-1.020	-718.55	N
18	0.1	1.7	8.52	7.39	-1.128	-794.38	N	6.84	-1.682	-1184.42	N	6.86	-1.662	-1170.43	N
19	0.1	1.7	10.07	8.50	-1.567	-1103.29	N	7.75	-2.317	-1631.90	N	7.77	-2.291	-1613.49	N
20	0.1	1.7	9.76	8.28	-1.483	-1044.13	N	7.57	-2.192	-1544.01	N	7.59	-2.167	-1526.22	N
21	0.1	1.7	7.54	6.67	-0.873	-614.77	N	6.25	-1.291	-908.82	N	6.27	-1.274	-896.90	N
22	0.1	1.7	6.51	5.91	-0.598	-421.43	N	5.61	-0.892	-628.00	N	5.63	-0.872	-613.97	N
23	0.1	1.7	6.95	6.17	-0.775	-545.92	N	5.77	-1.182	-832.57	N	5.82	-1.128	-794.33	N
24	0.1	1.7	6.91	6.18	-0.731	-514.82	N	5.84	-1.071	-754.49	N	5.90	-1.007	-709.04	N
25	0.1	1.7	4.91	4.76	-0.148	-104.32	N	4.69	-0.217	-152.53	N	4.70	-0.207	-145.53	N
26	0.1	1.7	6.98	6.23	-0.748	-526.78	N	5.88	-1.097	-772.79	N	5.95	-1.029	-724.75	N
27	0.1	1.7	6.89	6.17	-0.723	-508.89	N	5.83	-1.061	-746.92	N	5.90	-0.994	-699.81	N
28	0.1	1.7	6.17	5.71	-0.465	-327.67	N	5.44	-0.737	-518.77	N	5.48	-0.696	-490.00	N
29	0.1	1.7	2.43	2.39	-0.037	-26.40	N	2.37	-0.056	-39.33	N	2.38	-0.053	-37.35	N
30	0.1	1.7	5.24	4.37	-0.867	-610.30	N	3.92	-1.322	-931.34	N	3.98	-1.257	-885.01	N
31	0.1	1.7	4.19	3.64	-0.548	-385.77	N	3.35	-0.844	-594.54	N	3.38	-0.809	-569.87	N
32	0.1	1.7	5.38	4.49	-0.891	-627.54	N	4.07	-1.315	-926.03	N	4.15	-1.233	-867.97	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
33	0.1	1.7	4.67	3.96	-0.708	-498.81	N	3.61	-1.065	-749.66	N	3.66	-1.005	-707.84	N
34	0.1	1.7	4.78	4.05	-0.723	-508.86	N	3.72	-1.058	-744.77	N	3.79	-0.991	-697.66	N
35	0.1	1.7	3.96	3.52	-0.443	-311.74	N	3.30	-0.662	-466.22	N	3.33	-0.633	-446.00	N
36	0.1	1.7	3.72	3.34	-0.380	-267.85	N	3.15	-0.567	-399.36	N	3.18	-0.542	-381.95	N
37	0.1	1.7	4.04	3.58	-0.462	-325.22	N	3.35	-0.691	-486.69	N	3.38	-0.661	-465.65	N
38	0.1	1.7	3.69	3.32	-0.372	-261.79	N	3.14	-0.554	-389.79	N	3.16	-0.529	-372.81	N
39	0.1	1.7	2.61	2.52	-0.090	-63.38	N	2.48	-0.134	-94.02	N	2.49	-0.127	-89.24	N
40	0.1	1.7	2.54	2.47	-0.068	-47.64	N	2.44	-0.100	-70.37	N	2.44	-0.095	-66.75	N
41	0.1	1.7	3.72	3.34	-0.377	-265.70	N	3.16	-0.564	-397.07	N	3.18	-0.539	-379.91	N
42	0.1	1.7	6.12	5.66	-0.459	-322.99	N	5.44	-0.683	-480.74	N	5.47	-0.653	-460.02	N
43	0.1	1.7	6.15	5.68	-0.467	-328.63	N	5.45	-0.695	-489.14	N	5.48	-0.665	-468.12	N
44	0.7	1.6	3.55	3.19	-0.356	-49.92	N	2.97	-0.577	-80.80	N	2.99	-0.556	-77.87	N
45	0.7	1.6	2.52	2.14	-0.374	-52.35	N	1.91	-0.606	-84.82	N	1.93	-0.584	-81.76	N
46	0.7	1.7	3.97	3.18	-0.796	-111.47	N	2.70	-1.277	-178.83	N	2.76	-1.211	-169.54	N
47	0.1	1.7	4.46	3.84	-0.625	-439.99	N	3.56	-0.904	-636.46	N	3.62	-0.843	-593.88	N
48	0.1	1.7	4.29	3.63	-0.662	-466.01	N	3.33	-0.961	-676.57	N	3.39	-0.898	-632.19	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
49	0.7	1.6	1.64	1.51	-0.135	-18.85	N	1.43	-0.214	-29.98	N	1.44	-0.204	-28.50	N
50	0.1	1.7	4.15	3.53	-0.626	-441.03	N	3.21	-0.944	-664.58	N	3.26	-0.895	-630.30	N
51	0.1	1.7	3.10	2.80	-0.305	-214.85	N	2.61	-0.498	-350.44	N	2.62	-0.486	-342.51	N
52	0.1	1.7	2.95	2.69	-0.262	-184.38	N	2.52	-0.429	-302.07	N	2.53	-0.420	-295.44	N
53	0.1	1.7	4.57	3.83	-0.745	-524.59	N	3.45	-1.120	-788.93	N	3.51	-1.061	-746.89	N
54	0.1	1.7	4.33	3.66	-0.666	-469.34	N	3.34	-0.986	-694.25	N	3.40	-0.926	-651.86	N
55	0.1	1.7	4.43	3.73	-0.699	-492.24	N	3.41	-1.013	-713.58	N	3.48	-0.946	-665.95	N
56	0.1	1.7	4.81	4.00	-0.807	-568.64	N	3.64	-1.172	-825.60	N	3.72	-1.094	-770.24	N
57	0.7	1.7	3.55	2.84	-0.704	-98.58	N	2.42	-1.123	-157.34	N	2.48	-1.065	-149.10	N
58	0.7	1.6	3.64	2.92	-0.727	-101.83	N	2.48	-1.167	-163.43	N	2.54	-1.106	-154.90	N
59	0.7	1.6	3.42	2.75	-0.665	-93.16	N	2.36	-1.061	-148.59	N	2.41	-1.005	-140.79	N
60	0.7	1.6	3.81	3.04	-0.777	-108.86	N	2.57	-1.248	-174.82	N	2.63	-1.183	-165.68	N
61	0.7	1.6	3.15	2.57	-0.588	-82.34	N	2.22	-0.936	-131.09	N	2.27	-0.887	-124.18	N
62	0.7	1.6	3.88	3.09	-0.799	-111.88	N	2.60	-1.284	-179.79	N	2.67	-1.216	-170.37	N
63	0.7	1.6	2.60	2.15	-0.448	-62.73	N	1.86	-0.739	-103.46	N	1.90	-0.705	-98.67	N
64	0.7	1.6	2.46	2.06	-0.402	-56.35	N	1.80	-0.659	-92.26	N	1.84	-0.622	-87.07	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
65	0.1	1.7	5.79	4.63	-1.157	-815.00	N	4.00	-1.790	-1260.56	N	4.10	-1.691	-1190.64	N
66	0.1	1.7	5.39	4.42	-0.965	-679.45	N	3.98	-1.411	-993.49	N	4.07	-1.315	-925.87	N
67	0.1	1.7	5.26	4.33	-0.929	-654.27	N	3.90	-1.356	-954.95	N	4.00	-1.264	-890.31	N
68	0.7	1.6	3.61	2.89	-0.716	-100.24	N	2.46	-1.150	-161.06	N	2.52	-1.090	-152.60	N
69	0.7	1.6	4.21	3.32	-0.894	-125.19	N	2.77	-1.437	-201.30	N	2.85	-1.362	-190.73	N
70	0.7	1.6	3.52	2.83	-0.689	-96.53	N	2.41	-1.107	-155.11	N	2.47	-1.049	-146.95	N
71	0.7	1.6	3.27	2.63	-0.640	-89.63	N	2.20	-1.067	-149.46	N	2.26	-1.015	-142.17	N
72	0.7	1.6	3.48	2.76	-0.717	-100.40	N	2.29	-1.189	-166.50	N	2.34	-1.138	-159.39	N
73	0.7	1.6	3.12	2.53	-0.588	-82.35	N	2.13	-0.986	-138.11	N	2.17	-0.950	-133.11	N
74	0.7	1.6	2.38	2.04	-0.345	-48.29	N	1.82	-0.565	-79.07	N	1.84	-0.539	-75.48	N
75	0.7	1.6	3.04	2.51	-0.525	-73.56	N	2.17	-0.870	-121.88	N	2.21	-0.832	-116.54	N
76	0.7	1.6	2.39	2.05	-0.344	-48.18	N	1.83	-0.566	-79.30	N	1.85	-0.541	-75.81	N
77	0.7	1.6	2.67	2.25	-0.417	-58.45	N	1.97	-0.693	-97.05	N	2.00	-0.663	-92.84	N
78	0.1	1.7	3.07	2.78	-0.294	-207.37	N	2.63	-0.440	-309.60	N	2.66	-0.416	-292.98	N
79	0.7	1.6	3.78	2.96	-0.815	-114.16	N	2.42	-1.354	-189.68	N	2.48	-1.295	-181.38	N
80	0.7	1.6	3.16	2.57	-0.589	-82.55	N	2.22	-0.941	-131.84	N	2.27	-0.892	-124.90	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
81	0.1	1.7	4.18	3.56	-0.624	-439.70	N	3.27	-0.910	-641.11	N	3.33	-0.849	-597.77	N
82	0.1	1.7	3.64	3.21	-0.429	-302.17	N	2.98	-0.657	-462.68	N	3.05	-0.592	-416.59	N
83	0.1	1.7	4.22	3.66	-0.561	-395.09	N	3.36	-0.860	-605.51	N	3.45	-0.772	-543.36	N
84	0.1	1.7	3.99	3.49	-0.500	-352.29	N	3.22	-0.770	-542.14	N	3.30	-0.691	-486.28	N
85	0.1	1.7	4.69	4.01	-0.679	-477.83	N	3.65	-1.040	-732.20	N	3.76	-0.931	-655.71	N
86	0.1	1.7	4.20	3.65	-0.551	-388.23	N	3.35	-0.849	-597.73	N	3.44	-0.760	-535.45	N
87	0.1	1.7	3.96	3.46	-0.492	-346.53	N	3.20	-0.754	-531.30	N	3.28	-0.675	-475.50	N
88	0.1	1.7	4.46	3.84	-0.617	-434.49	N	3.51	-0.949	-668.21	N	3.61	-0.849	-597.71	N
89	0.1	1.7	3.52	3.14	-0.383	-269.63	N	2.93	-0.587	-413.15	N	3.00	-0.525	-369.39	N
90	0.1	1.7	2.16	2.13	-0.028	-19.69	N	2.13	-0.036	-25.11	N	2.19	0.034	23.65	Y
91	0.1	1.7	2.15	2.13	-0.020	-13.91	N	2.13	-0.019	-13.43	Y	2.20	0.055	39.02	Y
92	0.1	1.7	3.56	3.09	-0.472	-332.65	N	2.85	-0.714	-502.58	N	2.91	-0.653	-459.92	N
93	0.1	1.7	3.05	2.76	-0.289	-203.85	N	2.65	-0.405	-285.23	N	2.72	-0.334	-234.88	N
94	0.1	1.7	1.99	1.77	-0.227	-159.80	N	1.64	-0.356	-250.96	N	1.68	-0.309	-217.31	N
95	0.1	1.7	2.98	2.72	-0.266	-187.13	N	2.61	-0.372	-261.62	N	2.68	-0.302	-212.81	N
96	0.1	1.7	2.73	2.53	-0.198	-139.53	N	2.45	-0.276	-194.66	N	2.51	-0.225	-158.28	N

Table B4: Predicted Acid Deposition with 20% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
97	0.1	1.7	3.27	2.93	-0.342	-240.82	N	2.79	-0.476	-335.43	N	2.89	-0.384	-270.09	N
98	0.1	1.7	2.97	2.71	-0.260	-183.07	N	2.60	-0.363	-255.92	N	2.68	-0.293	-206.40	N
99	0.1	1.7	2.95	2.69	-0.259	-182.19	N	2.59	-0.359	-252.52	N	2.66	-0.289	-203.31	N
100	0.1	1.7	4.50	4.47	-0.030	-21.16	N	4.46	-0.040	-28.48	N	4.46	-0.039	-27.25	N
101	0.1	1.7	4.50	4.47	-0.032	-22.55	N	4.46	-0.043	-30.04	N	4.46	-0.041	-28.73	N
102	0.1	1.7	2.26	2.24	-0.014	-10.05	N	2.24	-0.019	-13.65	N	2.24	-0.016	-11.07	N
103	0.1	1.7	2.27	2.25	-0.018	-12.62	N	2.25	-0.024	-17.04	N	2.25	-0.019	-13.48	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m^3)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	1	3.1	2.99	-0.12	-11.86	N	3.05	-0.05	-5.47	N	3.07	-0.04	-4.18	N
2	1	2.9	2.83	-0.06	-6.02	N	2.86	-0.03	-2.82	N	2.87	-0.02	-2.17	N
3	1	3.2	3.06	-0.18	-18.26	N	3.13	-0.12	-11.81	N	3.15	-0.10	-9.64	N
4	1	4.4	3.88	-0.56	-56.27	N	4.08	-0.37	-36.52	N	4.14	-0.30	-29.79	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
5	1	5.4	4.50	-0.85	-85.21	N	4.80	-0.55	-55.34	N	4.90	-0.45	-45.14	N
6	1	4.0	3.60	-0.43	-43.30	N	3.75	-0.28	-28.09	N	3.81	-0.23	-22.95	N
7	1	5.3	4.50	-0.85	-84.98	N	4.79	-0.55	-55.18	N	4.89	-0.45	-45.04	N
8	1	4.3	3.76	-0.50	-50.40	N	3.93	-0.33	-32.70	N	3.99	-0.27	-26.74	N
9	1	5.3	4.44	-0.82	-82.19	N	4.73	-0.53	-53.36	N	4.82	-0.44	-43.59	N
10	1	4.5	3.91	-0.58	-57.58	N	4.11	-0.37	-37.35	N	4.18	-0.31	-30.58	N
11	1	6.9	6.32	-0.56	-56.17	N	6.51	-0.36	-36.41	N	6.58	-0.30	-29.90	N
12	1	5.0	4.29	-0.75	-75.10	N	4.55	-0.49	-48.73	N	4.64	-0.40	-39.87	N
13	1	7.4	6.72	-0.71	-70.59	N	6.98	-0.45	-44.71	N	7.06	-0.37	-36.88	N
14	1	6.5	6.11	-0.44	-43.55	N	6.26	-0.28	-28.24	N	6.29	-0.26	-25.74	N
15	1	7.2	6.58	-0.62	-62.49	N	6.79	-0.41	-40.82	N	6.81	-0.39	-39.03	N
16	1	5.4	5.34	-0.10	-9.66	N	5.38	-0.06	-6.02	N	5.38	-0.05	-5.47	N
17	1	7.3	6.68	-0.66	-66.36	N	6.91	-0.43	-43.42	N	6.92	-0.42	-42.19	N
18	1	8.8	7.69	-1.09	-108.92	N	8.07	-0.71	-71.43	N	8.09	-0.70	-69.76	N
19	1	10.2	8.67	-1.50	-149.93	N	9.19	-0.98	-98.39	N	9.21	-0.96	-96.24	N
20	1	9.9	8.47	-1.42	-141.70	N	8.96	-0.93	-92.96	N	8.98	-0.91	-90.85	N
21	1	7.9	7.07	-0.83	-82.71	N	7.36	-0.54	-54.17	N	7.37	-0.53	-52.69	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
22	1	6.9	6.36	-0.54	-53.62	N	6.55	-0.35	-34.98	N	6.57	-0.33	-33.01	N
23	1	7.0	6.40	-0.59	-59.02	N	6.61	-0.38	-38.35	N	6.66	-0.33	-32.54	N
24	1	7.2	6.54	-0.67	-66.64	N	6.78	-0.43	-43.28	N	6.85	-0.36	-35.81	N
25	1	5.5	5.40	-0.13	-13.35	N	5.45	-0.09	-8.65	N	5.46	-0.08	-7.55	N
26	1	7.3	6.58	-0.69	-68.60	N	6.82	-0.45	-44.56	N	6.90	-0.37	-36.62	N
27	1	7.2	6.53	-0.66	-66.40	N	6.76	-0.43	-43.14	N	6.84	-0.35	-35.33	N
28	1	6.6	6.15	-0.45	-44.72	N	6.30	-0.29	-29.34	N	6.35	-0.24	-24.46	N
29	1	2.1	2.10	-0.03	-3.22	N	2.11	-0.02	-2.02	N	2.12	-0.02	-1.71	N
30	1	4.3	3.56	-0.69	-69.01	N	3.82	-0.43	-43.21	N	3.89	-0.36	-35.82	N
31	1	3.4	3.01	-0.43	-42.56	N	3.18	-0.26	-25.54	N	3.22	-0.22	-21.59	N
32	1	4.6	3.79	-0.81	-81.45	N	4.08	-0.53	-52.61	N	4.17	-0.43	-43.01	N
33	1	3.9	3.28	-0.58	-57.67	N	3.49	-0.37	-36.97	N	3.56	-0.30	-30.33	N
34	1	4.1	3.45	-0.66	-65.66	N	3.68	-0.42	-42.42	N	3.76	-0.35	-34.68	N
35	1	3.4	3.02	-0.40	-39.93	N	3.20	-0.22	-22.22	N	3.23	-0.19	-18.92	N
36	1	3.2	2.88	-0.34	-34.20	N	3.03	-0.19	-19.06	N	3.06	-0.16	-16.22	N
37	1	3.5	3.07	-0.42	-41.80	N	3.25	-0.23	-23.20	N	3.29	-0.20	-19.77	N
38	1	3.2	2.86	-0.33	-33.44	N	3.01	-0.19	-18.61	N	3.03	-0.16	-15.85	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
39	1	2.3	2.21	-0.08	-7.84	N	2.24	-0.05	-4.83	N	2.25	-0.04	-4.05	N
40	1	2.2	2.17	-0.06	-6.01	N	2.19	-0.04	-3.70	N	2.20	-0.03	-3.11	N
41	1	3.2	2.88	-0.34	-34.16	N	3.03	-0.19	-18.94	N	3.06	-0.16	-16.14	N
42	1	6.5	6.13	-0.41	-41.29	N	6.31	-0.23	-22.83	N	6.35	-0.19	-19.46	N
43	1	6.6	6.15	-0.42	-42.00	N	6.33	-0.23	-23.20	N	6.37	-0.20	-19.78	N
44	1	3.3	2.93	-0.38	-38.42	N	3.09	-0.22	-22.50	N	3.12	-0.19	-19.23	N
45	1	2.8	2.40	-0.40	-40.42	N	2.57	-0.24	-23.62	N	2.60	-0.20	-20.21	N
46	1	4.8	3.91	-0.88	-87.62	N	4.22	-0.57	-56.91	N	4.32	-0.46	-46.44	N
47	1	3.9	3.31	-0.60	-59.55	N	3.52	-0.39	-38.68	N	3.59	-0.32	-31.58	N
48	1	3.4	2.80	-0.63	-62.81	N	3.02	-0.41	-41.03	N	3.09	-0.34	-33.63	N
49	1	1.9	1.76	-0.14	-14.36	N	1.81	-0.09	-9.37	N	1.83	-0.08	-7.73	N
50	1	3.2	2.67	-0.56	-55.62	N	2.85	-0.38	-37.90	N	2.91	-0.32	-32.14	N
51	1	2.4	2.10	-0.27	-27.34	N	2.16	-0.22	-21.63	N	2.17	-0.20	-20.34	N
52	1	2.2	2.01	-0.24	-23.56	N	2.06	-0.19	-18.69	N	2.07	-0.18	-17.61	N
53	1	3.6	2.92	-0.67	-66.94	N	3.13	-0.45	-45.36	N	3.20	-0.38	-38.29	N
54	1	3.4	2.81	-0.63	-62.67	N	3.02	-0.41	-41.44	N	3.09	-0.34	-34.31	N
55	1	3.5	2.88	-0.67	-66.70	N	3.11	-0.43	-43.42	N	3.19	-0.35	-35.47	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
56	1	3.9	3.11	-0.77	-77.39	N	3.38	-0.50	-50.33	N	3.47	-0.41	-41.07	N
57	1	3.9	3.10	-0.77	-77.00	N	3.37	-0.50	-50.05	N	3.46	-0.41	-40.81	N
58	1	4.0	3.17	-0.80	-80.15	N	3.45	-0.52	-52.09	N	3.55	-0.42	-42.47	N
59	1	3.7	3.01	-0.73	-72.72	N	3.26	-0.47	-47.25	N	3.35	-0.39	-38.51	N
60	1	4.1	3.29	-0.86	-85.77	N	3.59	-0.56	-55.74	N	3.69	-0.45	-45.43	N
61	1	3.5	2.82	-0.64	-64.04	N	3.05	-0.42	-41.58	N	3.13	-0.34	-33.86	N
62	1	4.2	3.33	-0.88	-87.80	N	3.64	-0.57	-57.01	N	3.75	-0.46	-46.39	N
63	1	2.6	2.25	-0.37	-36.92	N	2.38	-0.24	-23.64	N	2.43	-0.19	-18.80	N
64	1	2.5	2.17	-0.33	-32.84	N	2.29	-0.20	-20.24	N	2.35	-0.15	-15.05	N
65	1	4.1	3.29	-0.85	-85.45	N	3.59	-0.55	-55.07	N	3.70	-0.44	-44.27	N
66	1	4.4	3.44	-0.93	-92.99	N	3.77	-0.60	-60.27	N	3.89	-0.49	-48.90	N
67	1	4.3	3.38	-0.90	-89.80	N	3.69	-0.58	-58.28	N	3.80	-0.47	-47.42	N
68	1	3.9	3.14	-0.79	-78.96	N	3.42	-0.51	-51.23	N	3.52	-0.42	-41.69	N
69	1	4.6	3.57	-0.99	-98.67	N	3.91	-0.64	-64.00	N	4.03	-0.52	-52.08	N
70	1	3.8	3.08	-0.76	-75.53	N	3.34	-0.49	-48.83	N	3.43	-0.40	-39.66	N
71	1	3.1	2.64	-0.51	-50.63	N	2.86	-0.29	-29.34	N	2.93	-0.22	-22.01	N
72	1	3.3	2.75	-0.58	-57.98	N	2.97	-0.36	-35.72	N	3.05	-0.29	-28.60	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
73	1	3.0	2.56	-0.48	-47.85	N	2.76	-0.28	-28.34	N	2.81	-0.23	-23.25	N
74	1	2.6	2.26	-0.35	-34.83	N	2.41	-0.20	-20.46	N	2.44	-0.17	-17.22	N
75	1	3.3	2.73	-0.54	-54.38	N	2.96	-0.32	-31.68	N	3.00	-0.27	-26.98	N
76	1	2.6	2.28	-0.35	-35.31	N	2.43	-0.21	-20.56	N	2.46	-0.18	-17.55	N
77	1	2.9	2.47	-0.43	-43.36	N	2.65	-0.25	-25.24	N	2.69	-0.22	-21.56	N
78	1	2.4	2.08	-0.27	-26.86	N	2.19	-0.16	-15.64	N	2.22	-0.13	-13.37	N
79	1	3.6	2.91	-0.65	-65.33	N	3.15	-0.41	-40.61	N	3.24	-0.32	-32.31	N
80	1	3.4	2.81	-0.63	-63.23	N	3.04	-0.41	-40.79	N	3.12	-0.33	-33.09	N
81	1	3.3	2.73	-0.60	-59.57	N	2.94	-0.38	-38.50	N	3.02	-0.31	-31.25	N
82	1	2.7	2.36	-0.32	-32.40	N	2.55	-0.14	-13.78	N	2.62	-0.07	-6.54	N
83	1	3.1	2.71	-0.43	-42.70	N	2.98	-0.16	-16.23	N	3.07	-0.06	-6.44	N
84	1	3.0	2.58	-0.38	-38.15	N	2.82	-0.14	-14.27	N	2.91	-0.05	-5.42	N
85	1	3.5	2.98	-0.51	-51.24	N	3.31	-0.19	-18.82	N	3.43	-0.07	-6.79	N
86	1	3.1	2.70	-0.42	-41.86	N	2.97	-0.15	-15.35	N	3.07	-0.06	-5.50	N
87	1	2.9	2.56	-0.37	-37.17	N	2.80	-0.14	-13.60	N	2.89	-0.05	-4.83	N
88	1	3.3	2.85	-0.47	-46.74	N	3.15	-0.17	-17.06	N	3.26	-0.06	-5.93	N
89	1	2.6	2.32	-0.29	-28.91	N	2.50	-0.11	-10.58	N	2.57	-0.04	-3.70	N

Table B5: Predicted Annual Mean NH_3 Concentrations with 30% Reduction in Trips (µg/m³)														
		2019	2021				2031				2041			
			Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor Location	Critical Level (ug/m3)	Total NH_3	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Total NH_3	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
90	1	1.6	1.55	-0.02	-1.72	N	1.59	0.02	2.34	Y	1.66	0.10	9.91	Y
91	1	1.6	1.55	-0.02	-1.62	N	1.60	0.03	2.99	Y	1.69	0.12	11.72	Y
92	1	2.6	2.22	-0.35	-34.82	N	2.36	-0.21	-20.55	N	2.43	-0.14	-14.01	N
93	1	2.3	2.07	-0.26	-26.10	N	2.20	-0.12	-12.41	N	2.29	-0.04	-4.09	N
94	1	2.2	2.00	-0.23	-23.27	N	2.12	-0.11	-11.04	N	2.20	-0.04	-3.60	N
95	1	2.3	2.03	-0.24	-24.39	N	2.16	-0.11	-11.29	N	2.24	-0.03	-3.16	N
96	1	2.1	1.88	-0.18	-18.15	N	1.98	-0.08	-8.39	N	2.04	-0.02	-2.35	N
97	1	2.5	2.20	-0.31	-31.40	N	2.37	-0.14	-14.18	N	2.48	-0.03	-3.30	N
98	1	2.3	2.02	-0.24	-23.96	N	2.15	-0.11	-10.84	N	2.24	-0.03	-2.57	N
99	1	2.2	2.01	-0.24	-23.59	N	2.14	-0.11	-10.67	N	2.22	-0.03	-2.52	N
100	1	5.2	5.15	-0.02	-2.18	N	5.16	-0.01	-1.25	N	5.16	-0.01	-1.06	N
101	1	5.2	5.16	-0.02	-2.30	N	5.17	-0.01	-1.30	N	5.17	-0.01	-1.09	N
102	1	1.8	1.83	-0.01	-1.30	N	1.84	0.00	-0.40	N	1.85	0.00	0.02	N
103	1	1.9	1.84	-0.02	-1.65	N	1.86	0.00	-0.44	N	1.86	0.00	0.14	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
1	0.142	1.73	3.05	2.94	-0.110	-77.48	N	2.94	-0.110	-77.50	N	2.95	-0.102	-71.73	N
2	0.142	1.73	2.88	2.82	-0.056	-39.37	N	2.82	-0.056	-39.56	N	2.82	-0.052	-36.67	N
3	0.142	1.73	3.51	3.19	-0.322	-226.90	N	3.07	-0.438	-308.69	N	3.09	-0.421	-296.54	N
4	0.142	1.73	4.99	4.10	-0.890	-626.48	N	3.80	-1.191	-838.42	N	3.85	-1.139	-801.92	N
5	0.142	1.73	5.90	4.69	-1.207	-850.17	N	4.31	-1.590	-1120.03	N	4.38	-1.515	-1066.62	N
6	0.142	1.73	4.33	3.70	-0.624	-439.41	N	3.51	-0.814	-573.28	N	3.55	-0.776	-546.16	N
7	0.142	1.73	5.89	4.69	-1.204	-847.97	N	4.30	-1.587	-1117.85	N	4.38	-1.512	-1064.70	N
8	0.142	1.73	4.61	3.88	-0.729	-513.63	N	3.65	-0.954	-672.11	N	3.70	-0.910	-640.58	N
9	0.142	1.73	6.03	4.75	-1.277	-899.61	N	4.31	-1.718	-1210.15	N	4.38	-1.644	-1157.53	N
10	0.142	1.73	5.03	4.13	-0.905	-636.97	N	3.82	-1.208	-850.39	N	3.88	-1.155	-813.71	N
11	0.142	1.73	6.68	5.80	-0.883	-621.85	N	5.50	-1.179	-830.21	N	5.55	-1.129	-794.88	N
12	0.142	1.73	5.74	4.57	-1.170	-823.91	N	4.17	-1.573	-1107.83	N	4.24	-1.505	-1060.08	N
13	0.142	1.73	7.60	6.38	-1.227	-864.21	N	5.91	-1.691	-1191.06	N	5.97	-1.629	-1147.32	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
14	0.142	1.73	6.17	5.51	-0.666	-468.79	N	5.28	-0.896	-631.01	N	5.30	-0.875	-616.36	N
15	0.142	1.73	6.82	5.93	-0.886	-624.22	N	5.64	-1.182	-832.15	N	5.65	-1.165	-820.68	N
16	0.142	1.73	4.80	4.65	-0.144	-101.33	N	4.61	-0.193	-135.66	N	4.61	-0.188	-132.50	N
17	0.142	1.73	6.92	6.00	-0.920	-647.98	N	5.71	-1.219	-858.67	N	5.72	-1.207	-850.02	N
18	0.142	1.73	8.52	7.03	-1.494	-1052.14	N	6.54	-1.983	-1396.82	N	6.56	-1.966	-1384.49	N
19	0.142	1.73	10.07	7.99	-2.076	-1461.85	N	7.33	-2.735	-1925.76	N	7.35	-2.712	-1909.58	N
20	0.142	1.73	9.76	7.79	-1.965	-1383.47	N	7.17	-2.587	-1822.00	N	7.19	-2.565	-1806.34	N
21	0.142	1.73	7.54	6.39	-1.157	-814.45	N	6.02	-1.522	-1071.86	N	6.04	-1.507	-1061.43	N
22	0.142	1.73	6.51	5.72	-0.788	-554.77	N	5.46	-1.044	-735.09	N	5.48	-1.027	-722.95	N
23	0.142	1.73	6.95	5.95	-0.999	-703.53	N	5.60	-1.353	-953.03	N	5.64	-1.307	-920.23	N
24	0.142	1.73	6.91	5.96	-0.953	-671.20	N	5.66	-1.251	-880.82	N	5.72	-1.195	-841.33	N
25	0.142	1.73	4.91	4.72	-0.194	-136.80	N	4.66	-0.254	-178.66	N	4.67	-0.245	-172.60	N
26	0.142	1.73	6.98	6.00	-0.975	-686.42	N	5.69	-1.281	-902.10	N	5.75	-1.222	-860.33	N
27	0.142	1.73	6.89	5.95	-0.941	-662.89	N	5.65	-1.238	-871.77	N	5.71	-1.180	-830.80	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
28	0.142	1.73	6.17	5.55	-0.624	-439.69	N	5.31	-0.865	-609.43	N	5.35	-0.829	-583.47	N
29	0.142	1.73	2.43	2.38	-0.049	-34.58	N	2.36	-0.065	-45.85	N	2.37	-0.063	-44.12	N
30	0.142	1.73	5.24	4.12	-1.125	-792.43	N	3.72	-1.524	-1073.25	N	3.77	-1.466	-1032.53	N
31	0.142	1.73	4.19	3.48	-0.716	-504.03	N	3.22	-0.975	-686.71	N	3.25	-0.943	-664.41	N
32	0.142	1.73	5.38	4.22	-1.161	-817.57	N	3.85	-1.533	-1079.82	N	3.92	-1.462	-1029.43	N
33	0.142	1.73	4.67	3.75	-0.917	-646.00	N	3.44	-1.228	-864.51	N	3.49	-1.176	-828.33	N
34	0.142	1.73	4.78	3.83	-0.942	-663.26	N	3.54	-1.234	-869.27	N	3.60	-1.176	-828.46	N
35	0.142	1.73	3.96	3.37	-0.594	-418.42	N	3.17	-0.787	-553.90	N	3.20	-0.761	-535.76	N
36	0.142	1.73	3.72	3.21	-0.510	-359.47	N	3.05	-0.674	-474.54	N	3.07	-0.652	-458.94	N
37	0.142	1.73	4.04	3.42	-0.620	-436.74	N	3.22	-0.821	-578.48	N	3.24	-0.795	-559.59	N
38	0.142	1.73	3.69	3.19	-0.499	-351.52	N	3.03	-0.658	-463.41	N	3.05	-0.636	-448.19	N
39	0.142	1.73	2.61	2.50	-0.118	-83.28	N	2.46	-0.156	-109.99	N	2.46	-0.150	-105.78	N
40	0.142	1.73	2.54	2.45	-0.089	-62.70	N	2.42	-0.117	-82.53	N	2.43	-0.113	-79.34	N
41	0.142	1.73	3.72	3.21	-0.507	-356.95	N	3.05	-0.670	-472.18	N	3.07	-0.649	-456.78	N
42	0.142	1.73	6.12	5.50	-0.617	-434.20	N	5.31	-0.812	-572.05	N	5.33	-0.786	-553.44	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
43	0.142	1.73	6.15	5.52	-0.627	-441.86	N	5.32	-0.827	-582.11	N	5.35	-0.800	-563.22	N
44	0.714	1.594	3.55	3.08	-0.468	-65.48	N	2.89	-0.661	-92.55	N	2.91	-0.642	-89.91	N
45	0.714	1.594	2.52	2.02	-0.490	-68.68	N	1.82	-0.694	-97.18	N	1.84	-0.674	-94.42	N
46	0.714	1.73	3.97	2.95	-1.024	-143.48	N	2.52	-1.448	-202.80	N	2.58	-1.390	-194.75	N
47	0.142	1.73	4.46	3.65	-0.817	-575.03	N	3.40	-1.061	-746.89	N	3.46	-1.008	-709.95	N
48	0.142	1.73	4.29	3.43	-0.865	-609.05	N	3.17	-1.126	-793.20	N	3.22	-1.072	-754.68	N
49	0.714	1.594	1.64	1.47	-0.174	-24.30	N	1.40	-0.243	-34.01	N	1.41	-0.234	-32.73	N
50	0.142	1.73	4.15	3.33	-0.818	-576.06	N	3.06	-1.095	-771.01	N	3.10	-1.052	-740.77	N
51	0.142	1.73	3.10	2.70	-0.405	-285.37	N	2.53	-0.573	-403.85	N	2.54	-0.563	-396.40	N
52	0.142	1.73	2.95	2.60	-0.348	-244.96	N	2.46	-0.494	-348.04	N	2.47	-0.485	-341.78	N
53	0.142	1.73	4.57	3.60	-0.973	-685.13	N	3.27	-1.301	-916.25	N	3.32	-1.248	-879.22	N
54	0.142	1.73	4.33	3.46	-0.871	-613.14	N	3.17	-1.152	-810.92	N	3.23	-1.099	-773.90	N
55	0.142	1.73	4.43	3.51	-0.913	-643.19	N	3.24	-1.189	-837.04	N	3.30	-1.130	-795.71	N
56	0.142	1.73	4.81	3.76	-1.055	-742.91	N	3.44	-1.375	-968.46	N	3.50	-1.307	-920.41	N
57	0.714	1.73	3.55	2.64	-0.906	-126.91	N	2.27	-1.274	-178.48	N	2.32	-1.223	-171.34	N
58	0.714	1.594	3.64	2.71	-0.936	-131.04	N	2.32	-1.323	-185.31	N	2.37	-1.270	-177.92	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
59	0.714	1.594	3.42	2.56	-0.856	-119.93	N	2.21	-1.204	-168.56	N	2.26	-1.155	-161.81	N
60	0.714	1.594	3.81	2.81	-1.000	-140.07	N	2.40	-1.415	-198.22	N	2.45	-1.359	-190.30	N
61	0.714	1.594	3.15	2.40	-0.757	-106.01	N	2.09	-1.062	-148.72	N	2.13	-1.019	-142.75	N
62	0.714	1.594	3.88	2.86	-1.028	-143.92	N	2.43	-1.455	-203.79	N	2.49	-1.397	-195.63	N
63	0.714	1.594	2.60	2.03	-0.567	-79.44	N	1.78	-0.821	-114.99	N	1.81	-0.792	-110.91	N
64	0.714	1.594	2.46	1.95	-0.510	-71.50	N	1.73	-0.734	-102.82	N	1.76	-0.702	-98.37	N
65	0.142	1.73	5.79	4.30	-1.483	-1044.19	N	3.75	-2.037	-1434.38	N	3.84	-1.952	-1374.45	N
66	0.142	1.73	5.39	4.13	-1.260	-887.13	N	3.73	-1.654	-1164.55	N	3.82	-1.570	-1105.79	N
67	0.142	1.73	5.26	4.05	-1.213	-854.50	N	3.67	-1.590	-1119.90	N	3.75	-1.511	-1063.76	N
68	0.714	1.594	3.61	2.69	-0.921	-128.99	N	2.30	-1.304	-182.62	N	2.36	-1.252	-175.28	N
69	0.714	1.594	4.21	3.06	-1.150	-161.11	N	2.58	-1.630	-228.23	N	2.65	-1.564	-219.07	N
70	0.714	1.594	3.52	2.63	-0.887	-124.28	N	2.26	-1.256	-175.86	N	2.31	-1.205	-168.80	N
71	0.714	1.594	3.27	2.45	-0.820	-114.80	N	2.08	-1.192	-166.95	N	2.12	-1.147	-160.70	N
72	0.714	1.594	3.48	2.56	-0.914	-127.96	N	2.15	-1.325	-185.51	N	2.20	-1.281	-179.41	N
73	0.714	1.594	3.12	2.36	-0.754	-105.66	N	2.01	-1.102	-154.34	N	2.05	-1.070	-149.91	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
76	0.714	1.594	2.38	1.93	-0.450	-63.00	N	1.74	-0.638	-89.36	N	1.76	-0.619	-86.69	N
75	0.714	1.594	3.04	2.35	-0.687	-96.17	N	2.06	-0.983	-137.72	N	2.08	-0.956	-133.87	N
76	0.714	1.594	2.39	1.94	-0.450	-63.02	N	1.75	-0.640	-89.63	N	1.77	-0.622	-87.14	N
77	0.714	1.594	2.67	2.12	-0.546	-76.44	N	1.88	-0.783	-109.64	N	1.90	-0.761	-106.63	N
78	0.142	1.73	3.07	2.68	-0.392	-275.91	N	2.56	-0.515	-362.97	N	2.58	-0.498	-350.58	N
79	0.714	1.594	3.78	2.74	-1.036	-145.13	N	2.27	-1.506	-210.97	N	2.32	-1.456	-203.89	N
80	0.714	1.594	3.16	2.40	-0.759	-106.26	N	2.09	-1.067	-149.45	N	2.13	-1.024	-143.46	N
81	0.142	1.73	4.18	3.37	-0.816	-574.42	N	3.11	-1.067	-751.61	N	3.17	-1.014	-714.02	N
82	0.142	1.73	3.64	3.06	-0.580	-408.26	N	2.86	-0.779	-548.44	N	2.92	-0.722	-508.37	N
83	0.142	1.73	4.22	3.45	-0.767	-540.16	N	3.19	-1.028	-724.03	N	3.27	-0.951	-669.86	N
84	0.142	1.73	3.99	3.31	-0.684	-481.83	N	3.07	-0.921	-648.35	N	3.14	-0.851	-599.62	N
85	0.142	1.73	4.69	3.76	-0.930	-654.84	N	3.45	-1.245	-876.81	N	3.54	-1.150	-810.17	N
86	0.142	1.73	4.20	3.45	-0.755	-531.65	N	3.19	-1.016	-715.33	N	3.26	-0.939	-661.01	N
87	0.142	1.73	3.96	3.28	-0.674	-474.99	N	3.05	-0.904	-636.29	N	3.12	-0.834	-587.65	N
88	0.142	1.73	4.46	3.62	-0.845	-595.24	N	3.33	-1.136	-799.92	N	3.41	-1.049	-738.44	N
89	0.142	1.73	3.52	3.00	-0.525	-369.52	N	2.82	-0.703	-494.81	N	2.87	-0.648	-456.68	N

Table B6: Predicted Acid Deposition with 30% Reduction in Trips (keqN/ha/yr)															
	Critical Load (keqN/ha/yr)		2019	2021				2031				2041			
	Low	High		Change compared to 2019				Change compared to 2019				Change compared to 2019			
Receptor	CLMinN	CLMaxN	Acid deposition	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)	Acid deposition	Change due to Local Plan (PC)	Change as % of CL	Impact >1% of CL (Y/N)
90	0.142	1.73	2.16	2.11	-0.046	-32.22	N	2.11	-0.052	-36.42	N	2.17	0.009	6.48	Y
91	0.142	1.73	2.15	2.11	-0.036	-25.64	N	2.11	-0.035	-24.86	N	2.18	0.030	21.25	Y
92	0.142	1.73	3.56	2.95	-0.609	-428.83	N	2.74	-0.820	-577.46	N	2.79	-0.767	-540.49	N
93	0.142	1.73	3.05	2.67	-0.384	-270.38	N	2.57	-0.486	-342.52	N	2.63	-0.424	-298.44	N
94	0.142	1.73	1.99	1.70	-0.296	-208.39	N	1.58	-0.411	-289.29	N	1.62	-0.369	-259.77	N
95	0.142	1.73	2.98	2.63	-0.353	-248.83	N	2.53	-0.448	-315.28	N	2.60	-0.387	-272.47	N
96	0.142	1.73	2.73	2.47	-0.264	-185.56	N	2.40	-0.333	-234.66	N	2.44	-0.288	-202.77	N
97	0.142	1.73	3.27	2.81	-0.455	-320.64	N	2.69	-0.575	-405.12	N	2.77	-0.494	-347.81	N
98	0.142	1.73	2.97	2.62	-0.346	-243.74	N	2.53	-0.439	-308.93	N	2.59	-0.377	-265.47	N
99	0.142	1.73	2.95	2.61	-0.344	-242.57	N	2.52	-0.433	-305.10	N	2.58	-0.372	-261.98	N
100	0.142	1.73	4.50	4.46	-0.038	-27.00	N	4.45	-0.047	-33.37	N	4.45	-0.046	-32.27	N
101	0.142	1.73	4.50	4.46	-0.041	-28.70	N	4.45	-0.050	-35.24	N	4.45	-0.048	-34.06	N
102	0.142	1.73	2.26	2.24	-0.020	-13.82	N	2.23	-0.024	-16.95	N	2.24	-0.021	-14.70	N
103	0.142	1.73	2.27	2.25	-0.025	-17.47	N	2.24	-0.030	-21.31	N	2.25	-0.026	-18.21	N

Appendix B – AWP Traffic Modelling Technical Note

technical note

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LBWF HRA Air Quality Assessment

Traffic Data and Policy Review - Technical Note

Project No.	1102
Revision	F1
Date	29 April 2021
Client	Clearlead Consulting
Prepared	D Atkin
Checked	I Awcock
Authorised	I Awcock
File Ref.	P:\1102 Waltham Forest LP SA HRA Traffic Analysis\C Documents\1102 LBWF Additional Methodology Note F1 2021.04.29.docx

1 Introduction

1.1 Following the completion of initial air quality modelling testing of the likely impacts of the Waltham Forest Local Plan Part 1 proposals on the Epping Forest SAC (Kairus, April 2021), a further review has been undertaken to reality check the future traffic projections.

1.2 The output of the initial air quality modelling demonstrated exceedances in key vehicle based emissions in a number of locations. Refer to the Air Quality Study and Mitigation Strategy for details of those areas and subsequent sensitivity testing modelling.

1.3 Traffic models for the baseline and future years were provided for AM, PM, and Interpeak periods. The data provided to AWP was taken from LoHAM (London Highway Assignment Model), a strategic model representing routeing and congestion of motorised highway trips using London's highway network.

1.4 Data was provided for the AM, Interpeak (IP) and PM peak hours; for the years 2016, 2021, 2026, 2031 and 2041. The peak hours are understood to be defined as:

- AM Peak: 0800 – 0900
- Interpeak: average hour 1000 – 1600
- PM Peak: 1700 – 1800

1.5 Department for Transport (DfT) data points were then used to expand the combined peaks to deliver AADT forecast flows for assessment.

1.6 It is understood that LoHAM is currently being integrated as part of the MoTioN (Model of Travel in London) suite of travel modelling software:

> Model of Travel in London (MoTiON) is a multi-modal strategic transport model of London and the surrounding area. MoTiON can model how many trips there are likely to be, their origins and destinations and their modes of transport.

1.7 Other traffic modelling initiatives are also understood to be promoted by TfL such as the updates to the London One ITS model reflecting changes in signal changes and geometry across the London wide network.

1.8 TfL also contributed to the London Plan Evidence Base in their Report "Strategic Transport Modelling, Part of the London Plan evidence base, December 2017"[1]

1.9 In respect of travel demand and mode share the report suggests:

> *Travel demand and mode share*
>
> Travel demand is expected to increase in proportion to the growth in population and employment from around 27 million trips per day in 2015 to around 33 million trips per day in 2041.
>
> In the London Plan core reference case, car percentage mode share is expected to fall from 36 per cent of all trips in 2015 to 30 per cent in 2041.The delivery of the MTS would enable demand for travel in London to increase in a more sustainable, active and efficient way, with car percentage mode share forecast to fall to 20 per cent in 2041.

[1] https://www.london.gov.uk/sites/default/files/strategic_transport_modelling_report.pdf

1.10 The Executive Summary concludes:

> The key conclusion is that if the MTS is delivered, the revised London Plan population and economic growth can be achieved with sustainable transport outcomes. The London Plan and MTS make a sustainable, active and efficient mode share of 80 per cent achievable.

1.11 The LoHAM data provided when converted to AADT indicates forecast vehicular traffic growth across the network under consideration between 2021 – 2041 of around 10%. This contrasts with the latest Travel in London Report[2] which indicates that car driver journeys have not changed significantly in the last few years.

1.12 As data would have been submitted into LoHAM at some point in the past it is thought that the forecast traffic flows utilised in the initial air quality modelling are not likely to be fully representative of reduced mode shares supported by the London Plan, the Mayors Transport Strategy and emerging policy in the Waltham Forest Local Plan Part 1 promoting changes in travel behaviours away from the use of the private car.

1.13 This additional note sets out some of the policy aspirations and a basis for some sensitivity testing of the air quality modelling based on reduced traffic flows.

1.14 The factors considered in this note are:

- Transport Initiatives to support walking, cycling and the use of public transport and the likely effects of other Local Plan Part 1 policies on car parking and active travel
- Initiatives to increase the use and uptake of electric vehicles such as installation of off road and on road, private and public EV charging points
- HGV Route Management

1.15 The transport and traffic effects of these interventions are subject to personal behaviours and local geography and so cannot be categorically quantified across the whole Borough. The basis for sensitivity testing of the air quality analysis is therefore set out below.

[2] https://tfl.gov.uk/cdn/static/cms/documents/travel-in-london-report-13.pdf

1.16 The accompanying Air Quality Mitigation Strategy will include requirements for ongoing monitoring which can trigger further measures to be implemented if emissions are not meeting targets.

2 Transport Initiatives

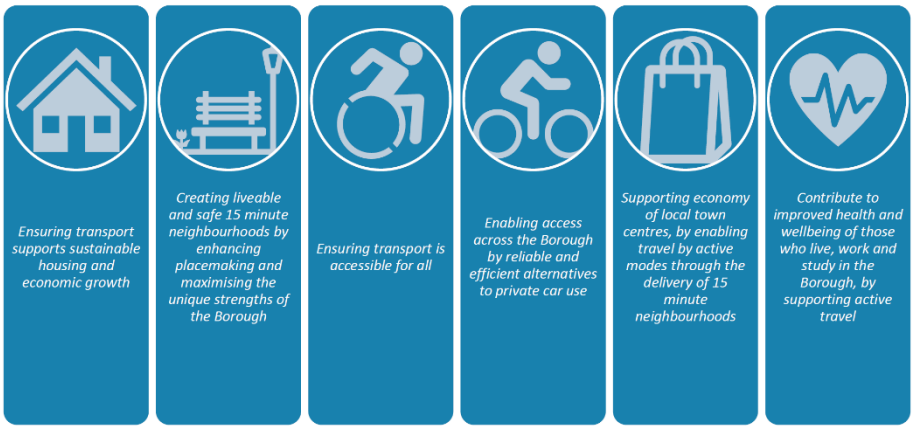
2.2 The Transport effects of the Waltham Forest Local Plan Part 1 are reviewed in a Topic Paper[3] by Arup which sets out the approach proposed to be taken to manage transport in the Borough during the Local Plan period and sets out some strategic transport objectives:

Specific transport objectives have also been set to

- *Improve active and sustainable transport choices across the Borough and beyond, building on the success of the 'Enjoy Waltham Forest programme', and encouraging wider integrated walking and cycling routes.*
- *Ensure timely, strategic and local infrastructure investment and delivery to support good sustainable growth for communities both now and in the future, through working with residents, partners, investors, developers and providers.*

2.3 The Waltham Forest Local Plan Part 1 will support the Mayors Transport Strategy (MTS, 2018[4]) and the goal set out within it for 80% of all trips in London to be made on foot, by cycle or using public transport by 2041.

2.4 A Transport Vision for Waltham Forest is set out with the following objectives;



[3] Arup Transport Topic paper February 2021
[4] https://www.london.gov.uk/what-we-do/transport/our-vision-transport/mayors-transport-strategy-2018

2.5 A route map is proposed establishing a new hierarchy for movement in Waltham Forest:

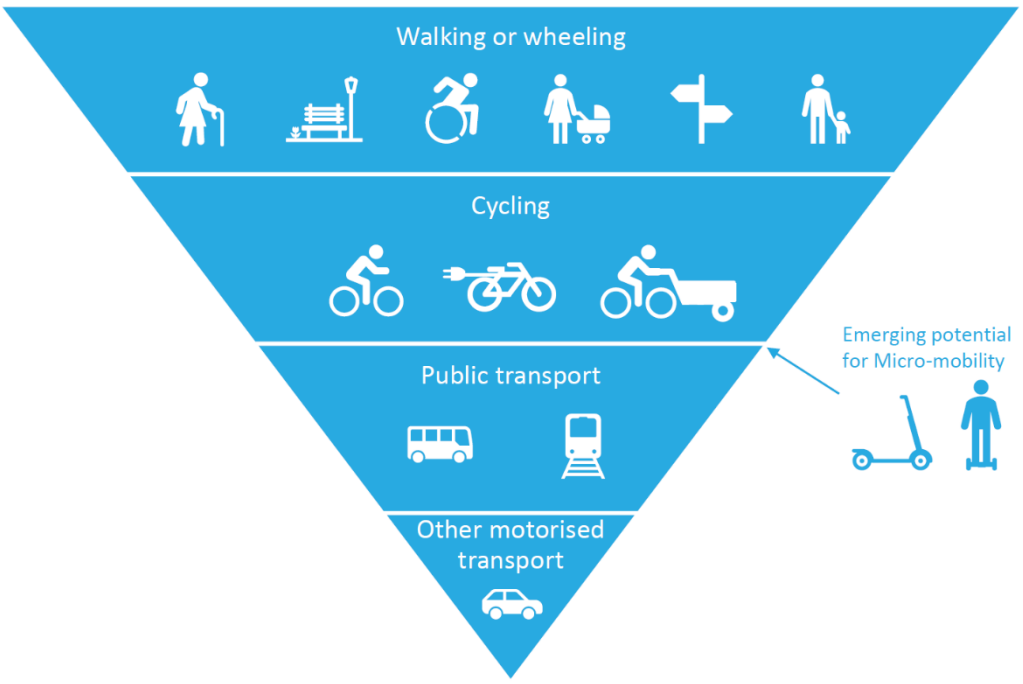


Figure 25 - Road user hierarchy

2.6 As a leader in walking and cycling provision in the UK, adoption of this hierarchy in Waltham Forest will put a strong focus on promoting sustainable development within the Borough encouraging and enabling people to make their local trips by walking and cycling.

2.7 To ensure development within the Borough is as sustainable as it can be car dominance will be addressed through parking policy and all new residential developments are proposed to be subject to 'Car Free' or 'Car Capped' agreements.

2.8 The Borough's approach to accommodating housing growth sustainably is by increasing housing density around existing town centres, key transport interchanges and in areas of good transport connectivity and to increase the viability of local retail centres and transport services, while minimising need for longer distance travel.

2.9 This is in line with the 15 minute neighbourhood principle embedded within the Borough's Corporate Strategy, the aim of which is to reduce pressures on the highway and public transport network by reducing the need to travel and providing services within easy walking and cycling distance for all residents.

2.10 In the last six years Waltham Forest has invested in their Enjoy Waltham Forest Programme (https://enjoywalthamforest.co.uk) and were successful in obtaining funding for a "Mini Holland" project in the Borough.

2.11 Ongoing monitoring of the implemented Low Traffic Neighbourhood Projects (LTN's) demonstrates reductions in traffic flows on affected roads in the Borough of 56%[5]. Whilst some traffic is transferred to other road links, the "evaporation" of some traffic due to the projects is a recognised effect[6] suggesting that physical works reallocating road space away from cars can remove around 11% of vehicles from the road network.

2.12 The Waltham Forest Local Plan Part 1 includes a number of policies directly aimed at encouraging a move in the Borough away from travel by car or managing vehicular traffic:

- Policy 62 - Promoting Sustainable Transport
- Policy 63 - Active Travel
- Policy 64 - Public Transport
- Policy 65 - Development and Transport Impacts
- Policy 66 - Deliveries, Freight and Servicing
- Policy 67 - Construction Logistic Plans (CLPs)
- Policy 68 - Managing Vehicle Traffic

2.13 Policies 62 to 64 will underpin the move to a sustainable and active travel society with commensurate reductions in car borne travel.

2.14 Policy 65 requires all new development to be supported by a Transport Assessment which will assess the trip making expectations of the development and include requirements for developments to include a Travel Plan. Travel Plans typically include targets for vehicular traffic reduction and TfL Guidance suggests:

[5] http://democracy.walthamforest.gov.uk/documents/s44826/Appendix%20B%20-%20Engagement%20approach%20for%20delivery.pdf
[6] Disappearing traffic? The story so far, S. Cairns, S. Atkins and P.Goodwin; Proceedings of the Institution of Civil Engineers, Municipal Engineer 151, March 2002 Issue 1, Pages 13-22

Specifying targets

The travel plan shall achieve the following targets:

- That two years from first occupation of the development, the absolute number of car/van drivers to the site shall be no greater than the amount identified within the initial survey
- To further reduce the proportion of car/van drivers to the development by 5% in each of the two subsequent years
- That the proportion of car/van drivers to the development will not increase above the target specified in the travel plan or such other target as shall be agreed by the council and the owner (or any successor in title to the owner)

2.15 Research demonstrates that effective Travel Plans can reduce car trips from new residential development by between 10% and 60%[7] dependent upon local conditions and Travel Plan management. New development is therefore expected to reduce traffic flow when compared to historical levels.

2.16 Policy 68 further sets out the requirement for managing traffic:

Policy 68 - Managing Vehicle Traffic

In order to encourage and promote active and sustainable transport as the main means of travel in Waltham Forest to improve air quality, improve personal health and well-being and respond to the Climate Emergency, all new residential developments (major and minor) in the borough should be car-free. Where car parking is required, the following considerations will apply:

2.17 Whilst this is not expected to lead to a blanket ban on car ownership in new developments the encouragement for Active Travel in the borough and the implementation of the Low Traffic Neighbourhoods is expected to demonstrate reductions in car ownership.

2.18 A study into The Impact of Low Traffic Neighbourhoods and Other Active Travel Interventions on Vehicle Ownership[8] saw a reduction in car ownership within the borough of around 6%.

2.19 Policies 67 and 68 focus on freight and construction logistics and encourage change in the logistics industry seeking to reduce the emissions impact of deliveries and looking towards Zero Emission Deliveries.

[7] https://www.napier.ac.uk/~/media/worktribe/output-946596/travel-plans-for-new-developments-a-global-review.pdf 2017.
[8] https://findingspress.org/article/18200-the-impact-of-low-traffic-neighbourhoods-and-other-active-travel-interventions-on-vehicle-ownership-findings-from-the-outer-london-mini-holland-programme

2.20 These policies are mirroring what is already starting to happen with the growth in logistics and on line deliveries through the Covid 19 Pandemic.

Summary

2.21 All of the 7 transport policies in the Local Plan Part 1 focus on vehicular traffic reduction.

2.22 There is evidence that measures already implemented will bring about a long term and sustainable shift to active travel and reduction in vehicular movements on the streets of Waltham Forest.

3 Electric Vehicle (EV) Initiatives

3.1 London Borough of Waltham Forest has an Electric Vehicle Charging Point Strategy[9] and has been rolling out a programme of installation of Electric Vehicle (EV) charging points throughout the Borough with the Vision:

> ***Vision:*** *Enable Waltham Forest's residents, businesses and visitors to convert to low emission vehicles to help reduce transport related emissions and to promote more sustainable forms of transport. This is to be achieved by installing a network of charging points that caters for their respective needs and encourages further uptake of low emission vehicles, without impacting any other pavement users or sustainable modes of transport.*

3.2 The Strategy sets a number of targets including having a charging point within 500m of every home and to deliver a total of 200 publicly available charging points across the Borough in the next 5 years.

3.3 Data on EV ownership in 2018 demonstrated a sharp growth in uptake of EV's in the borough as shown in Figure 3.1, with at that time 177 EV's registered.

3.4 EV ownership in Waltham Forest is forecast to rise rapidly in the next eight years, with an estimated 2,457 plus electric vehicles registered to Waltham Forest residents and businesses by 2025 (TfL ULEV Delivery Plan) or up to 6,512 in the "high scenario". If achieved that would comprise around 8% of cars registered in the Borough.

3.5 To underpin this Strategy the Local Plan Part 1 sets out policies to support the update in EV's and the growth of charging infrastructure:

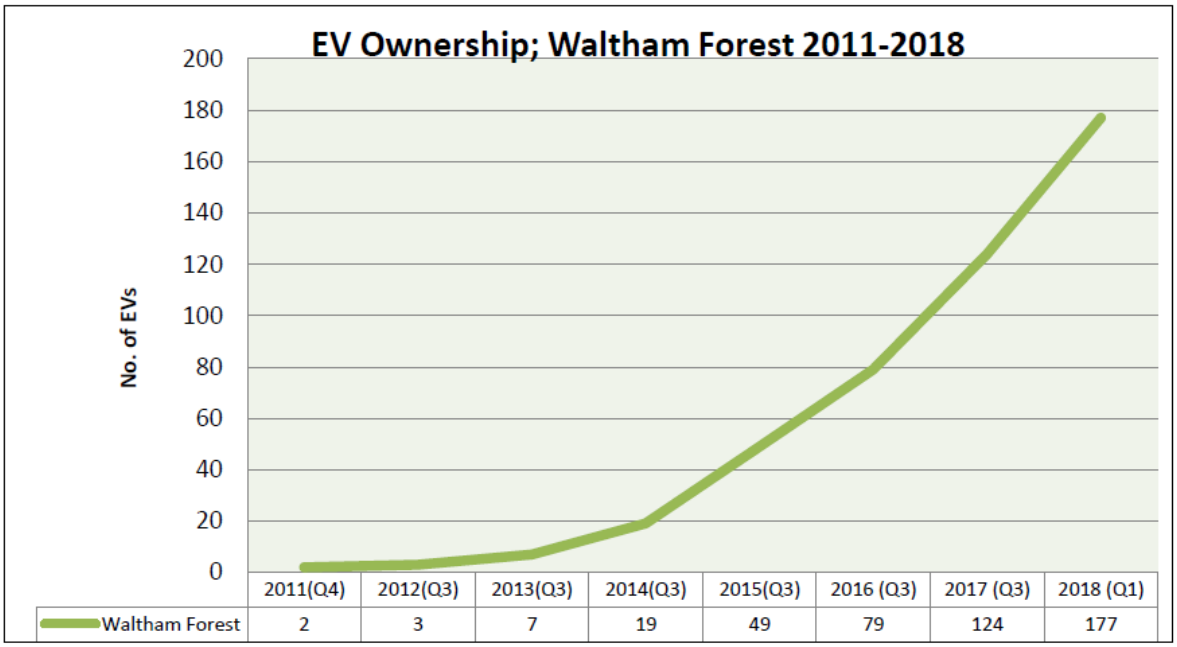
- Policy 69 - Electric Vehicles (EV)

[9] https://www.walthamforest.gov.uk/content/electric-vehicle-charging-points

- Policy 70 - Utilities Infrastructure

3.6 Policy 69 requires new development to make provision for on-site EV charging and to contribute to costs of the Borough Wide charging infrastructure. Policy 70 requires developers to ensure that utilities infrastructure is fit for purpose including the ability to connect and implement new EV charging measures.

Figure 3.1 EV Strategy Extract



3.7 The continued update of EV's for personal car use with zero impact on emissions within the EFSAC is expected to contribute to the reduction in harmful emissions and is therefore a factor to be considered in deriving sensitivity tests for air quality modelling.

4 HGV Route Management

4.11 HGV route management tries to keep as much HGV traffic out of the Borough as possible. Vehicles of this nature are directed to use the following trunk roads so they cause as little impact on the Borough as possible and only make the part of their journey to their final destination using the Borough's road network;

- M25 – To the North of the Borough cutting through The Epping Forest at Bell Common (where it is in Tunnel) - The preferred routing for HGV's is either use the A10 or M11 to access the Borough.

- M11 – Drops down the East Side of Waltham Forest

- A10 – Drops down the West Side of Waltham Forest
- A406 (North Circular Road) runs east to west through the borough dividing North and South linking up with the M11 and M25 to the East
- A12 Cuts across the South of the Borough – linking with the M11, A406 and M25

4.12 The Borough HGV routes are shown in Figure 4.1 and 4.2 below:

Figure 4.1 LBWF HGV Routes – wide area

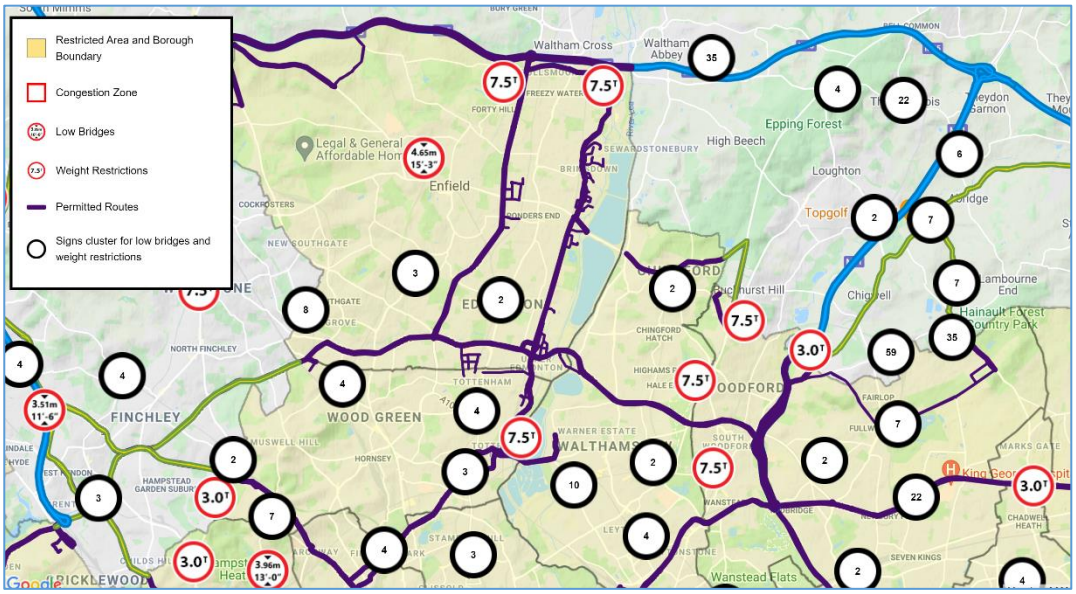
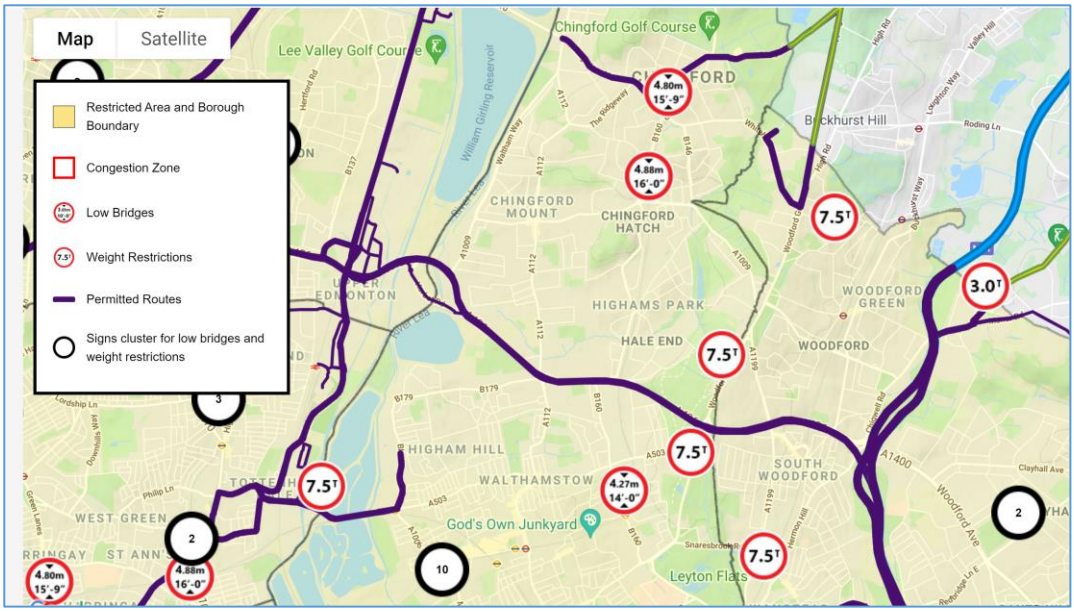


Figure 4.2 LBWF HGV Routes – central area

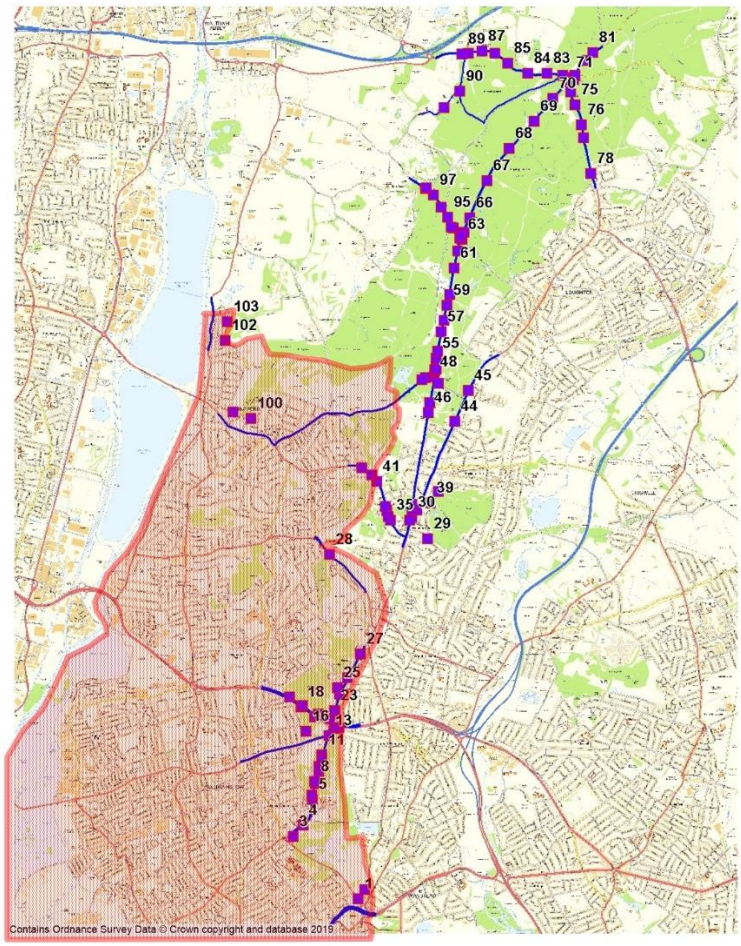


4.13 HGV route management ensures that high emitting HGV's are mainly kept away from the SAC and on routes such as the A406 North Circular Road, the A1055 and A10 to the west and the M11 to the east where more intensive traffic management can be implemented if required.

4.14 Waltham Forest Local Plan Part 1 policy 66 sets out the approach to deliveries, freight and servicing and includes encouragement for sustainable last mile services; support for freight consolidation arrangements and a requirement for operators to achieve FORS[10] Silver standard.

4.15 The locations for AQ assessment of the impacts on the HRA are located on roads within 200m of the Epping Forest SAC as indicated on the modelling node location plan in Figure 4.3 below.

Figure 4.3 Air Quality HRA Modelling - Receptors



[10] https://www.fors-online.org.uk/cms/silver/ The Fleet Operator Recognition Scheme (FORS) is a voluntary accreditation scheme for fleet operators which aims to raise the level of quality within fleet operations, and to demonstrate which operators are achieving exemplary levels of best practice in safety, efficiency, and environmental protection.

4.16 The locations for AQ assessment of the impacts on the HRA are in the main not on the permitted HGV routes and therefore unlikely to be subject to significant increases in HGV traffic.

4.17 HGV management should therefore contribute to the ongoing reduction in emitting vehicles impacting on the SAC.

5 Effects on Future Traffic Flows and AQ Modelling Sensitivity Tests

5.11 As outlined above the route map proposed in the Waltham Forest Local Plan Part 1 for sustainable transport led growth with a strong emphasis on active travel and walkable neighbourhoods is expected to deliver reduced traffic flows compared to those extracted from modelled data.

5.12 The Local Plan Part 1 policies and transport interventions promote sustainable transport use with an ongoing emphasis on walking , cycling and public transport which is expected to lead residents of Waltham Forest to change travel behaviours.

5.13 The implementation of measures to encourage the uptake in EV is expected to lead to a significant increase in the zero emitting fleet within the Borough.

5.14 Through the Mayor's Transport Strategy and London Plan, other adjacent Boroughs should be adopting similar aspirations which will further drive down the in combination effects of vehicular travel.

5.15 Epping Forest District Council (EFDC) borders Waltham Forest to the East and contains part of the Epping Forest SAC. EFDC have assessed the Air Quality effects of their emerging Local Plan on the Epping Forest SAC and have published an Air Quality Mitigation Strategy[11] which sets out the mitigation measures and results of modelling of the effectiveness of the following measures:

- the representation of queuing traffic in the model
- the composition of the vehicle fleet observed to travel on links in Epping Forest compared with the idealised fleet included in the modelling base data

[11] Epping Forest Interim Air Pollution Mitigation Strategy: Managing the Effects of Air Pollution on the Epping Forest Special Area of Conservation (December 2020)

- mitigation measures including modal shift and EV's

5.16 The likely effects of LBWF emerging policy on future travel choices and mode share in the Waltham Forest Borough has been reviewed along with the impact of their EV Strategy.

5.17 No account has been taken of the anticipated variations in composition of the vehicle fleet but the findings of EFDC as they affect the EFSAC as reported in their Air Quality Mitigation Strategy is also a relevant consideration for the assessment of impacts in Waltham Forest.

5.18 The various LBWF policy measures set out above are expected to have a downward effect on car usage and car ownership on the Waltham Forest Borough as set out in Table 5.1 and discussed below.

5.19 The various measures listed below, supported by other LBWF strategies such as the Capital Investment Strategy and EV Strategy, are also expected to create the atmosphere of change leading to reductions in pollution emitting car usage in the Borough:

- promotion of active travel
- improved cycleways
- the promotion of walking and cycling in walkable neighbourhoods
- the growth of the EV fleet and availability of public charging infrastructure
- the growth in car clubs
- the ongoing sustainability of new behaviours in walking and cycling formed through the Covid 19 Pandemic.

Table 5.1 Anticipated Emitting Traffic Reduction Effects of Various Measures within Waltham Forest

Item	Measure	Potential Traffic reduction effect
a	Low Traffic Neighbourhoods – reductions in traffic flows and traffic "evaporation"	11% to 56%

Item	Measure	Potential Traffic reduction effect
b	Low Traffic Neighbourhoods – reduction in car ownership	6%
c	Travel Plan Implementation	10% - 60%
d	Electric vehicle uptake	8%
e	Other measures such as HGV route management, cycle and walking routes programmes; school travel programmes; bus enhancement programmes; last mile delivery programmes; vehicle fleet composition; car clubs / car sharing; potential ULEZ expansion..	10% - 20%
	Proposed range of traffic reduction for AQ modelling	10% – 30%

5.14 Low traffic neighbourhoods have been implemented across the Borough and the effects on traffic flows on and around the streets in a pilot area have been studied to identify potential traffic flow benefits[12].

5.15 The Walthamstow Village trial comprised road closures in a number of locations with the objectives of:

> Walthamstow Village is one four residential areas in Walthamstow Town Centre to receive funding from Transport for London to make the area more accessible to people who want to walk and cycle for local journeys

[12] https://enjoywalthamforest.co.uk/work-in-your-area/walthamstow-village/comparison-of-vehicle-numbers-before-and-after-the-scheme-and-during-the-trial/

The core objectives of the scheme were to:

- reduce the volume of traffic and noise outside people's homes
- improve road safety for all users
- make the area easier and safer for people who want to walk and cycle for local journeys
- generally make the area more attractive for residents and visitors.

5.16 Traffic data was collected on 12 directly affected streets and 3 streets bordering the scheme area before during and after implementation of road closures. The data demonstrated reductions in traffic flows on streets in the study area of between 22% and 97% although one street experienced an increase of 40% in traffic flow.

5.17 Overall across the 12 streets monitored, traffic flows were reduced by 14,516 vehicles per day, a 56% reduction in traffic flow.

5.18 Other studies by Cairns[13] [14] brought together experience from 70 case studies of road space reallocation from general traffic, across 11 countries, with opinions from 200 transport professionals. It shows that traffic is a result of human choice, driven by people making all sorts of different decisions when driving conditions change. The respondents in the Cairns study, for example, changed their mode of travel, chose alternative destinations, or the frequency of their journey, consolidated trips, took up car sharing or didn't make the journey at all.

5.19 In half of the case studies, there was a 11% reduction in the number of vehicles across the whole area where road space for traffic was reduced, including the main roads.

5.20 Local experience in Waltham Forest and research from around the world supports the likelihood set out in item a of Table 5.1 of a decrease in traffic on local roads as a result of a Borough-wide programme of Low Traffic Neighbourhoods of between 11% and 56%.

5.21 Research[15] into the Low Traffic Neighbourhood (or Mini-Holland) programme also shows that the implementation of such schemes leads to

[13] Disappearing traffic? The story so far, S. Cairns, S. Atkins and P.Goodwin; Proceedings of the Institution of Civil Engineers, Municipal Engineer 151, March 2002 Issue 1, Pages 13-22
[14] https://londonlivingstreets.com/2019/07/11/evaporating-traffic-impact-of-low-traffic-neighbourhoods-on-main-roads/
[15] https://findingspress.org/article/18200-the-impact-of-low-traffic-neighbourhoods-and-other-active-travel-interventions-on-vehicle-ownership-findings-from-the-outer-london-mini-holland-programme

reductions in car ownership which in turn would lead to increases in active or smarter travel choices by walking cycling or the use of public transport. Decreases in traffic flows related to reductions in car ownership is therefore likely to be a further long term effect of the roll out of the Low Traffic Neighbourhoods programme. The study concluded that:

> In conclusion, numbers of cars and vans are falling in mini-Holland intervention areas, particularly those involving an LTN. This adds to evidence that these interventions lead to traffic evaporation (London Borough of Waltham Forest 2017) and a mode shift away from cars (Aldred and Goodman 2020).

5.22 The reduction in observed car ownership of 6% as set out in item b of Table 5.1 contributes to the likelihood of a sustainable and long term reduction in car trips in the Borough.

5.23 Item c in Table 51 reflects the aspiration that most of the 27,000 new homes proposed in the Local Plan Part 1 will be car free as required by the car parking policies promoted in the Plan. That will be procured through Legal Agreement (TCPA s106) and the implementation of Travel Plans for all new development including the 52,000sqm of employment space proposed in Local Plan Part 1.

5.24 Travel Plans are a long standing part of the government toolkit to support vehicular traffic reduction and research demonstrates that as set out in item c of Table 5.1, reductions in trip generation from new development of between 10% and 60%, dependent upon location and interventions, can be achieved. Such traffic reductions would also contribute to future Borough-wide reductions in traffic.

5.25 Waltham Forest Council are also implementing a wide ranging programme to encourage the uptake of EV's in the Borough as described above and set out in the Electric Vehicle Charging Point Strategy. If the uptake is as anticipated this would lead to 8% of the Borough based vehicle fleet being zero emission EV's with no impact on air quality. Further air quality vehicle emission benefits would be gained through Hybrid vehicles operating in electric only mode.

5.26 Table 5.1 item d therefore identifies an effective emitting traffic reduction of a further 8% due to the update of EV's.

5.27 Waltham Forest have a further raft of other transport related measures and programmes being implemented and monitored through their Behaviour Change monitoring programme. Further funding is also available for

Borough wide implementation of walking and cycling initiatives as well as bus service enhancements, some associated with new development, which are anticipated to bring about further changes in the mode of travel in the Borough.

5.28 These wide ranging programmes and activities, supported by central government and with wide ranging community support, in themselves are expected to bring about further vehicular traffic reduction through the life of the Local Plan as indicated in item e of Table 5.1 of between 10% and 20%

5.29 The wide ranging and varied measures proposed and supported by central government and Waltham Forest Local Plan policy are therefore expected to bring about emitting vehicular traffic reductions of at least 10%-30% in the plan period.

5.30 It is therefore proposed to undertake sensitivity testing in the air quality modelling based upon reductions in traffic flows of 10%, 20% and 30% to test the sensitivity of the links within the Epping Forest SAC to changes in traffic flows.

Appendix C - Waltham Forest Air Quality Action Plan 2018 -2023 Updated List of Actions

Air Quality Action Plan 2018-2023 (Annual Status Report 2020 update)

The table below provides a summary of Waltham Forest progress against the Air Quality Action Plan, as reported in the Council's 2020 Annual Status Report. The table is colour coded to indicate progress made. The progress column includes progress with emissions/concentration data, benefits and negative impacts / complaints.

Completed
Ongoing
Outstanding from original plan
New items yet to commence

Further details of these actions along with responsibilities, costs and benefits can be found within the action plan accessible here: https://www.walthamforest.gov.uk/content/air-quality

Measure	LLAQM Action Matrix Theme	Action	Progress
Ensuring emissions from construction are minimised			
Action1	Emissions from developments and buildings	Every major development will have a construction management condition.	From 2019 onwards all major developments are required to have discrete conditions for: • Air Quality Dust Management Plan (AQDMP) • Non Road Mobile Machinery (NRMM) Waltham Forest are part of the pan London NRMM project led by Merton. For 2020/2021, 17sites have been audited and 15 sites were found to be compliant. 2 sites were found to be non-complaint. These sites are chased to encourage compliance.
Action 2	Emissions from developments and buildings	Every major development will have a Non Road Mobile Machinery condition, and compliance will be checked via spot checks at development sites.	
Action 3	Emissions from developments and buildings	All developments with CHP and biomass plant will have a condition to ensure that it meets the standards for emissions from the combined heat and power and biomass plants set out in the Sustainable Design and Construction SPG, and use ultra low NOx boilers.	

Action 4	Emissions from developments and buildings	All developments shall meet the Air Quality Neutral Emissions Benchmarks for Buildings and Transport set out in the Sustainable Design and Construction SPG.	
Action 5		An Informative will be placed on all relevant planning applications for the developer to consider "First Steps in Urban Air Quality". A Trees and Design Action Group (TDAG) Guidance Document	The implementation of this action is under consideration. In regards to planning applications the tree service: • Only remove trees if they are Dead Dying Dangerous or implicated in an insurance claim • If trees must be removed, then we would preferably like their CAVAT, with which we will use to plant more trees • The minimum we expect is 3 trees for every 1 removed
Action 6a, Action 6b	Public health and awareness raising	To improve information relating to the Smoke Control Areas on the council's web site. Action 6b: To prepare an advice leaflet for residents on authorised fuels and exempt appliances, which will be distributed at point of sale locations for fuel and wood burners. Action 6c: To prepare a planning informative for new solid fuel burners.	In December 2018 / January 2019 the council delivered a SCA awareness campaign through regular tweets around indoor burning, DEFRA approved fuels and appliances. In 2020 we did not have a SCA awareness campaign as the Communications Team were mostly focused on COVID-19 information. In 2021, it is proposed to develop and deliver an enhanced campaign to promote awareness of and compliance with smoke control area requirements. We will be utilising the PHE comms toolkit for local air quality incidents including from domestic burning and BBQs.

Action 6d, Action 6e, Action 6f	Emissions from developments and buildings	To promote the Waltham Forest waste collection service for garden waste via “Waltham Forest News” in order to prevent bonfires. To publicise Information on the adverse health effects of smoke from bonfires An Annual review of number of bonfire enforcement interventions	In 2020 the council sent out over 157 letters in relation to SCA or bonfire complaints. These letters contained advise and discourage burning and measures that will mitigate smoke pollution if people insist on having a bonfire. As part of the revamping council’s AQ webpage in 2020 we will improve information on the adverse health effects on burning, promote the council’s free garden waste collections and discourage bonfires.
Action 7, Action 7a	Emissions from developments and buildings	Promoting and delivering energy efficiency retrofitting projects in workplaces and homes using the GLA RE:NEW and RE-FIT programmes to replace old boilers / top up loft insulation in combination with other energy conservation measures. Annual reporting on HECA and number of boilers updated.	Waltham Forest’s efficiency retrofitting projects are now primarily through the Council’s Salix fund. In 2020 we implemented 17 SALIX projects and the expected CO2 savings is 173tonnes CO2. The projects were LED lighting upgrades, solar panel instillations, boiler upgrades and oil boiler replacements. In our 2019 HECA report Waltham Forest has completed: • Fuel Switch from electric heating to communal gas fired heating & hot water - 150 properties . • Solar PV for 22 properties • Cavity wall insulation for 128 properties • A-rated boiler upgrades for 694 properties • Replacement windows 107 properties • Communal solar PV for 3 properties • Energy efficiency upgrades for 199 fuel poor households delivered by fuel poverty provider

			• 53 Solar PV installations on properties in the able-to-pay sector under the Solar Together scheme. Waltham Forest has been awarded funding from the Government's Green Homes Grant scheme to improve energy efficiency of residential properties with an EPC rating of D, E, F or G. Over 200 homes have been or will be retrofitted during the period 2020-2022.
Action 8	Public health and awareness raising	Work to ensure that Public Health Teams are supporting engagement with local stakeholders (businesses, schools, community groups and healthcare providers). This will include briefing the Director of Public Health each year with the Annual Status Report, and updating them quarterly on the progress of the actions in this plan.	In 2020 the Public Health and Air Quality & Environmental Protection teams worked collaboratively on a number of projects including: • The School Super Zone Pilot. • Cleaner Air Hospital Project (Please see action 41 for further details). • Promoting AQ workshops information via our education hub.
Action 9a, Action 9b, Action 9c	Public health and awareness raising	Improve the council website with air quality information including the "Living Map", developed as part of the "Enjoy Waltham Forest" project. The map suggests alternative, better AQ walking and cycling routes. Improve local communication with at least one post annually in Waltham Forest News, all projects being	Action 9a: COMPLETE The AQ page on the council's website has a section on Walkit.com. This is a web based urban walking route planner that allows you to plan your journeys via less polluted routes. Action 9b: ONGOING. Comms in 2020 were limited but in September and October 2020 Waltham Forest promoted the Clean air day and EnginesOff campaign via press releases and social media.

		tweeted, and all major projects show cased on Council TV screens. Joint Anti-idling project on national Clean Air Day 21st June 2018	Action 9c: COMPLETE The council held a joint anti-idling project focusing around Walthamstow town centre for clean air day 2018.
Action 10	Public health and awareness raising	Refresh the Waltham Forest's Joint Strategic Needs Assessment which has air quality as a key theme	In December 2018 the council published its Joint Strategic Needs Assessment on Air Quality and Health. This was published by Public Health with input from Air Quality & Environmental Protection. https://www.walthamforest.gov.uk/content/joint-services-need-assessment-jsna COMPLETE
Action 11	Public health and awareness raising	Strengthening coordination with Public Health by ensuring that at least one consultant grade public health specialist within the borough has air quality responsibilities outlined in their job profile (as part of a wider role, not a dedicated air quality post)	The Public Health team are working collaboratively on several projects including: • The School Super Zone Pilot. • Cleaner Air Hospital Project (Please see action 41 for further details). Officer in post, regularly liaises with AQEP team. Ongoing action with AQEP will be covered by action 8. COMPLETE
Action 12	Public health and awareness raising	Director of Public Health to sign off Statutory Annual Reports and all new Air Quality Action Plans	ONGOING

Action 13a, Action 13b, Action 13c.	Cleaner transport	The Head of Transport will be fully briefed on Public Health duties and air quality opportunities and risks related to transport in the borough. Prepare a briefing which can be disseminated amongst the Transport Team. All meetings will be minuted and included in the appendix of future AQAP updates.	Highways and AQEP work very closely teams usually meet every 6 weeks or more frequently. Both teams are briefed on all relevant initiatives. ONGOING
Action 14	Public health and awareness raising	Air Quality Business Pledge initiative on Clean Air Day 21st June 2018	The AQ business pledge was promoted on CAD 2018. We currently have two businesses who have made AQ business pledge. These businesses have been provided with a toolkit to help businesses include considering AQ as a factor in their businesses building emissions, transportation and supply chain. COMPLETE
Action 15	Public health and awareness raising	Promotion of airTEXT by running a campaign in the week of national "Clean Air Day" 2018.	Complete: for the period 1st April 2019 to 31st March 2020 Waltham Forest had 18 new subscribers bringing the total to 189. Number of airTEXT Waltham Forest alert Days 1 April 2019 – 31 March 2020: 17 Number of airTEXT alerts sent to Waltham Forest subscribers 1 April 2019 – 31 March 2020: 3374

clearlead

Action 16, Action 16a	Public health and awareness raising	To run a campaign to promote the Transport for London STARS programme in Waltham Forest. Working to deliver the recommendations of the audits from the audited schools in this programme	There are now 57 schools in the borough with TfL STARS accredited travel plans including 25 Gold standard schools which have shown the highest commitment to encouraging active and sustainable travel over the past three years. No Schools in WF were audited in The Mayor's school air quality audit programme. ONGOING
Action 17a, Action17b	Localised solutions	Run "School Streets" trial School Air Quality Ambassadors initiative alongside national Clean Air Day	On national Clean Air Day 2018, all schools were invited to contact us if they would like assistance with trialling "School Streets" initiatives. 22 schools have expressed an interest in having a School Street. In 2019, two trial locations, Byron Road (George Mitchell School) and Marsh Lane (Willow Brook Primary School, St Joseph's Catholic Infant School, and Riverley Primary School) were launched on Monday 23 September. Complete In 2020 8 school streets went live and further schemes are planned for 2021: https://www.walthamforest.gov.uk/schoolstreets
Action 18	Delivery servicing and freight	Require the Council's waste contractor to have Gold status under the Fleet operator Recognition Scheme.	New waste, street cleansing and ground maintenance contract commenced end of Sept 2019 and runs for 8 years. Includes a requirement for a shift in how vehicles and equipment are powered.

			• Have swapped all of the ground equipment, so leaf blowers etc. from petrol to electric. • Have mandated vehicles under 3.5 tonnes to be electric • Will be having a fully electric dustcart to service the market, as the engines have to be left on to use the lifting and compacting equipment. • Not practical or economically viable for contractors to provide dustcarts using other fuel sources at the time but all are Euro VI diesel ONGOING
Action 19	Delivery servicing and freight	Update Procurement policies to ensure sustainable logistical measures are implemented (and include requirements for preferentially scoring bidders based on their sustainability criteria)	Air Quality is included in the Council's Sustainable Procurement Policy 2015-2019. The council launched a Sustainable Procurement Working Group in July 2019. The council has commenced consultation for a refreshed / new version of the of the Sustainable Procurement Policy. ONGOING
Action 20a, Action 20b,	Delivery servicing and freight	Monitor the use and mileage of the Zero Emission Delivery Service and Cargo Bikes. Promote the Zero Emission Delivery Service and Cargo Bikes through the website and Waltham Forest News.	In 2020 ZED: • Saved an estimated 23 tonnes CO2 emissions • Delivered 37,893 packages • Travelled over 69,362 miles

Action 20c, Action 20d		The Waltham Forest Construction Consolidation Pilot is being developed by the Asset Management Team Monitor the Waltham Forest Sustainable freight initiative, and convert this to NOx emissions and report annually.	The Council has undertaken significant publicity about this e.g. the ZED service has its own Twitter and Instagram accounts @zedwalthamforest In 2021/22, it is intended to explore options for further projects to promote sustainable freight deliveries. ONGOING
Action 21	Delivery servicing and freight	Complete a feasibility study on Virtual Loading Bays in town centres during 2019.	The Council's Business Low Emission Neighbourhood (BLEN) project, which is due to be delivered in 2020/2021, will include an investigation of virtual loading bays in Leytonstone. ONGOING
		Borough fleet actions	
Action 25a, Action 25b	Borough fleet	To monitor and report the annual emissions for the staff car club To submit bid to OLEV for workplace EV chargers	In September 2018, electric car charging points were installed at the Town Hall and the vehicles were switched to fully electric. Since that time over 27,500 miles have been driven by the staff and public. The public can book the vehicles out of office hours and at the weekends. In 2020 we had 115 registered staff members. Usage us currently averaging at around 1,000 miles per month. Waltham Forest Town Hall now has 6 bays. Two for staff / public 4 for e-car rental / pool cars. Staff Car club: ONGOING

			Workplace EV Chargers: COMPLETE
		Localised solutions	
Action 26	Localised solutions	To report the actions from the "Strategy for the Planning and Management of the Borough's Urban Forest" annually in the AQAP	The Trees Strategy is available on the Council's website https://www.walthamforest.gov.uk/content/trees Data for 2019/20 Planting Total 1948 Felling Total 497 Net Increase 1451 With regards to Urban Air Quality, the Tree Service addresses this in two ways 1. Carbon Sequestration, knowledge in this area is constantly improving and The City of London are assisting us to improve our calculation and monitoring systems both for COF funding and tree choice 2. Capture and Retain Airborne Fine Particulate Matter (PM2.5)
Action 27	Cleaner transport	Complete the implementation of the Lea Bridge Road Cycle Route by Autumn 2018	Lea Bridge Road was officially launched on the 17th October 2019, and includes: • Eight kilometres of fully segregated cycle track along the length of the road, • Seven key junction upgrades including Markhouse and Orient Way junction • 52 side roads being transformed into new blended crossings • 33 improved bus stops

			• Nine new pedestrian and cyclist controlled crossings Action Complete; So far The Enjoy Waltham Forest programme has: • Introduced over 42km of segregated cycle track, • 62 toucan crossings • 65 modal filters • 31 pocket parks • 145 blended crossings • Planted more than 900 trees • 37 public realm improvements
Cleaner transport			
Action 28	Public health and awareness raising	To continue to run regular anti-idling campaigns throughout 2018 and 2019	In 2020 we had to cancel the majority of our anti-idling events due to social distancing. We had 4 'normal' events prior to COVID-19 restrictions. We trailed one event in October using large posters print outs of the anti-idling leaflet in order to maintain distance. Our anti-idling events these focus on education and awareness raising however are attended by our parking / CCTV teams who enforce on inappropriate parking and stopping on yellow lines and our neighbourhood team to provide a uniformed presence and can issue idling fines if needed. COMPLETE
Action 29	Cleaner transport	Lowering the legal speed limit to 20mph in built up residential areas	Completed in most residential areas. Further work to be done in the north of the borough.

Action 30	Cleaner transport	10 new car club bays by March 2019	There are now over 75 car club bays in the borough. COMPLETE
Action 31	Public health and awareness raising	To hold a “Pedestrian Day” on World Car Free Day on 22nd September to promote the improvement of mass transit, cycling, and walking and give communities a chance to see what their town could be like car free	To celebrate World Car Free Day, we held Waltham Forest’s largest street party! • Walk-In-Stow - over 5.5km of road was closed in the borough, over 10,000 visitors attended Walk-In-Stow on Hoe Street. • 77 street parties took place in Waltham Forest in 2019. COMPLETE
Action 32	Cleaner transport	Free or discounted parking charges at existing parking meters for zero emission cars	This actional be considered when the Council’s parking charges are next reviewed.
Action 33	Cleaner transport	Free or discounted residential parking permits for zero emission cars	All resident permits are charged based on Engine size/CO2 emissions (g/km). COMPLETE
Action 34	Cleaner transport	Emission based charges for Residential and Controlled Parking Zone permits	
Action 35	Cleaner transport	To have the 17 new residential EV charging points fully operational by 2019	WF now has 120 lamp column sockets. 82 fast charging dual sockets. COMPLETE

			The Council has now adopted a comprehensive Electric Vehicle Charging Point Strategy. A new Action is included as Action 51.
Action 36	Cleaner transport	Installation of rapid chargers to help enable the take up of electric taxis, cabs and commercial vehicles (in partnership with TfL and/or OLEV)	4 rapid chargers has been installed by TfL at the following locations: • Church Lane E11 • High Street car park E17 • Mission Grove car park E17 • Richmond Road car park E4 SUPERCEDED The Council has now adopted a comprehensive Electric Vehicle Charging Point Strategy. A new Action is included as Action 51.
Action 37	Cleaner transport	Install eight bespoke secure cycle hubs at stations across the borough by the end of 2019	Seven cycle hubs have now been installed. • 140 bike hangars were installed in 2020 for a total of 480 hangers. • Four additional secure cycle parking hubs are proposed in Chingford, Higham's Park and two locations at Blackhorse Road. ONGOING
Action 38	Cleaner transport	Launch fleet of free to hire modified bikes by Autumn 2018	In December 2018 the council launched a pilot project for fleet of electric pool bikes. • Staff signed up to the scheme – 215 • Total number of hires – 5293

			• Total distance cycled – 16,140.80km COMPLETE
		Additional Measures and Actions added since AQAP publication (2018)	
Action 39	Monitoring and other core statutory duties	Research Project with King's College London to be published in July 2018	In 2018 Waltham Forest Council commissioned King's College London's Environmental Research Group to model the impacts of recent road interventions in the borough, particularly the Enjoy Waltham Forest scheme, on air quality. This report has been published on the council website. The report found that that measures to prioritise pedestrians and cyclists such as segregated cycle lanes, increased pocket parks and timed road closures had made a marked contribution to improving air quality and health in the borough Featured in several news outlets including the evening standard: https://www.standard.co.uk/news/london/children-will-live-longer-thanks-to-waltham-forests-mini-holland-cycle-scheme-a3903256.html COMPLETE
Action 40	Public health and awareness raising	Develop a Clean Air Hospital Framework for Whipps Cross University Hospital, in partnership with Barts Health NHS Trust and Global Action Plan.	Waltham Forest Council and Global Action Plan are working together to help hospitals become Clean Air Hospitals, playing their part in helping to reduce air pollution in London and protecting the health of the most vulnerable. • understand what it means to be a Clean Air Hospital • assess progress against 7 elements

			• develop a Clean Air Action Plan to improve air quality • assign ownership within the hospital to implement the plan • track and report progress towards becoming a Clean Air Hospital Impact: Improve the health of people in Waltham Forest by reducing air pollution levels. Outcomes: We will support hospitals in Waltham Forest to achieve the following outcomes: • cut NO2 emissions by 5% and PMs by 5% • protect the health of vulnerable patients in Waltham Forest by encouraging them to change their behaviour to benefit their health and reduce air pollution. COMPLETE Whipps Cross University Hospital Clean Air Action plan to be published in 2020.
Action 41	Localised solutions	Identify schools that could benefit from green infrastructure and implement greening projects to improve air quality in suitable schools.	A green screen was installed at Woodside Primary in January 2019. A list of schools that were a priority for green screens was complied. These have now all been installed: Sybourn Primary School- Willowbrook Primary School - George Tomlinson Primary School

			South Grove Primary School Green Leaf Nursery - Barclay School Walthamstow Barclay School Leyton COMPLETE Further school green screen projects have been identified for future green screen rollouts.
Action 42	Monitoring and other core statutory duties	Start Monitoring PM 2.5 in the borough.	In January 2019 a PM2.5 BAM monitor was installed at the Dawlish Road Air Quality monitoring station. COMPLETE
Action 43	Public health and awareness raising	Launch a pedometer challenge to encourage children to walk to school	To celebrate the start of Waltham Forest's year as the first London Borough of Culture, WF contacted all schools in the borough and distributed over 7000 pedometers to schools so pupils can log their steps. COMPLETE South Grove Primary won with a total of 12,071,811 steps. Prizes for winning included four road safety bollards and goodie bags with AQ mini games for all pupils.
Action 44	Localised solutions	To deliver a programme of school streets projects across the borough	As of 19/04/2021 we currently have 15 live school street schemes.

Action 45	Cleaner transport	To continue to develop area based schemes to promote walking and cycling and enhance local neighbourhoods	Low Traffic Street Schemes: • Hilltop Area • Coppermill Area • Markhouse Series 4 area • South Leytonstone • School Streets Strategic Cycle Network: • Quietway 2 (Cycle Way 27) • Forest Road • Olympic Park Links • Forest Road • Woodford New Road Leytonstone BLEN works have commenced. ONGOING
Action 46	Cleaner transport	Explore benefits of low cost pollution monitors	Undertake a trial of low cost pollution monitors to explore the accuracy and value of these monitors during 2020/21 The council has procured 3 Aeroqual AQY monitors. These are being trailed at LTN and School Street interventions in the borough. ONGOING

Action 47	Public health and awareness raising	Continue to deliver anti-Idling events and explore enforcement options	Participate in the London wide project. Report on enforcement and events. Explore further enforcement options such as introducing a TMO to increase fines. Waltham Forest promoted the Engines Off campaign via press releases and social media as part of our clean air day communications. In 2020 we had to cancel the majority of our anti-idling events due to social distancing. We had 4 'normal' events prior to COVID-19 restrictions. We trailed one event in October using large posters print outs of the anti-idling leaflet in order to maintain distance. We aim to revert to delivering two anti-idling events per month (during term time) once social distancing restrictions have been lifted. Further enforcement options are being considered. ONGOING
Action 48	Localised solutions	Develop an indoor AQ improvement assessment project	Explore indoor air filtration and monitoring options in high relative exposure scenarios such as schools in areas of poor air quality. We are working with TAPAS to look at monitoring options at schools in the borough: https://tapasnetwork.co.uk/
Action 49	Public health and	To hold annual events and activities around Clean Air Day and World Car	Waltham Forest is part of the Healthy Streets Everyday programme which focuses on six key workstreams:

	awareness raising	Free Day to promote walking cycling and improved air quality.	1. Streetscape improvements 2. New traffic regulations to make streets more pedestrian-friendly 3. Car-free events 4. Guidance on how to create Healthy Streets Everyday 5. Communications 6. Evaluation and monitoring of project interventions
Action 50	Public health and awareness raising	Improve the availability of information about air pollution in Waltham Forest for residents, businesses and visitors to the borough.	1. Revamp the air quality section of the Council's website during 2021/22. 2. Explore options for improved communications to residents about air quality.
Action 51	Monitoring and other core statutory duties	Monitor air quality in all Focus Areas and report on air quality improvement projects in these areas.	There are 13 focus areas in the borough. These are: 1. Sewardstone Rd & Kings Head Hill 2. Billet Round About, Chingford Rd, Billet Rd 3. Hall Lane & North Circular 4. Southend Rd, Woodford New Rd 5. Forest Rd, Blackhorse Rd, Blackhorse Lane 6. Forest Rd & Wood St 7. Lea Bridge Rd 8. Whipps Cross Rd & Lea Bridge Rd 9. Lea Bridge Rd & Markhouse Rd 10. Hoe St

			11. Hoe St & Selborne Rd 12. Green Man Round About, Leytonstone High Rd, Gainsborough Rd 13. Leyton High Rd, Warren Rd, Ruckholt Rd Diffusion tubes have now been deployed in all AQ focus areas except for 5. Forest Rd, Blackhorse Rd, Blackhorse Lane as there are ongoing road improvement projects which include works on lampposts.
Action 52	Cleaner transport	To support residents and businesses to take up electric vehicles, in order to reduce air pollution caused by vehicle emissions	The Council has adopted an electric vehicle charging point strategy setting out measures and targets to support electric vehicle recharging through to 2025. The key objectives are: • Continue to deliver an electric vehicle charging network that meets the demands of residents, businesses and visitors; • Designing sites that take into consideration other road users, particularly pedestrians; • Suitable coverage of the borough by 2025 (our target is for 80% of residents and businesses to be within 250m of a charging point by 2025); • Ensure the charging network has capacity for further expansion; • Encourage the uptake of electric vehicles through initiatives and public engagement; • Identify income opportunities that will lead to the provision and maintenance of charging points becoming cost neutral to the borough

			In 2020 the Council installed 47 public EV charging sockets: • Residential single socket 5.5kW lamp column charging points – 5 • Free standing dual-socket 7kW charging points – 38 • Rapid 50kW+ charging points – 4 By the end of 2020 the network was comprised of 206 public EV charging sockets: • Residential single socket 5.5kW lamp column charging points – 120 • Free standing dual-socket 7kW charging points – 82 • Rapid 50kW+ charging points – 4
Action 53	Emissions from developments and buildings	To improve energy efficiency in privately rented properties with the aim of achieving a minimum EPC standard of 'C'.	This action will primarily be delivered through the Council's property licensing scheme. Targets for this action are being developed
Action 54	Public health and awareness raising	Undertake a second school superzone project.	This project will build on the successes of the pilot superzone project covered by Action 8. It is planned to identify the location of the new superzone school during later in 2021 and set out clear objectives for the project.

Appendix D – Relevant LP1 Policies

The following policies are the submission version policies within LP1, which can be found in the following two documents:

- Waltham Forest Local Plan (Shaping the Borough, LP1) 2020-2035 - Proposed Submission Document, October 2020
- Schedule of Proposed Changes to the Published Plan, April 2021

Box A4.1: LP1 Policy 63 - Active Travel

All new development will be expected to support a shift to active transport modes and encourage an increase in walking and cycling. Proposals will be expected to:

Walking

A. Improve the pedestrian environment by supporting high quality and safe public realms with facilities and amenities;

B. Contribute towards the delivery of TfL's 'Liveable Neighbourhoods for all' programme, through enhancements to walking connections to local destinations, transport hubs and amenities;

C. Maximise opportunities to increase permeability of the public realm in and around the development for people travelling by foot, bike or public transport;

D. Provide wide enough footpath for the number of people expected to use them and designed for vulnerable road users;

E. Ensure that any improvements to access routes or green corridors would not result in adverse effects on the integrity of the Epping Forest Special Area of Conservation;

Cycling

F. Contribute and support the delivery of high quality and safe strategic or local cycle networks in the borough, linked to public transport nodes, as well as public spaces, facilities and amenities;

G. Ensure the provision of secure public and on-site cycle parking facilities for occupiers and visitors, that are compliant with Waltham Forest Parking Standards, London Plan requirements and London Cycling Design Standards (LCDS), at prominent locations;

H. Deliver accessible cycle parking and appropriate off-street storage for people using cargo bikes or adapted cycles, hand carts and for people who may not be able to lift bikes (when include ground floor retail and take-away food outlets).

I. Provide well-designed, accessible facilities including prominent and well-located showers, changing rooms and lockers. The provision should be proportionate to the scale of development and cycle parking provided;

Box A4.1 Continued: LP1 Policy 63 - Active Travel

J. Promote and contribute towards the introduction and expansion of cycle hire facilities or any other sustainable transport initiatives and;

K. Ensure that any improvements to access routes or green corridors would not result in adverse effects on the integrity of the Epping Forest Special Area of Conservation.

Box A4.2: LP1 Policy 64 - Public Transport

The Council will ensure that development is properly integrated with the public transport network by:

A. Working with TfL, Network Rail and other partners to facilitate improvements to public transport infrastructure (Bus, National Rail, Underground, or Overground network) with regard to capacity, provision of interchanges and step-free access;

B. Ensuring connectivity and integration of the public transport network with other transport modes including walking, cycling within and outside the borough;

C. Supporting public transport schemes that seek to improve connectivity to local areas with lower Public Transport Accessibility Level (PTAL); in line with Policy 96 -

Infrastructure and Developer Contributions;

D. Seeking development contributions towards enhancing public transport provision and infrastructure in order to mitigate likely adverse impact of development;

Box A4.3: LP1 Policy 65 - Development and Transport Impacts

To effectively assess the impacts of development, agree suitable mitigations and monitoring, where appropriate development proposals should be submitted with the following documentation:

A. A Transport Assessment (TA) showing how the development will contribute towards meeting local and London-wide transport objectives, and detail measures to achieve this (including street improvements, on-site facilities, and engagement);

B. A site Travel Plan detailing how development will enable walking, cycling and public transport use amongst users, including agreed targets, implementation and funding, and monitoring regime;

C. Construction Logistics Plan (CLP) setting out the potential impacts of construction traffic, and how this will be reduced. An Outline CLP should be submitted at application stage, followed by a Detailed CLP at the pre-construction phase, in line with Policy 67 - Construction Logistic Plans (CLPs).

Box A4.4: LP1 Policy 68 - Managing Vehicle Traffic

In order to encourage and promote active and sustainable transport as the main means of travel in Waltham Forest to improve air quality, improve personal health and well-being and respond to the Climate Emergency, all new residential developments (major and minor) in the borough should be car-free. Where car parking is required, the following considerations will apply:

A. In the case of proposed developments in less well-connected areas, a robust Transport Assessment must be provided to justify the need for any deviation from car-free development, in line with London Plan policies and paragraph 15.30;

B. Proposals must not exceed maximum parking standards set out in the London Plan and the Parking Standards included in Appendix 1 'Parking Standards'.

C. DDA Parking spaces should be provided for all developments, including car-free proposals in accordance with best practice standards, as set out in the London Plan and the Council parking standards;

D. Parking or loading provision for essential operational or servicing needs must be justified through a Transport Assessment, in line with Policy 65 - Development and Transport Impacts;

E. Where other car parking (including motorcycle parking) is exceptionally provided it must not exceed London Plan and the Council's parking standards;

F. New development must incorporate designated spaces for deliveries within the boundaries of the development and provide Delivery and Servicing Plans which encourage provision for low-emission, consolidation and last mile delivery modes; in line with Policy 65;

G. Car Parking in new developments for GPs, health and educational facilities will be supported by following the Council's Parking Standards and London Plan policies;

H. Operational parking for business and industry uses will be permitted when need is clearly demonstrated within the Transport Assessment, and measures have been applied to minimise the number of vehicles, frequency and impact of trips. All operational vehicles should be electric;

Parking Management

J. Where parking is provided as part of a development, proposals must be supported with a Car Parking Management Plan detailing the mechanism for leasing spaces, the provision of disabled parking to meet future demand, and activation of passive electric charge points;

K. Proposals must ensure that disabled parking spaces in residential developments are only used by Blue Badge holders who are occupiers of wheelchair accessible units in the development. Disabled spaces must not be sold off or leased to other residents;

L. A car-free agreement within legal agreements will be required, restricting new residents from accessing parking permits within existing CPZs or ensuring future CPZs are in place before a development is occupied;

Box A4.4 continued: LP1 Policy 68 - Managing Vehicle Traffic

M. Where roads in close proximity to the site are not managed, or adequately managed by parking controls, appropriate financial contributions will be sought to secure the delivery of CPZs;

Estate Regeneration

N. Where car parking is re-provided as part of Council housing estate regeneration schemes, car parking should be reduced to meet the minimum need of returning residents. Where car parking exceeds Council parking standards, evidence of parking need should be provided;

O. Re-provided car parking spaces for existing residents should at no point be offered to new residents.

Car Clubs

New development will be required to contribute to the borough's public car club network by:

P. Providing accessible spaces on site or contributions to deliver bays on-highway;

Q. Encouraging car owner to use the network with a free membership and active promotion;

R. Contributing to the monitoring of the schemes throughout Section 106 agreements, in line with Policy 96 - Infrastructure and Developer Contributions.

Box A4.5: LP1 Policy 11- North Waltham Forest

Development will be supported in the North of the Borough as a distinctive area for targeted investment and growth in and around the designated centres and the North Circular corridor where it:

A. Supports and encourages the delivery of a minimum of 3,400 new quality homes in the strategic locations as follows:

i. 300 homes in North Chingford
ii. 100 homes in South Chingford/Chingford Mount
iii. 400 homes in Highams Park
iv. 400 homes in the Sewardstone Road strategic location
v. 800 new homes in the North Circular location
vi. Outside of Strategic Locations a minimum of 1,400 homes have been identified in the Brownfield Land Register and the Strategic Allocations DPD;

B. Reflects the local character of the area or improve the quality of the local environment with particular reference to the requirements of Policy 4 Location of Growth, Policy 5 Management of Growth and Policy 6 Good Growth;

C. Strengthens, supports and encourages existing and new employment opportunities in the North of the Borough, with the delivery of 1,950 new jobs;

D. Enables investment and the regeneration of the District Centres of North Chingford, South Chingford, Highams Park and Sewardstone Road Neighbourhood Centre (see Policies Map);

Box A4.5 Continued: LP1 Policy 11- North Waltham Forest

E. Supports the development of an improved cycle and pedestrian network in accordance with the Transport policy at Policies 62, 63, 64 and 68;

F. Contributes to the Council's objectives of managing the impact of development on the Epping Forest Special Area of Conservation (EFSAC) (in line with the requirements of Policy 83); the Lee Valley Special Protection Area (policy 84) ; and the protection of Green Belt and Metropolitan Open land (MOL), (Policy 79) improving access where appropriate;

G. Applies place-making principles that reflect the character and local distinctiveness of Highams Park, with particular reference to the Highams Area of Special Character, cultural and green assets as set out in the Highams Park Neighbourhood Plan;

H. In North Chingford it:

i. Contributes to the regeneration of North Chingford Centre and the development of a community hub focused in this centre
ii. Protects and enhances the Chingford Green Conservation Area in accordance with the requirements of Policy 74: Conservation Areas;

I. In South Chingford/ Chingford Mount it:

i. contributes to the development of a community hub focused at South Chingford District centre;
ii. Contributes to connectivity, diversification of commercial space, new employment, protecting local character and enhancing public space with a focus on Albert Crescent;

J. In the Sewardstone Road Strategic Location it:

i. Focusses new development to the area of Kings Head Hill/Sewardstone Road junction;
ii. Contributes to the improvement of public realm and public spaces across the area and walking and cycling accessibility, connectivity, permeability and legibility to Ponders End, North Chingford District Centre and South Chingford / Chingford Mount, in addition to other identified routes; and

K. In the North Circular Corridor Strategic Location, it;

i. Provides opportunities to link to the neighbouring large scale regeneration and infrastructure investment at the adjoining Meridian Water, London Borough of Enfield;
ii. Strengthens the character and identity of the A406 corridor through design improvement measures for better safety, functional and effective connections with local places, activity hubs and communities; and
iii. Provides leisure opportunities around and in the vicinity of Banbury Reservoir which preserve and enhance the openness of the Green Belt and provide additional biodiversity benefits and which contribute to the aims of Policies 79, 80, 81 and 82.

Box A4.6: LP1 Policy 69 - Electric Vehicles (EV)

Where development provides car parking or increased vehicles on borough roads, it should accelerate uptake of electric vehicles by:

A. Providing infrastructure for electric vehicle charging, including a minimum of 20 per cent of spaces to have active charging facilities, with passive provision for all remaining spaces;

B. Demonstrating within car parking management plans how occupants using electric vehicle charge points will be charged fairly and consistently, and how the number of EV charge points will be increased to meet demand;

C. Incentivising ownership and use of electric vehicles, including permitting only electric vehicles at new residential development, reduced rate parking charges or leases for spaces, or subsidised electricity;

D. Contributing the boroughs publicly accessible rapid charging and on-street charging network, especially where development is served by electric vehicles for taxis and deliveries and servicing.

Box A4.7: LP1 Policy 66 - Deliveries, Freight and Servicing

All development within the borough should seek to minimise the adverse impacts of deliveries, freight and servicing by:

A. Using sustainable transport initiatives and zero emission vehicles, such as cargo bikes and electric vehicles, for servicing trips and last mile deliveries;

B. Reducing the number of freight, servicing and delivery trips to and from developments at the operational and construction phases;

C. Managing freight and servicing by utilising local and area wide facilities to consolidate and time deliveries;

D. Operating facilities and measures to reduce waste collection trips, such as consolidated waste collection for businesses, and underground waste storage;

E. Arranging deliveries outside of peak hours and in the evening or night-time;

F. Managing road danger resulting from freight and servicing vehicles by using suppliers that meet Fleet Operator Recognition Scheme (FORS) Silver standard;

G. Where appropriate, promoting facilities to enable efficient online retailing and minimise additional freight trips arising from missed deliveries, including storage lockers or concierge services.

Box A4.8: LP1 Policy 67 - Construction Logistic Plans (CLPs)

To minimise the impact of construction logistics on the road network all new residential and commercial development in the borough should enable efficient and sustainable servicing and delivery of goods, waste and servicing activity to and from sites. Proposals should be supported by an Outline CLP where appropriate to satisfy the following requirements:

A. Reduce the potential impact on the local community through a comprehensive and thorough risk assessment;

B. Minimise construction traffic and manoeuvres that place other road users at risk by providing or ensuring safe routes to the site for construction traffic, and avoid areas with levels of vulnerable road users, including schools, town centres and areas with high density of pedestrians and cyclists;

C. Reduce construction traffic and manoeuvres in the main roads in order to minimise potential traffic congestion in town centres.

D. Consolidate freight deliveries with other local and regional development sites or using consolidation facilities by the incorporation of Delivery and Servicing Plans;

E. Minimise road danger resulting from construction vehicles by using suppliers that meet Fleet Operator Recognition Scheme (FORS) Silver standard;

F. Promote the use of safest vehicles, including those that meet direct vision standards, and use features such as pedestrian and cyclist autonomous emergency braking, intelligent speed assistance and alcohol interlock systems;

G. Identify the suitability of the site and its ground conditions to enable the adoption of vehicles that are fitted with enhanced vulnerable road user safety features;

H. Minimise impact on local transport network by recognising site delivery, collection management and locating all vehicle loading and unloading facilities within the boundary of major development;

I. Be used as a monitoring tool to ensure developments are adhered, reviewed and updated inline with the CLP prior to the start of each new phase of construction;

J. Be required prior to commencement of the development. This will be required at sites that will or have the potential to that have the potential to impact on the highway network public transport services, sustainable transport, have difficult access, may affect nearby developments or surrounding residents; and

K. Adhere to the CLP guidances and templates.

Box A4.9: LP1 Policy 90 - Air Pollution

New development should mitigate any adverse air pollution impacts by:

A. Ensuring development meets, and where possible improves upon, air quality neutral standards over its lifetime and does not contribute to a decrease in air quality during the construction or operation stage;

B. Undertaking Air Quality Assessments (AQA's) for the following types of development:

i. All major developments, unless there is clear evidence that transport and building emissions will be less than the existing use;

ii. Development in areas of sub-standard air quality and changes of use which result in an introduction of sensitive receptors to areas of poor air quality;

iii. Development in close proximity to sensitive uses;

iv. Developments which involve significant demolition and construction;

C. Ensuring development is air quality positive in air quality focus areas;

D. Assessing existing air quality and avoiding locating sensitive uses in areas exposed to air pollution;

E. Minimising exposure to air pollution through the considered positioning and design of new development, considering private, communal, public open space and child play spaces;

F. Incorporating on-site measures to improve air quality, however where it can be demonstrated that on-site provision is impractical or inappropriate, off-site measures to improve local air quality may be acceptable, providing equivalent air quality benefits can be demonstrated; and

G. Where major application proposals would not achieve the air quality neutral benchmark, the applicant will be expected to make a financial contribution as set out in Planning Obligations SPD.

Appendix E – AWP Technical Note: Additional Traffic Analysis and Monitoring Information

technical note

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LBWF HRA Air Quality Assessment and Mitigation Strategy

Traffic and AQ Monitoring Implementation Strategy

Project No.	1102
Revision	F1
Date	03/03/22
Client	Clearlead / LBWF
Prepared	I Awcock
Checked	D Atkin
Authorised	I Awcock
File Ref.	**p:\1102 waltham forest lp sa hra traffic analysis\c documents\reports\1102 lbwf methodology note - implementation and monitoring.docx**

1 Introduction

1.1 Following the completion of initial air quality modelling of the likely impacts of the Waltham Forest Local Plan on the Epping Forest Special Area of Conservation (EFSAC) (Kairus, April 2021), comments have been raised by Natural England (NE) regarding the air quality impacts on the EFSAC.

1.2 In order to provide information to address the comments from NE, this note further considers the traffic related impacts and in particular the potential mitigation options available in the event that Local Plan development related impacts on the SAC are observed.

1.3 In addition to considering further soft measures to manage traffic flows in the EFSAC further strategic transport assessment work has been undertaken to consider the contribution made by proposed developments in Waltham Forest to the traffic on the routes in question within Epping Forest.

1.4 This note should be read alongside the Local Plan Part 2 (LP2) Site Allocations Document (Regulation 19 draft, November 2021). It should be noted that the nearest allocation at North Chingford within the LP2 is around 6km to the south of the locations of impact identified in the air quality modelling.

1.5 The furthest allocations are around 9 miles to the south.

1.6 Section 2 of this note sets out the Strategic Transport assessment work with Section 3 considering further traffic monitoring measures that might be able to be implemented in response to NE concerns.

1.7 Section 3 sets out the monitoring measures that could be implemented along with additional measures in London Borough of Waltham Forest (LBWF) that could further control the growth of traffic impacting the EFSAC from LBWF.

1.8 Section 4 provides a summary.

2 Strategic Transport Assessment

2.1 A Strategic Transport Assessment has been undertaken to ascertain which, if any, of the proposed development areas in the Waltham Forest Local Plan would be likely to have a traffic impact on the key EFSAC links:

- A121 Honey Lane;
- Pynest Green Lane; and
- Avey Rd / Cross Roads.

2.2 A combination of GIS analysis and 2011 Census Travel To Work (TTW) data was used to determine whether the Waltham Forest development areas would have any impact on the EFSAC links.

2.3 Using GIS provides a strategic approach, based on location data and traffic conditions, whilst the Census analysis approach takes into account human behaviour and the possibility of rat-running to travel between two points.

2.4 Further assessment of the baseline traffic data used for the air quality assessment has also been undertaken in the light of inconsistencies identified between data used by Epping Forest District Council (EFDC), historic link flow data from Essex County Council (ECC) and the baseline

modelled data utilised by LBWF obtained from TfL. This additional assessment is set out below.

2.5 The use of ANPR data to adjust the modelled vehicle fleet mix for the purpose of air quality modelling has also been considered as set out below.

2.6 DVLA data for EV ownership in LBWF has also been extracted to demonstrate historic growth in ownership and the potential future trend to further evidence the expectations for EV uptake in LBWF during the plan period.

2.7 The final part of the strategic transport assessment considers evidence for the origins of visitor numbers to Epping Forest.

2011 Census Travel To Work Data

2.8 Using origin/destination Travel to Work (TTW) data from the 2011 Census and professional judgement of route choices, it is possible to determine the likely level of traffic originating from Waltham Forest and using the EFSAC links on journeys to work. This standard approach to origin-destination analysis in transport modelling is widely used to determine trip distribution for new developments.

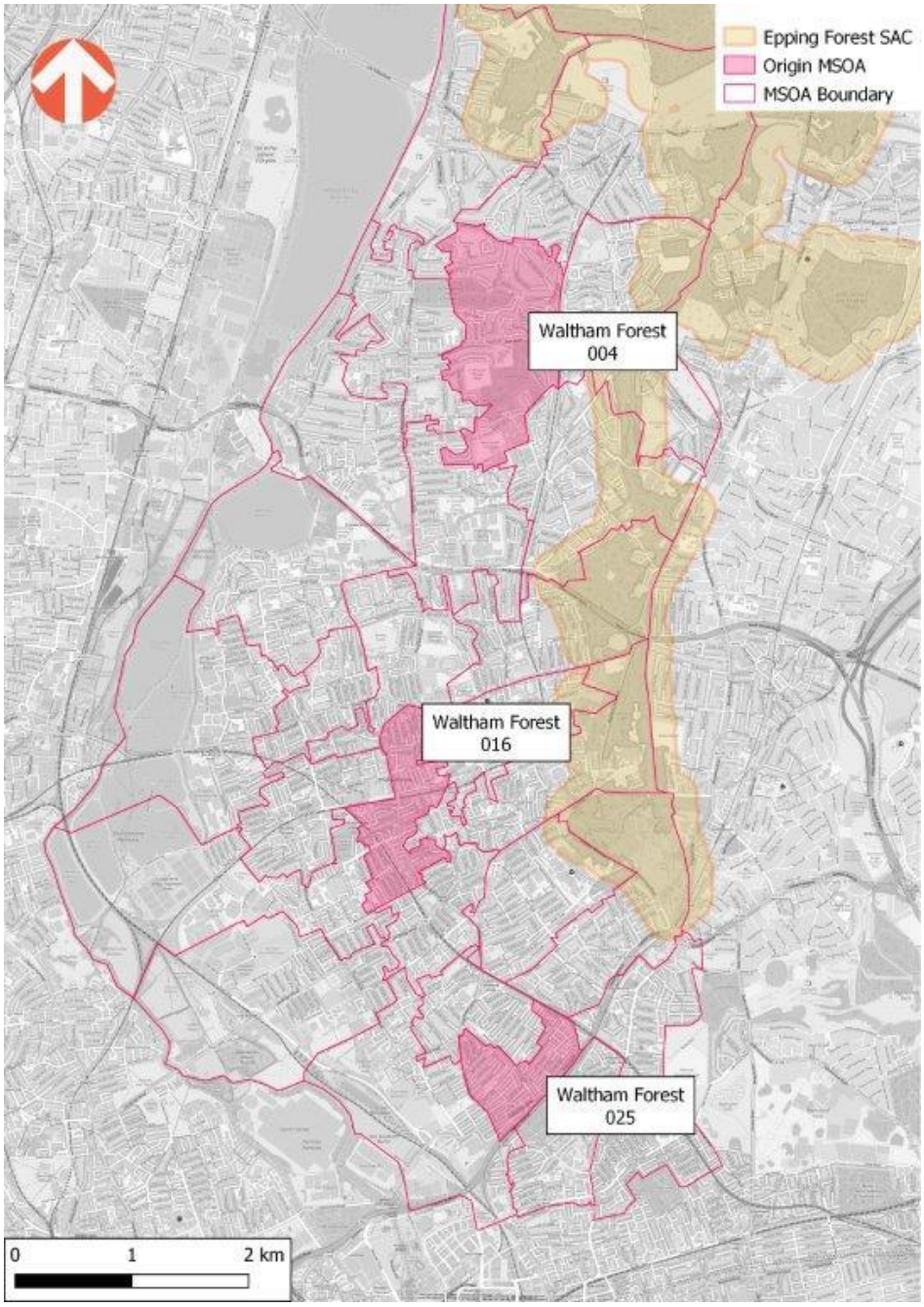
2.9 Single points of origin have been used to model proposed development areas in Waltham Forest North, Central and South, selected to tie in with the Local Plan development areas. An ONS Middle Super Output Area (MSOA) central to each of these areas was picked to represent the wider area. MSOA's as origin should be predominantly residential in nature. The 3 MSOA's defined as origin points located as shown on Figure 2.1 below are:

- Waltham Forest 004 (North)
- Waltham Forest 016 (Central)
- Waltham Forest 025 (South)

2.5 The MSOAs used for the destinations were taken from the borough~~s~~ of Waltham Forest and Epping Forest District. Breaking down the borough/district into the MSOAs allows for multiple destination points to be used from which journeys can be mapped.

2.6 There is generally more route choice for journeys within a smaller area, allowing for rat-running and local conditions, so breaking down into MSOAs allows for consideration of these varying route choices.

Figure 2.1 Modelled MSOA locations



2.7 Further afield, Local Authority Districts (LAD) are used, where journeys are all likely to be funnelled through one or two key routes to reach their destinations, and a more detailed breakdown is not required.

2.8 2011 Census Origin/Destination data was acquired from NOMIS between each of the origin MSOAs and the destination MSOAs and LADs. This gives a single-origin matrix of car drivers travelling between their home (origin MSOA) and place of work (destination MSOA or LAD). Each destination

MSOA or LAD therefore has a percentage of residents travelling to each area for work from their origin MSOA.

2.9 Using a combination of online routing and professional judgement (based on route attractiveness, link types, journey times, junction congestion etc.), each origin and destination point is assigned a route (or multiple routes where these exist) and where this route is considered to run through any of the EFSAC links, this is noted.

2.10 The outcome is a total percentage of all journeys to work leaving their origin and travelling through one or more of the EFSAC links to the destination. The exercise is then repeated for each origin MSOA to derive the total number of trips likely to be travelling through the EFSAC links for commuting journeys by car.

2.11 The proportion of route choices from / to each origin or destination MSOA that would be likely to use links within EFSAC can then be derived and the results of that TTW Census analysis is set out in Table 2.1.

Table 2.1: 2011 Census TTW Analysis Results

Origin MSOA	% Traffic on each EFSAC Link		
	A121 Honey Lane	Pynest Green Lane	Avey Rd / Cross Roads
WF004	9%	7%	8%
WF016	3%	3%	3%
WF025	2%	1%	2%
Borough Average	**4.6%**	**3.6%**	**4.3%**

2.12 Table 2.1 shows that on average, the LBWF could be expected to produce between 3.6% and 4.6% of trips which would use the key EFSAC links. This is highest in the northern area of Waltham Forest, where routes predominantly use Epping Forest New Road and the A112 to access areas north of the borough, avoiding the use of the EFSAC links.

GIS Analysis

2.13 A GIS software package was used to perform origin-destination analysis on routes between the borough of Waltham Forest and areas outside the borough. Again, the three MSOAs were isolated to represent a 'north', 'central' and 'south' area as set out above.

2.14 A 50km radius around the borough was nominally used as a maximum area for journeys to work, and each MSOA within Waltham Forest and Epping Forest was assigned a centroid node to represent that MSOA. Areas outside of these two boroughs were broken down by LAD, and each one assigned a centroid.

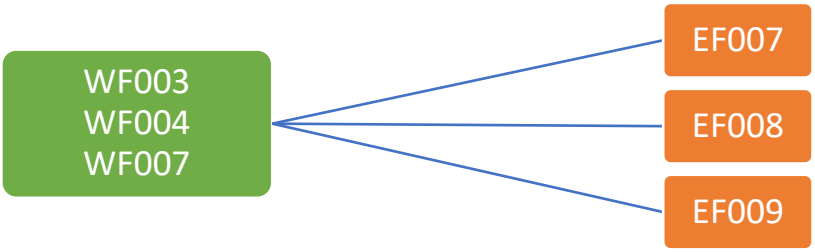
2.15 Shortest path analysis was used (Algorithm A1) for each origin node (WF MSOA centroids) to all destination nodes (EF and LAD destination nodes). Shortest Path uses a routable network, in this case data imported from the Ordnance Survey OpenRoads dataset, which maps all roads in the United Kingdom, and determines the shortest path by distance between two points on the network. The route analysis calculates the shortest path based on geometric data of each link length on the network.

2.16 The A1 analysis showed that none of the shortest paths between origins in LBWF and TTW destinations in EFDC or other local authority districts would use the EFSAC links to reach the destination nodes.

2.17 As the shortest path analysis is based purely on distance and does not account for traffic conditions or local environment, the exercise was repeated using an alternative method (A2), using open-source routing algorithms (similar to Google Maps) to produce a series of origin-destination routes based either on shortest path / fastest journey or a mixture of the two ('balanced' method). The algorithm picks the 'best' route for each journey based on known typical traffic conditions and local constraints.

2.18 Using the A2 method, it was possible to force some traffic to use the A121 Honey Lane link. The origins and destinations which used the A121 are set out in Figures 2.2 and 2.3.

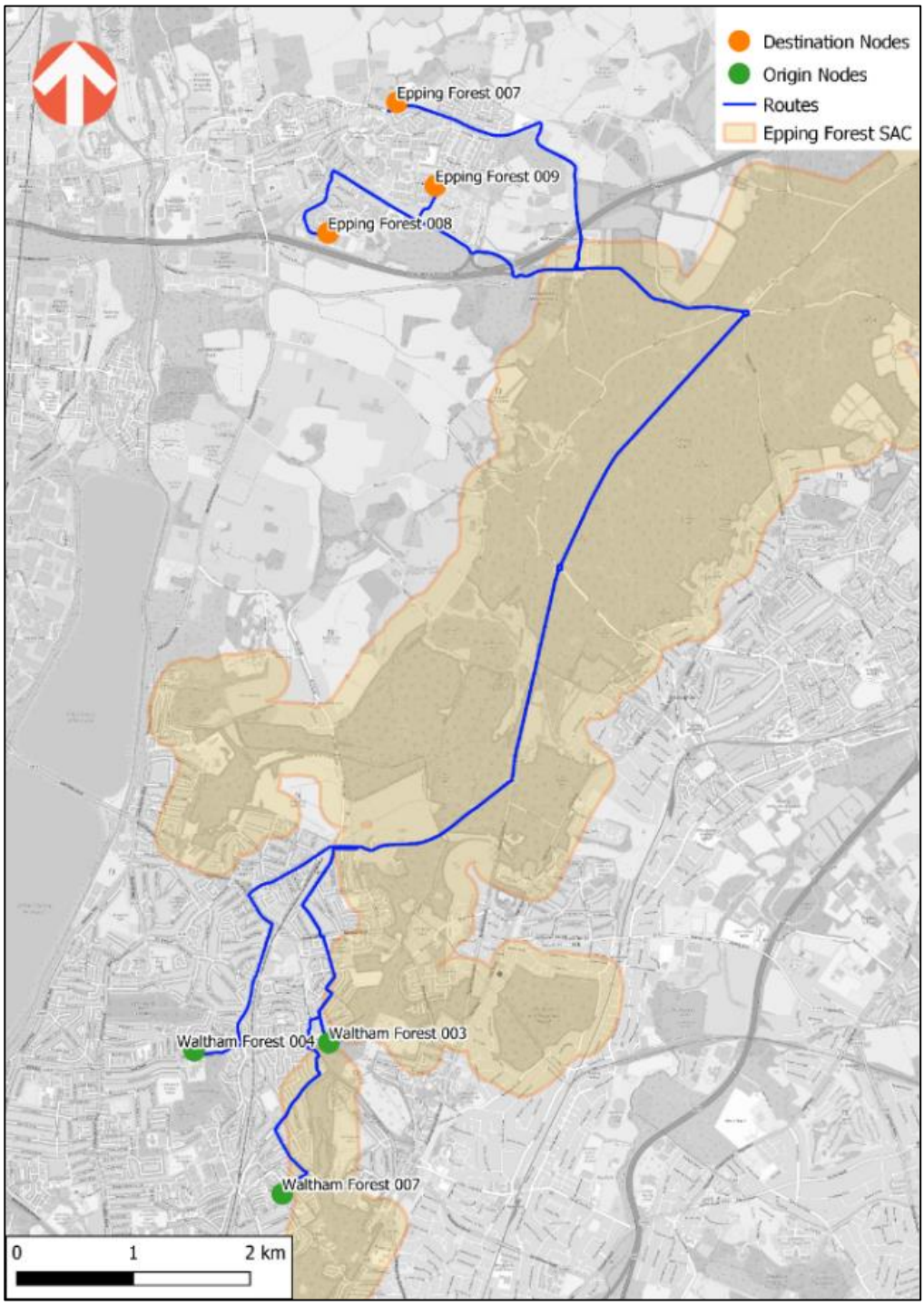
Figure 2.2: Origin (Green) / Destination (Orange) MSOAs Using A121 Honey Lane



2.19 The results of the A2 analysis showed that only three MSOAs in Waltham Forest could be routed through the A121 Honey Lane, or indeed any of the EFSAC links to reach the destinations in EFDC or other LAD's. The MSOAs

were all north of the North Circular Road and located to the north east of Waltham Forest borough.

Figure 2.3: Map of Origin / Destination Routes Using A121 Honey Lane



2.20 The results of the analysis both using the Census Data and GIS analysis shows that very little traffic originating in Waltham Forest would use any of the key links through the EFSAC. The predominant traffic through these links

would be expected to be from within Epping Forest District and surrounding local authorities, and not Waltham Forest.

Traffic Baseline Data Review

2.21 Traffic data provided by LBWF for the purpose of undertaking the air quality assessment (Kairus April 2021, updated March 2022) was derived from the LOHAM model as set out in the AWP Note[1].

2.22 This review has identified that traffic data has been provided by ECC as highway authority for links within EFSAC to the District of Epping Forest for use in their Local Plan review[2].

2.23 The ECC derived data has been utilised by Aecom to model air quality impacts from EFDC Local Plan on the EFSAC.

2.24 Data has also been obtained from ECC for traffic flows on the key links indicating air quality exceedances due to the LBWF Local Plan. Data from 2017 has been factored to AADT to compare with data used in the EFDC air quality review and the LBWF air quality model as shown in Table 2.2 below.

Table 2.2: Link Flow Data Comparison

Link Location	LBWF Model	AQ Pts	2031 WF AADT	Aecom Model	Aecom Scenario 4 2033 with LP Flow	2017 ECC AADT Factored ATC Data
A121 Honey Lane - (Wake Arms Roundabout to M25 J26 and Dowding Way)	Link 14	83, 85, 86, 87	32,692	J01_05	29,218	22,767
	Link 14		32,692	J33_02	29,174	
	Link 14		32,692	J33_04	29,547	
Crossroads, High Beech and Avey Lane to Sewardstone Road (A112) (Forest Road Network	Link 12	93, 95, 96, 97, 98	13,715	J35_03	2,326	3,789
	Link 12		13,715	J35_02	3,793	
	Link 12		13,715	J36_04	3,851	
Pynrest Green Road to Claypit Hill (Forest Road Network)	Link 13		2,450	Not Incl		

2.25 The data demonstrates good correlation on the A121 (Link 14 / J01/02/04/05) however some disparity is identified for Crossroads, High Beach and Avey Lane. Here the LBWF modelled flows obtained from the

[1] Ref to AWP initial technical note
[2] https://www.efdclocalplan.org/wp-content/uploads/2019/01/EB503-Transport-Asessment-Report-Essex-Highways-January-2019.pdf

LOHAM model do not correlate against the Aecom EFDC data or the ECC ATC data by a factor of around 3.6 (360%).

2.26 The resulting air quality impacts on Crossroads, High beech and Avey lane may therefore also be significantly overstated.

ANPR Data Review

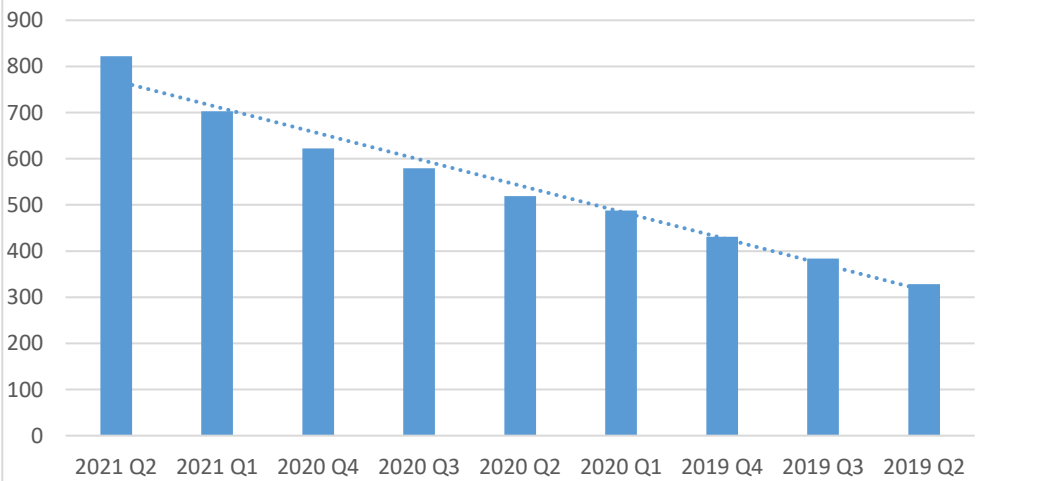
2.27 ECC also collected ANPR data which was used by Aecom to derive a vehicle fleet mix comparison against usual DfT fleet mix contained in the normal air quality dataset.

2.28 This revised fleet mix was used to more accurately reflect local conditions and has now been utilised in the sensitivity analysis of LBWF air quality impacts (see Kairus Technical Note ANPR001 appended to the update Air Quality Assessment, Kairus, March 2022).

EV Usage

2.29 The numbers of EV registered within the postcode areas E4 and E17 covering LBWF has been identified from DVLA datasets as shown in Figure 2.4 below:

Figure 2.4 Licensed ULEV's in E4 + E17 Postocde



2.30 The most recent data indicates growth of over 100 vehicles per quarter indicating that the high levels of uptake anticipated in the LBWF Plan and in the air quality model is likely to be achieved or exceeded.

Strategic Transport Assessment – Conclusions

2.31 Strategic analysis of census TTW data using 2 different methodologies indicates that a very small proportion of vehicles to/from LBWF Local Plan sites might have an impact on links with AQ exceedances in the EFSAC.

2.32 The predominant traffic through these links would be expected to be from within Epping Forest District and surrounding local authorities, and not Waltham Forest.

2.33 Further analysis of the traffic flow baseline used in the AQ modelling has been undertaken using ECC traffic count data. The analysis indicates that resulting air quality impacts on Crossroads, High beech and Avey lane may be significantly overstated within the Waltham Forest air quality impact assessment (April 2021, updated in March 2022).

2.34 The growth in the EV fleet within LBWF has been reviewed and the most recent DVLA data indicates growth of over 100 vehicles per quarter indicating that the high levels of uptake anticipated in the LBWF Plan and in the air quality model is likely to be achieved or exceeded.

3 Further Traffic Monitoring Measures

3.1 The AWP Note "LBWF HRA Air Quality Assessment, Traffic Data and Policy Review - Technical Note" dated 29/04/2021 considered the traffic data associated with air quality modelling of those impacts.

3.2 Table 5.1 of that document identified the "Anticipated Emitting Traffic Reduction Effects of Various Measures within Waltham Forest" and set out five traffic reduction measures (a – e) already set out within the Local Plan Part 1.

3.3 This additional note considers the likelihood of those factors being effective and drills down further into the range of effects of Local Plan development in Waltham Forest on the EFSAC.

3.4 The principal means of monitoring and managing Local Plan related traffic and air quality impacts will be through a wider traffic management plan for Epping Forest that the responsible authority should be putting into action.

3.5 Table 5.1a below adds further commentary on each measure promoted in table 5 to propose monitoring arrangements and the likely effect of this measure on Epping Forest.

3.6 Table 5.2 below suggests further Epping Forest related measures that could be implemented outside of Waltham Forest by the responsible authority to assist in managing traffic impacts in Epping Forest.

Table 5.1a Anticipated Emitting Traffic Reduction Effects of Various Measures within Waltham Forest – with additional commentary

Item	Measure	Potential Traffic reduction effect	Commentary	Further Mitigation if required by monitoring
a	Low Traffic Neighbourhoods (LTN) – reductions in traffic flows and traffic "evaporation"	11% to 56%	Most likely to have an effect in the immediate vicinity of allocations and within LBWF neighbourhoods and strategic routes in the Borough. General effect through overall reduced desire to travel.	Additional LTN areas within LBWF to influence mode of travel to areas in SAC
b	Low Traffic Neighbourhoods – reduction in car ownership	6%	Reduction in LTN car ownership would be likely to have a wider effect across the whole borough and would impact traffic flows in SAC.	Additional car clubs and non car mode options to reach and pass through EFSAC.
c	Travel Plan Implementation	10% - 60%	Good management of travel plan measures in new development can have a significant effect at the higher end of the identified range.	Further expansion on non car means to reach and pass through EFSAC.
d	Electric vehicle uptake	8%	Since EV uptake removes emitting vehicles from creating impacts this is the most guaranteed of all measures	Increased opportunity for EV take up. Replacement of non EV car club vehicles with EV.

Item	Measure	Potential Traffic reduction effect	Commentary	Further Mitigation if required by monitoring
e	Other measures such as HGV route management, cycle and walking routes programmes; school travel programmes; bus enhancement programmes; last mile delivery programmes; vehicle fleet composition; car clubs / car sharing; potential ULEZ expansion.	10% - 20%	These other multiple measures reach across other Boroughs and so require cooperation but would have a wider regional impact than that associated solely with LBWF LP developments.	Increased action with other authorities. Implementation of HGV banned routes in EFSAC.
Total lowest potential traffic reduction		45%		

3.7 Table 5.1a identifies measures already being promoted by LBWF in their Plan. Table 5.2 below suggests further measures directly related to the locations where impacts are observed.

3.8 Those further measures could be implemented outside of Waltham Forest by the responsible authority to assist in managing traffic impacts in Epping Forest.

Table 5.2 EFSAC Potential Traffic Management Measures

Item	Measure	Potential Traffic reduction effect	Commentary	Further Mitigation if required by monitoring
f	Weight limits on all EFSAC routes to remove HGV content	10%	Would remove the highest emitting vehicles in the short term but would require implementation by others.	Widening the areas of weight limited routes and better enforcement.

Item	Measure	Potential Traffic reduction effect	Commentary	Further Mitigation if required by monitoring
g	Reduced Speed limits through areas of AQ impact	0%	The overall reduction in speeds through the forest would reduce the risk of congestion and queueing, providing more free flowing traffic resulting in lower emissions	Detailed traffic modelling of lowered speeds would provide evidence of predicted effect of this measure. Widening the areas of speed limited routes and better enforcement could result.
h	Relocation of car parking areas in EFSAC	10% - 60%	As part of a Management Plan to relocate areas of access away from AQ stressed areas to other parts of the SAC more able to cope.	Further relocation or reduction of car parking
i	Road Closures	100%	Closing roads to traffic in locations with greatest stress due to traffic related air quality.	Widening the areas of road closures.

3.9 It can therefore be seen that measures already being promoted by LBWF are expected to achieve at least the 30% targeted reduction in traffic flows at EFSAC receptors where permissible emission levels are exceeded.

3.10 Other measures can also be implemented within Epping Forest to further manage the impact of traffic from the wider or regional area on those receptors.

4 Summary and Conclusions

4.1 A Strategic Transport assessment considering likely routings for journeys to work for new residents of development in LBWF has been undertaken using two alternate methodologies.

4.2 Both methodologies demonstrate low likelihood that vehicles on the links of concern within EFSAC would originate from new development in LBWF.

4.3 The baseline traffic data used to form the air quality assessment of links in EFSAC has been reviewed and compared to similar data used for EFDC and observed traffic flows. The modelled data is demonstrated as being 360% higher than that observed or used by EFDC thereby indicating that the AQ impacts on one link in the SAC due to LBWF Local Plan may be significantly overstated.

4.4 ANPR data utilised by EFDC in their air quality strategy has also been reviewed and sensitivity testing with an alternate fleet mix undertaken.

4.5 The take up of EV's has also been investigated using DVLA datasets to show that the expectations for future ULEV update in LBWF in the Local Plan period are justified.

4.6 A region wide approach is recommended to address traffic movements through EFSAC with potential highway mitigation measures to be promoted by the local highway authority ECC.

AWP