# Horsham and Chichester Local Plans

## Outline Air Quality Mitigation Strategy

Horsham District Council

September 2024

Delivering a better world

## Quality information

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# Glossary

| Term | Meaning |
|---|---|
| NOx | Oxides of nitrogen. Term given to nitrogen oxide and nitrogen dioxide. These are two pollutants emitted from vehicle exhausts that are of relevance to both human health and the environment. In the latter this is primarily due to their role in nitrogen and acid deposition. |
| NH3 | Chemical symbol for ammonia. Ammonia is an environmentally relevant pollutant emitted from agriculture (livestock and fertiliser) and also from some vehicle exhausts (particularly the catalytic converters of petrol cars). It is toxic to vegetation (including lichens and mosses) and is also a significant source of nitrogen. |
| Nitrogen deposition | Once NOx and ammonia are emitted, some is deposited from atmosphere as nitrogen. Nitrogen acts as a fertiliser and can therefore promote the growth of less desirable plants over the growth of desirable plants in the natural environment. |
| Acid deposition | Once nitrogen is deposited it contributes (along with deposition of sulphur dioxide which is not emitted from vehicle exhausts) to deposition of acid in the natural environment. This can have negative implications for vegetation. |
| Habitats Regulations Assessment (HRA) | The process of assessing compliance with the Conservation of Habitats and Species Regulations 2017 (as amended), with regard to impacts on internationally important wildlife sites including Special Areas of Conservation (SAC) |
| Special Area of Conservation (SAC) | An international designation to protect sites of European importance for their habitats and/or animals other than birds |
| In combination | HRA requires the consideration of impacts on SACs to be undertaken cumulatively with other plans or projects, rather than focussing entirely on the impacts of the specific plan or project in isolation. In this case it means there must be consideration of all sources of traffic growth, not just Horsham or Chichester Local Plans. |
| Ultra-low emission vehicles | A general term for all vehicles that do not operate using combustion engine technology and thus have no exhaust emissions, particularly electric vehicles. |
| Critical level | Concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge |
| Critical load | 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 |
| Automated Number Plate Recognition | Camera technology that uses optical character recognition on images to read vehicle registration plates to create vehicle location data |
| Euro Standard | Vehicle emission standards for pollution from the use of new land surface vehicles sold in the European Union and European Economic Area member states and the United Kingdom, |
| Emission Factor Toolkit (EFT) | Published by Defra and the Devolved Administrations to assist local authorities in carrying out Review and Assessment of local air quality as part of their duties under the Environmental Act 1995 as amended by the Environment Act 2021. The EFT allows users to calculate road vehicle pollutant emission rates for a specified year, road type, vehicle speed and vehicle fleet composition. |

# 1. Introduction

1.1 Following a review of the predicted air quality impacts of Horsham District Local Plan and Chichester Local Plan on The Mens SAC in discussion with Natural England, it was considered that the assessment of effects would benefit from greater understanding of potential changes to emissions of NOx and ammonia – and resultant impacts on ambient NOx and ammonia concentrations, nitrogen and acid deposition rates – from traffic on the A272 past the SAC over the Local Plan period, which extends to 2039. In particular, the Councils wish to address representations made by Natural England to Horsham District Council at Regulation 19 of their Local Plan which are understood to be broadly the same as for the Chichester Regulation 19 Local Plan. Their advice was:

> *"We advise that at present it is not possible to ascertain that the Local Plan will not result in adverse effects on the integrity of The Mens SAC… Natural England advises that the assessment does not currently provide enough information and/or certainty to justify the assessment conclusion. Further assessment and consideration of mitigation options is required… Natural England would welcome the opportunity to work with your authority to resolve this matter."*

1.2 In response, AECOM advised that Natural England's comments requiring further detail and explanation could be addressed through application of more realistic emissions factors for NOx and ammonia to reflect potential future changes in vehicle types, as the original assessment had used worst-case emission factors for 2030 with 2039 traffic flows.

1.3 The resulting HRA Addendum to Horsham Local Plan concluded that no adverse effect on integrity of The Mens SAC will arise from nitrogen deposition or NOx. However, in combination ammonia will exceed 1% of the critical level for sites supporting lichens and bryophytes by 2032-2035, being 0.02 µg/m$^3$ (2% of the critical level) at 10m from the roadside, falling to 1% of the critical level by 15-20m from the roadside. Therefore approximately 2% of The Mens SAC is affected by 'in combination' ammonia to a greater than imperceptible degree and this represents a small retardation of the improvement that would be seen in the absence of growth, which would conflict with the air quality target for this SAC as set by Natural England. In the Supplementary Advice on the Conservation Objectives the SAC has a 'restore' target for air quality: '*Restore concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System'*.

1.4 The critical level for ammonia is exceeded by approximately 16% under all scenarios, irrespective of traffic growth, due to existing agricultural sources of ammonia (livestock and fertiliser). However, small modelled incremental changes in average ammonia such as the 0.02 µgm$^{-3}$ modelled here at 10m from the roadside may not be statistically significant due to the large variance in ammonia concentrations that monitoring indicates is experienced at many rural sites during the course of a year. Therefore, care should be taken not to read too much into small forecast changes in average ammonia concentration. Therefore, to summarise the modelling work undertaken for Horsham Local Plan (reported in full in the Horsham Local Plan HRA Addendum):

- In combination atmospheric ammonia will slightly exceed 1% of the critical level for sites supporting lichens and bryophytes, being 0.02 µg/m$^3$ (2% of the critical level) at 10m from the roadside, falling to 1% of the critical level by c. 15-20m from the roadside. Moreover, small modelled incremental changes in average ammonia may not be statistically significant. In other words, while an effect on integrity cannot be dismissed it is small in magnitude.
- Due to the extent of movement away from fossil fuels expected by 2040, the ammonia effect identified above is a slowing of the rate of reduction in ammonia concentrations that would otherwise occur, rather than a net deterioration.
- This effect on integrity applies to approximately 2% of The Mens SAC. Therefore, it is physically localised with most of the SAC being affected to an imperceptible degree.
- The 'in combination' breach of the 1% of the critical level threshold is not expected to occur until late in the plan period, between 2032 and 2035 depending on the build out trajectory.

1.5 Moreover, any impact is temporary (though not necessarily short-term) as the UK vehicle fleet continues to progress naturally away from fossil fuels. Taking these factors into consideration it is concluded that the most appropriate approach to dealing with the forecast increase in ammonia concentrations, proportionate to the small in combination effect forecast late in the Local Plan period, is to introduce a programme of

measures to encourage a further shift from petrol cars and vans to ultra-low emission vehicles (ULEVs) over the period to 2039, beyond that modelled to arise purely from implementation of national policies and 'natural shift'. Automated Number Plate Recognition (ANPR) data for the A272 collected for Horsham District Council indicates that the local area already has a greater proportion of electric vehicles than the average fleet. This provides evidence that local existing and future car and van owners would be more responsive to a package of such measures than the average motorist.

1.6 It should be noted that neither growth in the Chichester plan area nor Horsham District are wholly responsible for the in combination ammonia emissions exceeding 1% of the critical level. However, as reported in paragraph 2.3 of the HRA Addendum, modelling indicates that Horsham Local Plan would provide approximately half of the increase in traffic flows on this link to 2039 and that approximately a third of the increase in traffic flows attributable to the Horsham Local Plan stems from a single site - Strategic Policy HA4: Land East of Billingshurst. The remaining traffic to 2039 comes from all other sources including all other Local Plans that will contribute further traffic to the road network, including but not limited to that in Chichester Local Plan. The contribution of Chichester Local Plan to the overall 'in combination' impact will be much smaller than that of Horsham Local Plan because relatively little growth is planned in the north of the Chichester plan area in that Local Plan.

1.7 Air quality impact assessment modelling similar to that undertaken for the Horsham Local Plan was also undertaken independently for the Chichester Local Plan HRA. However, there were some technical differences in that modelling due to it being undertaken by a different organisation, and it modelled growth in Horsham District in much less detail than was done for the Horsham Local Plan HRA. This means the results of the two modelling exercises are slightly different although they concur on the existence of a forecast ammonia impact from traffic growth. Due to the fact that Horsham Local Plan is responsible for 50% of forecast traffic growth on the relevant section of the A272 to 2039 (far more than Chichester) and to avoid having multiple mitigation strategies or monitoring targets for a single stretch of road, it is the modelling for Horsham that has been used to develop this mitigation strategy.

# 2. The Strategy

2.1 A shift is required from petrol cars to Ultra-Low Emission Vehicles (ULEVs) in order to address ammonia emissions[1]. A shift from older Euro standards to newer Euro standards without any increase over and above forecast electrification will not be sufficient because in reducing NOx levels some newer Euro standard combustion engine vehicles have higher ammonia emissions than older Euro standards[2].

2.2 According to Brook Lyndhurst (2015)[3], the evidence suggests that a package of well-designed financial incentives plus non-financial incentives, and possibly also investment in public charging infrastructure, may be the most effective means of increasing electric vehicle uptake (electric vehicles currently being the most common type of ULEV). Note that the conversion of petrol cars to ULEVs is what has been modelled for the Local Plan, adequately suppressing the forecast increase in traffic movements on the A272 past the SAC.

[1] Electric cars are the specific type of ULEV that has been modelled. There are other emerging technologies (notably hydrogen) but these would have the same benefit for the SAC as they do not emit $NO_2$ or ammonia. A general shift in vehicles from petrol/diesel to electric will be encouraged by the mitigation strategy but it will be particularly important to target petrol cars due to their ammonia emissions.

[2] Emissions of NOx from road traffic are decreasing due to the implementation of tighter European type approval standards (Euro Standards). However, ammonia is produced by the control systems that are designed to reduce emissions of NOx from road traffic vehicles, and there are currently no limitations on emissions of ammonia. Emissions of ammonia are greater from petrol than from diesel cars, whilst the converse is generally the case for NOx.

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/464763/uptake-of-ulev-uk.pdf

2.3 With that in mind, the Councils need to have a suite of measures operating to enable a conclusion of no adverse effects on integrity. Those measures are outlined in this section of the document. These will be developed further by Horsham and Chichester Councils and both Councils may not implement every measure. The suite of measures is based upon the package of measures identified in the Epping Forest Local Plan Interim Air Pollution Mitigation Strategy for Epping Forest SAC[4], which was identified to address ammonia impacts on Epping Forest SAC and was accepted by The Planning Inspectorate allowing the Local Plan to be adopted. The Epping Forest work was used as a basis because the scale of ammonia impact at that SAC was much greater than the impact forecast at The Mens SAC.

## Measures to incentivise ownership of ULEVs

2.4 The uptake of ULEVs could be positively incentivised by (for example) introducing schemes to directly assist with ULEV purchase through direct grant funding via developers and delivered through Section 106 agreements. These should also be particularly focussed on Billingshurst and especially on allocation HA4: Land East of Billingshurst.

## Active Travel initiatives

2.5 Introducing initiatives to support walking, cycling and increased public transport use and ensuring these are included in planning consents and developer packs to future residents as appropriate. These should also be particularly focussed on Billingshurst and especially on allocation HA4: Land East of Billingshurst. Specific improvements to active travel networks will as appropriate be identified in the Infrastructure Delivery Plan.

## Bus and rail connections

2.6 There would be an insistence on design measures within development sites to facilitate access to bus and rail services and insist on a travel plan that might include financial incentives or forward funding to extend a bus service. Policy 24 of the emerging Horsham Local Plan and Policy T1 (Transport Infrastructure) of the Chichester Local Plan seek to secure reductions in the use of private vehicles for journeys, and in particular, journeys during the peak hours. The spatial strategy for the emerging Horsham Local Plan has also been developed in order to maximise the opportunities for reducing vehicle usage. This is a well-established approach to plan-making and decision making and has multiple benefits. In this instance securing modal shift will have benefits for the SAC and is a positive measure as it will reduce the level of growth in the number of vehicles using roads in close proximity to it. This will support slowing the predicted growth in the number of vehicles contributing to atmospheric pollution and potentially the estimated length of queues, particularly at peak times, which is known to be a contributing factor in respect of atmospheric pollution.

## Awareness Raising Campaigns

2.7 To promote the benefits of electric vehicles, the availability of charging infrastructure, and falling electric vehicle prices due to falling battery costs, to residents of both authorities and particularly those who live in settlements surrounding the SAC such as Billingshurst. For example, Horsham District Council recently held an electric vehicle open day which resulted in strong public interest. Publicising the ecological issues and air quality issues associated with not converting should also be considered. This could also be used to counter-act perceptions about ULEVs. For example, people tend to think ULEV range is poor but despite early predictions that ULEVs would only be driven for low mileages, recent research in the UK and other countries indicates privately owned ULEVs are being driven for comparable mileages to petrol and diesel cars.

2.8 With regard to awareness raising, the issues of air pollution and the climate crisis are becoming far more widely understood and actions to address them are going higher up the agenda in terms of peoples' and businesses priorities. However, beyond the development world it is thought that little is known by existing residents and businesses within the District of the issues facing the SAC. Beginning an awareness raising campaign about these issues and helping people to understand that driving a petrol or diesel vehicle on the

[4] https://www.eppingforestdc.gov.uk/wp-content/uploads/2021/02/Interim-Epping-Forest-Air-Pollution-Mitigation-Strategy.pdf. The APMS includes reference to a Clean Air Zone but modelling undertaken for that Local Plan HRA identified that such a zone would predominantly address the NOx issues at Epping Forest (which do not exist at The Mens SAC) and would be largely ineffective in addressing ammonia. Therefore a further package of measures was identified to address ammonia and these are the basis for the suite of measures in this current mitigation strategy.

A272 is affecting its long-term health is an important measure in supporting the achievement of a switch from petrol and diesel to electric or other non-polluting vehicles.

2.9 Of particular importance will be providing information about the range of grants and incentives that exist, together with an understanding of what the longer-term financial savings that could be achieved by switching to electric, or other alternative technologies. This can be an important component of decision making when looking to buy or lease a new vehicle or making decisions as to how people want to travel in the future, as will providing information about the location of charging infrastructure. Such a campaign can begin the conversation and help to achieve the targets that need to be met in terms of switching from petrol and diesel cars to ULEVs to secure improvements in air quality.

2.10 These would all stand a high likelihood of being effective measures as the most commonly cited barriers to private car buyers buying an ULEV in the future are range concerns, purchase price and a lack of knowledge about/familiarity with ULEVs[5].

## Charging infrastructure

2.11 Seeking to maximise electric vehicle charging infrastructure towards an objective of this being universally available in public and private parking spaces and that a significant proportion of new parking spaces have active EV charging provision (particularly rapid charging provision) or at minimum the infrastructure to enable easy installation in the future, and for all new residential parking spaces.

2.12 With regard to electric vehicle charging points, the outcome is to ensure that there will be greater opportunities for people to be able to access charging points and therefore have greater certainty that the necessary infrastructure will be in place to support ULEVs. This will help to inform future decision-making by residents and businesses when making vehicle purchases or entering into leasing agreements. These are important initiatives since various pieces of research suggest that public charging infrastructure may have an equal or greater impact on EV uptake than financial incentives[6].

2.13 Automatic Number Plate Recognition (ANPR) data collected has shown that the Vehicle Fleet Mix for vehicles using the A272 is older than the national average (although there is also a higher percentage of electric vehicles than the national average) and therefore purchase decisions may come forward sooner than might be expected. As the requirement relates to ‘destination’ sites as well as ‘origin’ sites it will give people greater comfort that, if they are purchasing or leasing electric vehicles which have greater range limitations, that charging options will be available. This also supports the wider roll out of measures for the provision of electric vehicle charging points (i.e. autonomous measures) being encouraged and supported by the UK Government.

2.14 West Sussex County Council adopted an Electric Vehicle Strategy in December 2019. A summary note on this is presented in Appendix B of this strategy. The strategy sets out a vision that will enable West Sussex residents, when travelling in a car or small van, to choose ultra-low emission vehicles and travel in a carbon neutral way. To achieve the vision, the Strategy has three highly ambitious aims:

- 70 per cent of all new cars in the county to be electric by 2030;
- To put a sufficient charging infrastructure in place to support the vehicles predicted to be reliant on public infrastructure charge points; and
- To ensure a renewable energy source for all charge points is enabled.

2.15 Horsham District Council approved an Electric Vehicle Charge Point Strategy in March 2020. This dovetails with the County’s Strategy.

## Travel Plans

2.16 Implement focussed travel plans to encourage modal change through demand and supply measures such as implementing electric charging infrastructure, utilising existing and implement new cycle infrastructure, investing in pedestrian infrastructure (new footways, signage), encouraging and supporting car clubs (electric), school transport to use ULEVs. For developments that generate significant amounts of movement,

[5] Ibid
[6] Page 35 of Uptake of ULEVs (Brook Lyndhurst, 2015) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/464763/uptake-of-ulev-uk.pdf

interventions should be documented in a Transport Assessment or Statement submitted in support of the application. These must include appropriate contributions to support off-site improvements.

## Communications Infrastructure

2.17 Since the COVID-19 pandemic there has been a shift to working from home for office-based workers, and while many employers encourage their employees to spend some time in the office each week the general trend for a much more flexible working environment continues. Home working has an air quality benefit because it reduces (potentially considerably) the number of commuting trips taken in a given year. However, in some rural areas the infrastructure to enable the most efficient home working is still limited. The promotion and enhancement of communications infrastructure supports the objective of reducing car usage and will support reductions in work based travel. This will therefore support a slowing down of the predicted growth in traffic on the A272 past The Mens SAC.

## Controlling delivery of development/occupation

2.18 A site specific policy could be considered relating to East of Billingshurst, which would be linked to the ANPR monitoring undertaken by Horsham and Chichester Councils. This would enable the Councils to intervene if conversion of petrol/diesel cars and vans to electric vehicles in early monitoring periods fell behind what was required to meet the target for 2039. A similar stand-alone policy could be considered to capture other sites, bearing in mind also the practicalities of implementing this over a wider area.

## Summary

2.19 The measures in this strategy are summarised in Table 1 below.

**Table 1 Summary of measures**

| Measure | Reason | Mechanism |
|---|---|---|
| Incentivise ownership of ULEVs | Introducing schemes to directly assist with ULEV purchase is likely to be effective in increasing uptake beyond that which would occur naturally without local stimulation. | Direct grant funding via developers and delivered through Section 106 agreements and/or other sources of funding. |
| Active travel initiatives | Promotion and enhancement of active travel reduces the likelihood that people will make journey along the A272 past The Mens SAC and thus reduce the forecast emissions impact. | Planning consents and developer packs to future residents, particularly focussed on Billingshurst and especially on allocation HA4: Land East of Billingshurst.<br><br>Infrastructure Delivery Plan. |
| Bus and rail connections | Promotion and enhancement of bus and rail connections reduces the likelihood that people will make journey along the A272 past The Mens SAC and thus reduce the forecast emissions impact. | S106 process and Travel Plans. |
| Awareness raising | Concerns about ultra-low emission vehicles (e.g. cost and range) are a key factor in reducing uptake and evidence shows that increased uptake is stimulated by supply of accurate information. | Direct campaigns by the Council and information provided by developers. |
| Charging infrastructure | Lack of sufficient charging infrastructure is a key concern in limiting uptake of electric vehicles. Local initiatives to maximise provision of that infrastructure will increase uptake. | Direct actions by the Council (Electric Vehicle Charging Strategy) and by developers secured through planning consents and Section 106 |
| Travel Plans | Implementing travel plans will encourage modal change through demand and supply measures such as implementing electric charging infrastructure, utilising existing and implement new cycle infrastructure, investing in pedestrian infrastructure (new footways, signage), encouraging and | A Transport Assessment or Statement submitted in support of the application for developments that generate |

| Measure | Reason | Mechanism |
|---|---|---|
| | supporting car clubs (electric), and school transport to use ULEVs. | significant amounts of movement. |
| Communications infrastructure | Improvement in communications infrastructure such as high speed broadband provision increases capacity for home working and will reduce commuting journeys along the A272. | Actions by developers secured through Section 106. |
| Controlling delivery of development/occupation | Enables a response to the effectiveness of the other measures to delay impacts if required | Policy requirement introduced through Main Modifications or in future Local Plan Reviews if required. |

## Implementation

2.20 All of these groups of measures are directly facilitated by Strategic Policy 24 (Sustainable Transport) and Policy 25 (Parking) of the Horsham Local Plan, and Policy T1 (Transport Infrastructure) and T2 (Transport and Development) of the Chichester Local Plan, or the supporting text, and could therefore be introduced and effective from the point of Local Plan adoption. Indeed, these policies will, as the Plans progress, be given greater weight where planning consent is being granted.

2.21 The uptake in ULEVs and, in particular, the shift from petrol cars to ULEVs on the A272 past the SAC would need to be monitored and tracked across each five-year review period. This could be done using automatic number plate recognition (ANPR) and should be implemented every five years from Local Plan adoption to capture data on the vehicle fleet in that year. Such surveys are quick and easy to set up and relatively cheap. If, at a given five-year review, progress was not sufficient then the mitigation measures would need to be adjusted and/or the Local Plan updated to adjust where feasible the control over the phasing of development and, where necessary, limit the quantum of development coming forward in future Plan periods.

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

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

2.23 In addition to these targets, other factors could also result in the achievement of the air quality modelling predictions, such as a lower increase in traffic growth than that assumed in the modelling. Therefore, traffic monitoring will also be key elements in assessing effectiveness. For example, if vehicles other than petrol cars convert to ULEVs that may still result in an improvement in pollution, as there would be if there are reductions in the predicted growth in traffic.

2.24 Initiatives are to be further developed over the plan period such that they can be introduced prior to the forecast impact on the SAC in 2032-35. The more rapidly and easily deliverable initiatives will be in place from the point of plan adoption. In addition to this, and only should it be required, both Councils would consider future joint working with Natural England, acting as lead agent, and other affected local planning authorities on further mitigation options, including initiatives to reduce atmospheric ammonia from agricultural sources. The effectiveness of any such schemes, and appropriateness for dealing with local plan growth-related impacts, would need to be clearly demonstrated.

# 3. Performance Targets and Monitoring

3.1 It is not possible to predict how much future ammonia concentrations would be reduced by the measures set out in Section 2, since it would be dependent on uptake. However, it is possible to identify what further percentage conversion of petrol cars to ULEVs would be required in order to reduce the 'in combination' ammonia impact to 1% of the critical level and then use Automated Number Plate Recognition (ANPR) to

track the shift in the vehicle fleet (and in particular the degree of electrification) towards the necessary additional shift to electric vehicles. This was the approach which was agreed for Epping Forest Local Plan and was considered sufficiently robust to ensure that Epping Forest SAC would be protected.

3.2 Since the impact is not forecast to occur until late in the plan period (2032-2035 according to modelling presented in Appendix B of the HRA Addendum), this could be used as a performance target in future Local Plan Reviews to confirm whether the measures were on target to achieve their objective, and if not either introduce further measures or amend Local Plan growth in the plan areas. That would enable the mitigation strategy to be compliant with the Conservation of Habitats and Species Regulations 2017, because it would ensure that if the shift from petrol/diesel cars and vans to electric vehicles (or other ultra-low emission technology) was not on track, future Local Plan Reviews (which must by law occur every five years) would enable either additional measures to be implemented, or phasing of development to be amended, such that the performance targets would be met by 2039.

3.3 The mechanism to achieve this is set out in this section of the report. The Horsham HRA Addendum details the updated modelling methodology used to reach the conclusions drawn. To summarise this briefly here, as a new version of Defra's EFT was available at the time of the modelling update, this was used in the updated modelling. However, a more realistic vehicle fleet projection based on a recently published DfT projection that aligns with the Government's Net Zero ambitions was used in the EFT instead of using the default vehicle fleet within the tool. Use of this projection significantly increased the level of electrification of the vehicle fleet by 2039 compared to the default EFT fleet used in previous modelling, which is deemed to be more cautiously representative of the anticipated future vehicle fleet, based on current policy and obligations.

3.4 There is some uncertainty regarding the approach taken to model ammonia concentrations using emission rates for road traffic vehicles as emissions are not regulated in the same way as nitrogen oxides; however, Table 2 below shows that to reduce the pollutant dose (particularly ammonia) that would otherwise occur by 2039 to an acceptable level (i.e. 1% of the critical level), a minimum 50% conversion of remaining petrol cars to ULEVs would be required by that year. In other words, 50% of the remaining petrol vehicles on the A272 would need to convert to electric vehicles (or simply avoid using that road). This equates to the switching of an additional 13-14% of the total vehicles in the fleet to electric, based on 45% of cars (10% vans) being projected to be electric in 2039 according to the main modelling assessment.

3.5 During 2019, 79,747 ULEVs were registered for the first time in Great Britain, an increase of 26% on 2018. The 2018 registrations were themselves up 20% on 2017 and 53% on 2016. The increase continues to be exponential: In 2023, there were 342,000 zero emission vehicles registered for the first time in the UK[7], of which 314,000 were zero emission cars, compared to 267,000 battery electric cars in 2022. In 2019 ULEVs accounted for 2.7% of all new vehicle registrations, up from 2.1% in 2018, 1.7% in 2017 and 1.2% in 2015[8]. In 2023, 17% of all new car registrations were ULEVs, a huge increase in the intervening four years.

3.6 Table 2 presents the composition of the car fleet operating past The Mens SAC derived from a combination of DVLA vehicle registrations data and local ANPR data, and subsequently projected using the DfT vehicle fleet projections aligning with the Government's Net Zero ambition. Table 2 shows that an additional 50% conversion of petrol to electric cars or other ULEVs would result in these vehicles making up 13-14% more of the overall vehicle fleet on the A272 past The Mens SAC by 2039, compared to the original 2039 projected levels. This would mean that electric vehicles would increase from 45%[9] of the fleet to 59% of the fleet.

[7] Vehicle licensing statistics 2023 (https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2023)
[8] Sources of data:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/800502/vehicle-licensing-statistics-2018.pdf
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/882196/vehicle-licensing-statistics-2019.pdf
[9] The local car fleet is projected in 2039 to comprise 45% electric cars (see Table 2, column header "Car - Electric")

3.7 In other words, there would be a 31% increase in the proportion of electric vehicles within the fleet, brought about by the 50% reduction in remaining petrol cars. The modelling in the technical note in Appendix A shows that this would bring down the in combination ammonia impact to 1% of the critical level, the threshold for imperceptibility. As set out in Appendix A, this 31% increase would equate to approximately an additional 1,000 vehicle trips per day that are zero emission (note that this is not 1,000 separate vehicles as most will probably make at least 2 trips past the SAC per day). According to 2021 Census data there are at least 85,000 cars or vans registered to people living in in Horsham District. Therefore, the necessary shift required in response to the mitigation strategy is a small proportion (less than 1%) of the overall Horsham vehicle fleet.

3.8 It is important to note that the additional 50% shift from petrol to electric cars is calculated based upon vehicle trips along the A272 as opposed to the number of vehicles on the road. Therefore, the benefits of converting from petrol to electric cars are amplified because a single electric vehicle can make multiple trips past the SAC, thereby reducing emissions more significantly. This means that each conversion from a petrol car to an electric car can have a 2- or 3-fold positive impact on reducing overall emissions along this route.

**Table 2 Car fleet composition presented as percentage of vehicle fleet using A272 past The Mens SAC.**

| | Car | | | | LGV | | | HGV, Bus, Other | |
|---|---|---|---|---|---|---|---|---|---|
| | Petrol | | Diesel | Electric | Petrol | Diesel | Electric | | Total AADT A272 The Mens |
| | Internal Combustion Engine (ICE) | Full Hybrid & Plug-in Hybrid | ICE | | ICE, Full Hybrid & Plug-in Hybrid | ICE | | | |
| **Future Base (FB) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (552) | 17% (940) | 5% (299) | 45% (2,473) | 1% (69) | 8% (460) | 10% (552) | 3% (186) | 5,531 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (276) | 9% (470) | 5% (299) | 58% (3,219) | 1% (34) | 8% (460) | 11% (586) | 3% (186) | |
| Change, % of total (number) | -5% (-276) | -9% (-470) | - | 14% (746) | -1% (-35) | - | 1% (34) | - | |
| **Do-Minimum (DM) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (674) | 17% (1,147) | 5% (366) | 45% (3,019) | 1% (84) | 8% (562) | 10% (674) | 3% (224) | 6,751 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (337) | 9% (574) | 5% (366) | 58% (3,930) | 1% (42) | 8% (562) | 11% (716) | 3% (224) | |
| Change, % of total (number) | -5% (-337) | -9% (-573) | - | 14% (911) | -1% (-42) | - | 1% (42) | - | |
| **Do-Something (DS) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (785) | 17% (1,336) | 6% (426) | 45% (3,515) | 1% (98) | 8% (654) | 10% (785) | 3% (200) | 7,799 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (393) | 9% (668) | 6% (426) | 59% (4,576) | 1% (49) | 8% (654) | 11% (834) | 3% (200) | |
| Change, % of total (number) | -5% (-392) | -9% (-668) | - | 14% (1,061) | -1% (-49) | - | 1% (49) | - | |

# Appendix A Technical Note on Modelling

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**Project name:**
Horsham Local Plan

**Project ref:**
Horsham Local Plan

**To:**
James Riley

**CC:**

**From:**
Julian Mann
Flo Kirk-Lloyd

**Date:**
May 2024

The following relates to Appendix A: Priority is on getting the Mitigation Strategy published. If quick and can be included

# Memo

**Subject:** Air Quality Mitigation Strategy Appendix A: Horsham Local Plan Air Quality Modelling – Sensitivity Test

# 1. Introduction

1.1 This technical note presents details of a sensitivity test looking at how the application of additional reductions in petrol vehicles (cars) to the projected fleet could impact the modelled nitrogen and acid deposition rates, annual mean nitrogen oxides (NOx) and ammonia ($NH_3$) concentrations along the E1 transect at The Mens SAC. The purpose of this exercise is to identify how much the currently forecast shift from combustion engine to ultra-low emission vehicles predicted for 2039 would need to increase in order to reduce the forecast in combination impact of traffic growth on ammonia concentrations at The Mens SAC to 1% of the critical level (the threshold of imperceptibility). This can then be used as a target to assess the effectiveness of the proposed measures to bring about the necessary further conversion. The note supplements the modelling conducted to assess the impacts from additional traffic due to the Horsham Local Plan (LP) and focuses on the results at the worst-case non-roadside receptor along the transect (E1_10m, 10m from the road edge).

1.2 The overall modelling methodology is discussed in detail in the air quality modelling methodology report to the Horsham Local Plan (LP) Habitat Regulations Assessment (HRA) and will therefore not be repeated in this technical note. The purpose of this note is to discuss the air quality impacts on ecology stemming from changes to the modelled vehicle fleet from sensitivity testing in more detail. The sensitivity test follows the same general modelling methodology as previously described in the main air quality report to the HRA, with just the vehicle fleet breakdowns being modified (as input into the Emissions Factor Toolkit (EFT) v12.0.1).

# 2. Overview of Horsham LP AQ Modelling

2.1 This section provides a brief summary of the modelled nitrogen and acid deposition, annual mean NOx and $NH_3$ concentrations at the worst-case non-roadside receptor (E1_10m; 10m from the road edge) for the current predictions of the impacts resulting from the Horsham LP, without additional mitigation as modelled in the sensitivity test. The following four scenarios were modelled:

- baseline scenario using 2019 traffic data (Base) – this is existing measured traffic flow;

- 2039 future baseline using 2019 baseline traffic data with a 2039 projected fleet (FB) – this is a hypothetical scenario which projects measured baseline traffic forward to 2039 but applies the improvements in emissions technology one would expect to see over that period. This shows the improvement that would occur in the absence of any traffic growth;
- 2039 Do-Minimum scenario without Local Plan traffic but with overall traffic growth (DM) – this allows for traffic growth on the network from sources other than Horsham Local Plan, including that from Chichester District; and
- 2039 Do-Something scenario with Local Plan traffic and overall traffic growth included (DS) – this allows for the traffic growth on the network from all sources, including Horsham Local Plan.

2.2 The results are presented in Table 1.

**Table 1 Modelled Results at E1_10m receptor**

| Pollutant | 2019 Base | 2039 FB | 2039 DM | 2039 DS | DS – DM Impact | DS – FB Impact |
|---|---|---|---|---|---|---|
| Annual Mean NOx (µg/m$^3$) | 13.05 | 6.93 | 6.98 | 7.01 | 0.03 | 0.08 |
| Annual Mean $NH_3$ (µg/m$^3$) | 1.26 | 1.20 | 1.21 | 1.22 | 0.01 | 0.02 |
| Annual Mean N Dep (kgN/ha/yr) | 23.58 | 21.10 | 21.19 | 21.24 | 0.05 | 0.14 |
| Annual Mean N Acid Dep (keq/ha/yr) | 1.68 | 1.51 | 1.51 | 1.52 | 0.01 | 0.01 |

2.3 Table 1 shows the modelled results at receptor E1_10m, including the DS – DM and DS – FB impacts, for annual mean NOx and $NH_3$ concentrations, nitrogen and acid deposition rates.

2.4 At the worst-case non-roadside receptor along the transect (E1_10m; 10m back from the road edge), the original modelling for the HRA showed the following:

- Ambient NOx concentrations: both the impact alone (Do-Something – Do-Minimum), and impact in combination (Do-Something – Future Base) were predicted to be below the 1% threshold of the annual mean NOx Critical Level (30 µg/m$^3$) in 2039.
- Ambient ammonia concentrations: the impact alone (Do-Something – Do-Minimum) was predicted to be below the 1% threshold in 2039, however, the impact in combination (Do-Something – Future Base) was predicted to be greater than the 1% threshold of the ammonia Critical Level (1 µg/m$^3$) for habitats containing lichens and bryophytes.
- Nitrogen deposition rates: both the impact alone (Do-Something – Do-Minimum), and impact in combination (Do-Something – Future Base) were predicted to be below the 1% threshold of the annual mean nitrogen deposition Critical Load (20 kgN/ha/yr) in 2039.
- Nitrogen-based acid deposition rates: both the impact alone (Do-Something – Do-Minimum), and impact in combination (Do-Something – Future Base) were predicted to be below the 1% threshold of the annual mean nitrogen deposition Critical Load (1.493 keq/ha/yr) in 2039.

# 3. Sensitivity Test – additional 50% reduction in petrol vehicles to 2039 fleet

3.1 An additional sensitivity test was run for each future year scenario, where the proportion of petrol vehicles in the 2039 modelled vehicle fleet was reduced, in order to roughly simulate what could be the result of targeted measures to increase the rate of switching from petrol vehicles to electric vehicles. Petrol vehicles are targeted here due to the disproportionately large impact of petrol vehicles on emissions of $NH_3$ when compared to diesel

vehicles. For each petrol-based vehicle category (cars and light goods vehicles (LGVs), internal combustion engine (ICE) and hybrid) in the EFT v12.0.1, the proportion was halved, and the difference added to the electric car and electric LGV categories (as appropriate). Table 2 on the next page summarises the vehicle fleet breakdown used for the FB, DM and DS scenarios for in the LP modelling and for the sensitivity test showing the 50% reduction in petrol vehicles. A fifty percent reduction was applied based on past experience of similar exercises for Epping Forest Local Plan, where a 50% further reduction was found to be necessary to bring the in combination increase in ammonia concentrations due to traffic growth below 1% of the critical level. This is based on the calculated number of movements that would need to either be completed by EVs in place of petrol vehicles or be removed from the road link entirely in order for the in combination effect to be below 1% in 2039. In the Horsham modelling, the 'in combination' impact is only just below 1% with a 50% reduction; even 49% reduction wouldn't be sufficient.

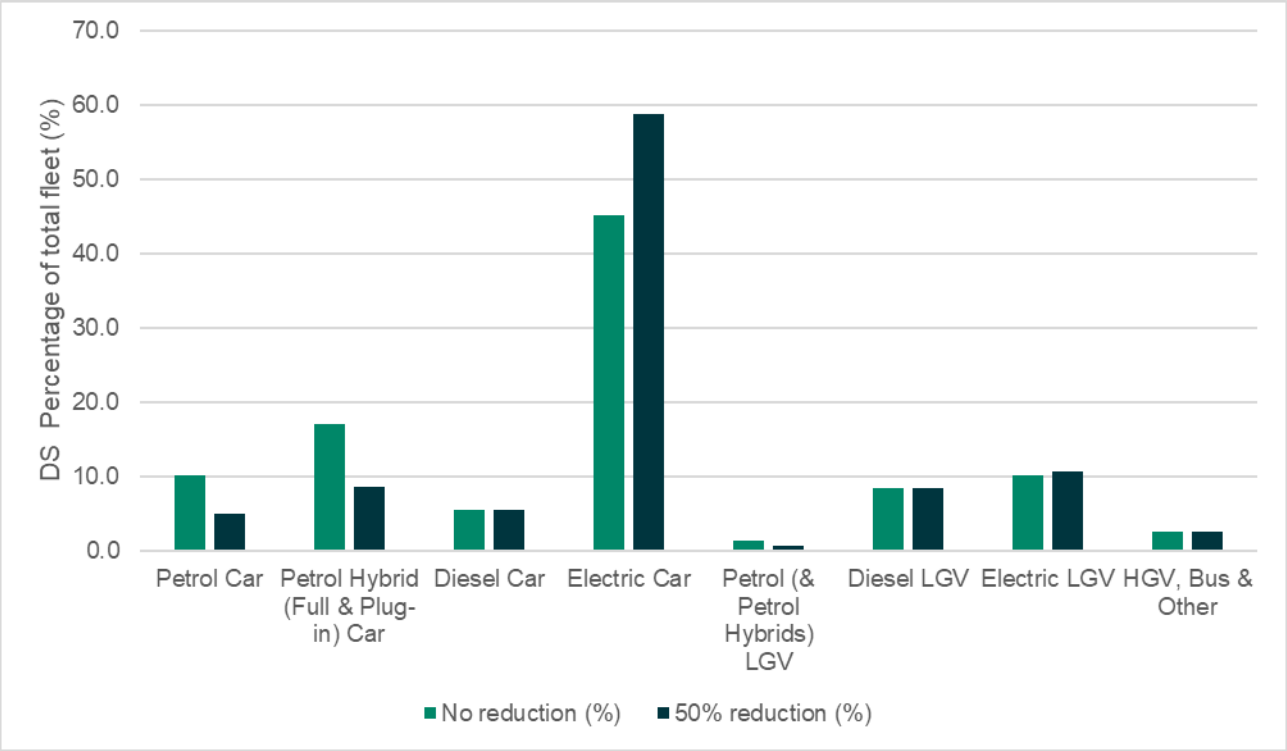
3.2 The modelling approach otherwise followed the same methodology as described in the air quality modelling methodology report to the Horsham LP HRA.

**Table 2 Vehicle fleet breakdown by type for the no additional reduction case and 50% additional reduction in petrol vehicles**

| | Car | | | | LGV | | | HGV, Bus, Other | |
|---|---|---|---|---|---|---|---|---|---|
| | Petrol | | Diesel | Electric | Petrol | Diesel | Electric | | Total AADT A272 The Mens |
| | ICE | Full Hybrid & Plug-in Hybrid | ICE | | ICE, Full Hybrid & Plug-in Hybrid | ICE | | | |
| **Future Base (FB) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (552) | 17% (940) | 5% (299) | 45% (2,473) | 1% (69) | 8% (460) | 10% (552) | 3% (186) | 5,531 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (276) | 9% (470) | 5% (299) | 58% (3,219) | 1% (34) | 8% (460) | 11% (586) | 3% (186) | |
| Change, % of total (number) | -5% (-276) | -9% (-470) | - | 14% (746) | -1% (-35) | - | 1% (34) | - | |
| **Do-Minimum (DM) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (674) | 17% (1,147) | 5% (366) | 45% (3,019) | 1% (84) | 8% (562) | 10% (674) | 3% (224) | 6,751 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (337) | 9% (574) | 5% (366) | 58% (3,930) | 1% (42) | 8% (562) | 11% (716) | 3% (224) | |
| Change, % of total (number) | -5% (-337) | -9% (-573) | - | 14% (911) | -1% (-42) | - | 1% (42) | - | |
| **Do-Something (DS) Scenario** | | | | | | | | | |
| No Reduction, % of total (number) | 10% (785) | 17% (1,336) | 6% (426) | 45% (3,515) | 1% (98) | 8% (654) | 10% (785) | 3% (200) | 7,799 |
| 50% reduction in petrol vehicles, % of total (number) | 5% (393) | 9% (668) | 6% (426) | 59% (4,576) | 1% (49) | 8% (654) | 11% (834) | 3% (200) | |
| Change, % of total (number) | -5% (-392) | -9% (-668) | - | 14% (1,061) | -1% (-49) | - | 1% (49) | - | |

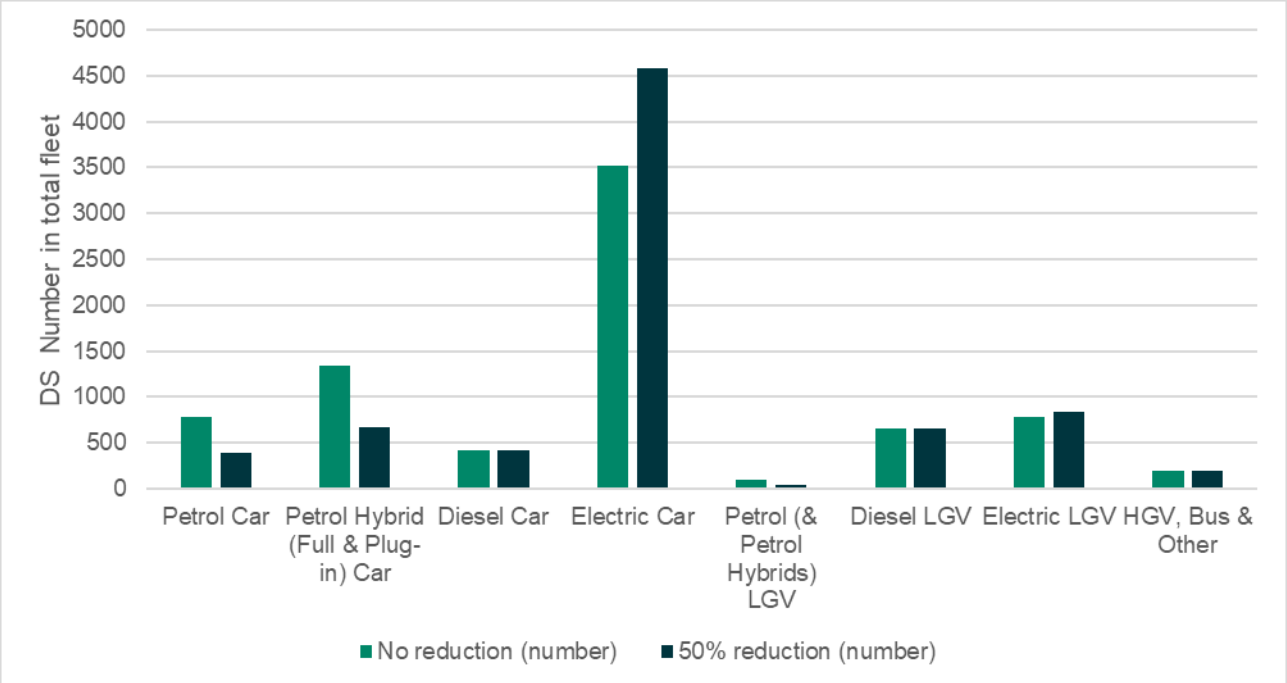
3.3 Table 2 shows that for all 2039 FB, DM and DS scenarios, petrol internal combustion engine (ICE) & hybrid cars comprise approximately 27% of the total vehicle fleet, with petrol LGVs a further 1%. Battery electric cars & LGVs are forecast to dominate the fleet with ~55% of the combined total. Therefore, targeting a further reduction of 50% (i.e. halving) of the total forecast petrol vehicles in the fleet at 2039, would leave petrol and hybrid cars comprising ~13-14% of the vehicle fleet, and <1% for petrol LGVs. This would increase the proportion of electric cars from ~45% to ~59% of the total fleet and increase the number of electric LGVs by <1%. This amounts to a relatively modest increase in electric vehicle uptake compared to the 2039 modelled fleet projection, equating to an increase of approx. 23% in electric cars (746 vehicles per day in the future base, 911 in the Do-Minimum and 1,061 in the Do-Scenario) on the A272.

**Figure 1 Vehicle fleet breakdown (% of total) for no additional reduction and 50% additional reduction for DS 2039 forecast**




3.4 Figure 1 shows the proportion of the total modelled vehicle fleet for 2039 by vehicle type for the DS scenario modelled with no additional reductions in petrol vehicles, and when an additional 50% reduction in petrol vehicles is applied to the fleet. This demonstrates a relatively small shift of vehicles from petrol to electric, as the proportion of petrol vehicles in the overall vehicle fleet is projected to already be relatively low in 2039 compared to the current situation. As petrol (and associated hybrid) LGVs comprise a very small proportion of the overall fleet, most of the change from the 50% reduction occurs due to the shift in pure-petrol (ICE) and petrol hybrid cars to battery electric cars. Figure 2 presents the same as above but for the total number of vehicles.

**Figure 2 Vehicle fleet breakdown (number) for no additional reduction and 50% additional reduction for DS 2039 forecast**



# Results

3.5 Table 3 gives the modelled results for the 50% reduction in petrol vehicles sensitivity test at receptor E1_10m, including the DS – DM and DS – FB impacts, for annual mean NOx and ammonia concentrations; and nitrogen and acid deposition rates.

**Table 3 Modelled Results for the 50% reduction in petrol vehicles sensitivity test at E1_10m receptor**

| Pollutant | 2019 Base | 2039 FB | 2039 DM | 2039 DS | DS – DM Impact | DS – FB Impact |
|---|---|---|---|---|---|---|
| Annual Mean NOx (µg/m³) | 13.05 | 6.90 | 6.94 | 6.96 | 0.02 | 0.06 |
| Annual Mean $NH_3$ (ammonia) (µg/m³) | 1.26 | 1.19 | 1.20 | 1.20 | 0.01 | 0.01 |
| Annual Mean N Dep (kgN/ha/yr) | 23.58 | 20.99 | 21.05 | 21.08 | 0.03 | 0.09 |
| Annual Mean N Acid Dep (keq/ha/yr) | 1.68 | 1.50 | 1.50 | 1.51 | 0.01 | 0.01 |

3.6 Table 3 shows that with the additional reduction in petrol vehicles, the sensitivity test generates an ammonia “in combination” impact (DS – FB) of 0.01 µg/m³, which is equal to the 1% threshold of the Critical Level of 1 µg/m³. All other impacts continue to meet the respective 1% thresholds of Critical Levels and Critical Loads, as is the case in the modelling exercise undertaken for the HRA as set out in the air quality modelling methodology report to the Horsham LP HRA.

## Assumptions and Limitations

3.7 The assumptions and limitations are unchanged from those set out in the air quality modelling methodology report to the Horsham LP HRA.

# 4. Summary and Conclusions

4.1 Building on the air quality modelling already undertaken supporting the Horsham LP HRA, an additional sensitivity test was carried out looking at how the application of additional reductions in petrol vehicles (cars) to the projected fleet in 2039 could impact modelled nitrogen and acid deposition rates, annual mean NOx and ammonia concentrations along the E1 transect on The Mens SAC adjacent to the A272 road .

4.2 An additional 50% reduction in petrol vehicles in the projected 2039 fleet was modelled, giving a decrease in petrol cars and LGVs (ICE and hybrid) from approx. 27-28% of the original vehicle fleet to 13-14% of the modified fleet, and an associated increase in electric cars and LGVs from approx. 55-56% of the original vehicle fleet to 69-70% of the modified fleet. This represents a relatively modest increase in electric vehicles of approx. 24-25% on the original modelled fleet.

4.3 At the worst-case receptor (except roadside) along the transect (E1_10m), the predicted ammonia “in combination” impact (DS – FB) decreased from 0.02 µg/m³ in the original modelling, which is above the 1% threshold of the Critical Level of 1 µg/m³, to 0.01 µg/m³ in the sensitivity test, equal to the 1% threshold. All other impacts “in combination” (DS – FB) and impacts “alone” (DS – DM) were found to be below the 1% Critical Level / Critical Load thresholds for annual mean NOx and $NH_3$, and nitrogen and acid deposition in the original modelling, and again for the sensitivity test.

# Appendix B Horsham District Council Note on Electric Vehicle Charging Infrastructure

## New Electric Vehicle Charge Point Network for West Sussex

West Sussex County Council adopted an Electric Vehicle Strategy in December 2019. The strategy sets out a vision that will enable West Sussex residents, when travelling in a car or small van, to choose ultra-low emission vehicles and travel in a carbon neutral way. To achieve the vision, the Strategy has three highly ambitious aims.

1. 70 per cent of all new cars in the county to be electric by 2030
2. To put a sufficient charging infrastructure in place to support the vehicles predicted to be reliant on public infrastructure chargepoints.
3. To ensure a renewable energy source for all chargepoints is enabled by us.

For the whole of the County point number 1 and 2 above will require the provision of approximately 7,000 charge points. This is the target number of charge points that will be delivered for the concession contract detailed below.

Horsham District Council approved an Electric Vehicle Charge Point Strategy in March 2020. This dovetails with the County's Strategy and demonstrates the number of charge points that would be required to support a scenario of 70% of new cars being EV's in 2030, that rely in public infrastructure is 1,367.

All of the Councils in West Sussex, led by the County Council, procured a private sector deliver partner to install a new network of charge points across the County. Connected Kerb were procured via a 15-year concession contract, to install, maintain and operate a new network of charge points, principally aimed at providing points for residents without off-street parking available. As residents with Electric Vehicles (EV) mostly charge their vehicles at home, the lack of off-street parking is a barrier to the take-up of EV's. The charge points are being installed in Council owned car parks and on highway land, in areas where there are less driveways or hard standing. There contract can also be used by other public sector bodies, such as Parish and Neighbourhood Councils to install charge points on land in their ownership.

### On-street installations

The following table gives an overview as of July 2024 for the highway sites where charge points have been installed and where they are due to be commissioned. In summary, 304 sockets will be available in the next few months.

| | | | On Street | | | |
|---|---|---|---|---|---|---|
| DISTRICT | SITES AVAILABLE | Civils Completed | Energised | Meters Installed | Sockets Installed | Sockets commissioned |
| Adur & Worthing | 29 | 23 | 19 | 19 | 134 | 112 |
| Arun | 17 | 11 | 7 | 7 | 64 | 42 |
| Mid Sussex | 6 | 3 | 3 | 3 | 18 | 18 |
| Horsham | 6 | 5 | 5 | 5 | 30 | 30 |
| Crawley | 7 | 6 | 5 | 5 | 34 | 30 |
| Chichester | 5 | 4 | 4 | 4 | 24 | 24 |
| | 70 | 52 | 43 | 43 | 304 | 256 |

For the next phase a total of 197 sites across the County have been identified with potential for charge point installations, which would give a further 1158 sockets. However, not all of these will come forward due to objections. Even with a 50% fall out rate this will give

approximately **900 sockets** installed by the end of 2025 (with the proposed phase added to those that are due to be commissioned).

**Car Park installations**

The next table gives a summary of the sockets that have, and are due to be installed, in Council owned car parks. Again, the data is from July 2024. A total of 171 sockets will be available in the next few months. In addition to these there are two rapid charge points in Horsham District Council owned car parks.

A further 12 sockets are located in a Horsham District Council owned car park which are not yet part of the Connected Kerb network.

| Car Park | | | | | | |
|---|---|---|---|---|---|---|
| DISTRICT | SITES AVAILABLE | Civils Completed | Energised | Meters Installed | Sockets Installed | Sockets commissioned |
| Adur & Worthing | 2 | 2 | 0 | 0 | 20 | 0 |
| Arun | 3 | 3 | 3 | 3 | 22 | 22 |
| Mid Sussex | 13 | 13 | 13 | 13 | 78 | 78 |
| Horsham | 8 | 8 | 6 | 6 | 41 | 33 |
| Crawley | 2 | 2 | 2 | 2 | 10 | 10 |
| Chichester | 0 | 0 | 0 | 0 | 0 | 0 |
| | 28 | 28 | 24 | 24 | 171 | 143 |

For the next phase 51 car park sites have been identified with a total of 336 sockets due to be installed by February 2025. Of these, a minimum of 18 will be in Horsham District Council owned car parks.

With the existing and planned installations, this equates to approximately **520 sockets** available by the end of February 205.

**Community Land**

The concession contract is also available to other public sector organisations. Parish Councils and Village Hall Trusts are able to apply for the charge points to be installed on their land. I do not have the data available for the number of installations that have taken place or are due to take place on community land. However, it will increase the approximately 1,400 charge points that will be installed on-street and within Council owned car parks over the next year.

[redacted] 14/8/24

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