Wealden Local Plan Examination

Written response on behalf of Wealden District Council to Holman et al (2019) A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.0

The IAQM document provides non-statutory guidance to IAQM members. It has not been widely used or tested in planning decisions. The document explains\(^1\) that it may be amended in response to legal clarification or changes to other guidance. It was produced by a small group led by Dr Holman\(^2\) with input from Dr Riley\(^3,4\) and it is thus unsurprising that, whilst there are points of agreement, there are also points of disagreement which have already been presented to the Inspector.

**Key areas of Agreement:**

- There may be adverse impacts >200m from roads\(^5\).
- Screening and appropriate assessment should be conducted in combination with other plans/projects.
- Air quality specialists may choose suitable deposition velocities\(^6\).
- Tempro growth is an appropriate way to consider ‘in-combination’ effects\(^7\).
- Spatially-averaged ‘background’ conditions should not be confused with location-specific ‘baseline’ conditions\(^8\).
- “Autonomous measures can only be taken into account if it is sufficiently certain that [they] will be deliver as anticipated”\(^9\) (emphasis added).
- There is no presumption that autonomous improvement can be exploited to allow adverse effects\(^10\).
- The DMRB-predicted 2%/yr reduction in deposition is inappropriate and is precluded because “it is not supported by monitoring data”\(^11\).

**Key areas of Disagreement:**

- The document assumes greater certainty in declining future trends than is warranted\(^12\), particularly in the context of a current upward trend in predicted background deposition\(^13\) and in locally-measured NO\(_2\) concentrations\(^14,15\).
- Conflates\(^16\) the small falls in national-average NOx/NO\(_2\) concentrations with evidence that models are able to predict the scale of reductions beyond reasonable scientific doubt. This is despite overwhelming evidence that the same models\(^17\) have consistently over-stated the rate of improvement in the past\(^18\).
- Suggests\(^19\) that local plans will delay improvements rather than cause deteriorations\(^20\). As shown in Appendix 1, the WLP cannot be confidently shown to only “delay” the improvements forecast using any relevant emissions tools.
- Recommends that predictions are not made <2m of roads\(^21\) and that the current distribution of qualifying features may constrain the air quality modelling\(^22\). Automatically disregarding effects <2m of roads, or where species have been precluded\(^23\), is not compliant with the Habitats Regulations, the European Guidance or the rulings on Cases C-258/11\(^24\) or C-461/17\(^25,26\).
• Asserts that increases <1% of the assessment level will have no effect and cites the 1,000 AADT screening criterion. WDC understands that changes <1% may have an effect and that significantly fewer than 1,000 vehicles can cause more than a 1% increase.

• Suggests that traffic-NH$_3$ emissions are small and falling. Traffic-NH$_3$ contributes >50% of traffic-related nitrogen deposition at the roadside and there are good reasons to expect these emissions to increase in the future (Appendix 2).

• Suggests a critical level of 200 µg/m$^3$ for 24-hour NOx concentrations, which is contrary to the advice of Prof. Sutton.

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1 e.g. Paras 1.2.4, 1.5.4 and 7.7.
2 Witness for the Ashdown Forest Stakeholder Forum (AFSF).
3 Witness for South Downs National Park Authority, Lewes District Council, and Tunbridge Wells Borough Council (the Joint Authorities).
4 IAQM members were consulted on the guidance but the published content was not agreed by the consulted members. Despite a heavy reliance, both in national policy and in the IAQM document, on the expertise of CEH, it is understood that CEH was not consulted by IAQM.
5 Para 5.3.7.
6 Para 5.4.1.21.
7 Para 5.2.8
8 Para 5.4.1.9.
9 Para 5.4.2.4.
10 Para 6.8.
11 Para 5.4.2.9.
12 For example, Paragraph 6.8 describes the forecast effects of autonomous measures as if there is absolute certainty that they will happen.
13 For example, the APIS website cited in the IAQM document predicts that the average background deposition flux to Ashdown Forest in 2016 (APIS uses the mid-year to report 3-year means) was higher than in any year since 2010 and also higher than in 2005, 2006, or 2007 (predictions prior to 2005 are not given). Thus, the historic trend in predicted background deposition is upward or, at best, flat.
14 See Figure 1 of doc I44 and Figure 2 of Appendix A to WDC’s response to the inspector’s questions.
15 WDC has also been advised by Prof. Sutton (e.g. doc I29 para 20) that it is not safe to assume that emissions reductions in the future are beyond reasonable scientific doubt.
16 In common with the examination statements of the AFSF and Joint Authorities.
17 The only emissions-forecasting model recommended in the document is Defra’s Emissions Factors Toolkit (EFT).
18 See e.g. doc I33 Paras 2.3 – 2.6, doc I44 Para 2.5 and Appendix A to WDC’s response to the inspector’s questions. These issues were also discussed at length by Drs Marner, Holman, and Riley at the EIP on the afternoon of 23rd May 2019.
19 Para 6.12
20 It is not clear why the approach for Local Plans is different from that “projects/plans” (Para 5.4.10). For these, the document suggests that autonomous reductions may be modelled following the same approach as used in Ch14 of doc I6 (i.e. subtracting the [without plan + with autonomous measures] from the [with plan + with autonomous measures]). This will always result in adverse effects from new (non-electric) traffic even after accounting for autonomous measures.
21 Para 5.4.1.13.
22 Para 5.3.8.
23 by adverse human effects.
24 Peter Sweetman and Others v An Bord Pleanála (2013)
26 Also see comments from Prof. Sutton in Para 50 of doc I29 and in Para 140-c of the same document (in which he explains - in the context of a critical level which he helped to set - that the current absence of species must not be used as justification to relax levels of protection).
27 Para 5.3.11.
Following advice from Prof. Sutton, see in doc I29 Para 45. This is also the interpretation of the IAQM summary of the Netherlands Judgement (Page 13) where it is stated that “It must be ascertained, however, that even below the threshold values, there is no risk of significant effects being produced which may adversely affect the integrity of the sites concerned”.

Following advice from Dr Marner based on the Ashdown Forest monitoring and modelling.

i.e. >1% of the critical levels.

Para D.6.1.

Para D4.9.

Doc I29, Para 86.
Appendix 1: Delay of Forecast Benefits

The IAQM document suggests that the contribution of a local plan will often be to “delay” a forecast improvement rather than be a “deterioration” (Para 6.12).

Tables Ex.1 to Ex.3 in the executive summary (Pages 5 to 7) of document I6 (Ashdown Forest Air Quality Monitoring and Modelling) set out the predicted concentrations and fluxes under each emissions scenario. Table 1, below, repeats the values for nitrogen deposition to heath. Looking down the first column, Table 1 shows that without any traffic growth, deposition would reduce from 22.7 to either 19.3 or 18.4 kg-N/ha/yr by 2028 depending on the emissions scenario. Traffic growth associated with the Plan ‘alone’ would add 1 kg-N/ha/yr (21.8 – 20.8) under emissions scenario B and 0.9 kg-N/ha/yr (20.7 – 19.8) under emissions scenarios C. For the Plan ‘in-combination’ the growth-related increments are 2.5 kg-N/ha/yr and 2.3 kg-N/ha/yr for scenarios B and C respectively. Different values would be derived if a background location were selected instead of a roadside location, since the WLP is having the greatest effect at the roadside.

Table 2 shows the forecast improvements from the existing situation at this location. The numbers in Table 2 have simply been calculated from those in Table 1 (e.g. 19.3 – 22.7 = 3.4). For scenario B, Table 2 shows that the 3.4 kg-N/ha/yr improvement that autonomous measures might otherwise deliver is reduced to just 0.9 kg-N/ha/yr once traffic growth is included. Thus, approximately 75% of the improvements that would otherwise be achieved will be removed. The Local Plan ‘alone’ is responsible for 30% (1/3.4) of this effect.

In order for this effect to be described as a “delay” rather than a “prevention” of improvements, certainty is required that the value that would be reached without the Local Plan will be reached at some point in the future even with the Local Plan. The EFT and CURED emissions models both provide for projections out to 2030. They do not go beyond this date. Similarly, none of the projection tools used in the modelling, or available for Local Air Quality Management, forecast for improvements beyond 2030. In order to show graphically, how the results in Table 1 would change each year to 2030, the modelling has been rerun for this location for each year. The results are shown in Figure 1 (for Scenario B) and Figure 2 (for Scenario C). It is quite clear that neither of these scenarios predict sufficient benefit from the autonomous measures that the adverse effect of the WLP is negated.

The argument that the adverse effect is “delayed” thus relies on invoking the possibility of additional autonomous benefits beyond those predicted in either CURED or EFT. While it is clearly possible that there will be such benefits, they cannot be quantified using available models and tools, including the EFT cited in the IAQM guidance. It is thus not possible to take account of them in the modelling. The idea that the adverse effect is being “delayed” should be understood in these terms.

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1 AQC deposition method.
2 These projections assume that traffic volumes change in a linear fashion between 2015 and 2028 and assume no subsequent increase in WLP or non-WLP traffic after 2028. CURED V3A and EFTv8.0 have been run for each year between 2015 and 2028. For expedience, simplifications have been made to link-specific speed profiles etc. but the overall trends shown in Figures 1 and 2 will not be affected by these simplifications.
3 EFT V9 has recently been published, but shows very similar patterns and also does not predict emissions after 2030.
In other words, it is not possible to determine how long the delay might be with the Local Plan, or that the adverse changes will, in fact, be negated at all.

<table>
<thead>
<tr>
<th>Emissions Scenario</th>
<th>Existing Traffic Volumes</th>
<th>2028 No WDC-growth</th>
<th>2028 With Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22.7</td>
<td>24.5</td>
<td>25.7</td>
</tr>
<tr>
<td>B</td>
<td>19.3</td>
<td>20.8</td>
<td>21.8</td>
</tr>
<tr>
<td>C</td>
<td>18.4</td>
<td>19.8</td>
<td>20.7</td>
</tr>
</tbody>
</table>

*a i.e. those areas of the SAC which are currently heath.

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<thead>
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<th>2028 No WDC-growth</th>
<th>2028 With Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>3.4</td>
<td>1.9</td>
<td>0.9</td>
</tr>
<tr>
<td>C</td>
<td>4.3</td>
<td>2.9</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Figure 1 – Forecast Change in Nitrogen Deposition to Roadside Heathland 2015-2030 Under Emissions Scenario B (Y scale starts at Critical Load Value).
Figure 2 – Forecast Change in Nitrogen Deposition to Roadside Heathland 2015-2030 Under Emissions Scenario C (Y scale starts at Critical Load Value).
Appendix 2 Traffic-related NH₃

The Importance of Traffic-related NH₃

The IAQM document suggests that traffic-related ammonia (NH₃) emissions are “small” and “declining”¹ (Para D.6.1). Measured roadside NH₃ concentrations are set out in Chapter 8 of document I6 (Ashdown Forest Air Quality Monitoring and Modelling). This includes three transects of NH₃ monitors beside roads. Two of these are alongside the busy A22. The third transect is beside a minor road which makes it less useful for the type of analysis presented below. Figure 1 shows the measured NH₃ concentrations (as shown in Table 8.5 of document I6) vs distance from the A22. Presenting the measurements in this way leaves no doubt that traffic on the A22 represents a significant source of NH₃.

As well as NH₃, all of the monitoring sites shown in Figure 1 also measured NO₂ concentrations. In document I6, these were used to calculate road-NOx concentrations. Figure 2 shows that the spatial pattern in NH₃ and NOx concentrations on moving away from the A22 is very similar, which is to be expected since both are primary pollutants released from the same emission source.

The NH₃ and NO₂ deposition rates are shown in Figure 3. They are based on the measured concentrations with the local measured background values subtracted. The concentrations have been multiplied by the simple deposition velocities presented in Table 5.1 of the IAQM document (assuming deposition to grassland). Figure 3 shows that NH₃ contributes more than half of the local traffic-related increment of nitrogen deposition. This finding is also in line with the more detailed modelling carried out for Ashdown Forest (as described in doc I6). As an example, Figure 4 shows the calculated deposition along ecological Transects J and K (which are also either side of the A22)². The relative contribution of NH₃ to local traffic-related nitrogen deposition is mostly between 50% and 70% along these transects. There should, therefore, be no doubt that traffic-related NH₃ emissions are very important to understanding, and quantifying, nitrogen deposition near to roads in Ashdown Forest.

¹ It is noted that the word “declining” is used specifically in relation to petrol vehicles and is thus not incorrect, although the impression given is one of declining fleet-average emissions.
² Using the AQC deposition method - these results are derived directly from those presented in Figures 9.40 and 9.41 of doc I6.
Figure 1 - ALPHA Monitoring Results (µg/m³ of NH₃) on Transects 1 (blue diamonds) and 2 (red squares) vs distance from the centre of road. Negative values are distance westward and positive values are distance eastward.

Figure 2 - Two-year (2014-2016) average NH₃ and NOx concentrations along two transects running perpendicular to the A22 after subtracting measured background concentrations.
Figure 3 – Local Traffic-related Increment of Deposition from NH$_3$ and NO$_2$ Beside the A22. Derived Solely from Measured Concentrations and the Deposition Velocities Published by IAQM.
Future Trends in Traffic-related NH$_3$

The modelling set out in document I6, and as used for the HRA, assumes that emissions of NH$_3$ per vehicle will not change in the future. This is because there is no sound basis to make numerical predictions of the rate of change. The IAQM document implies that NH$_3$ emissions from road traffic are falling. A preliminary indication of the ‘direction of travel’ for NH$_3$ emissions is given by the measurements made by Rose (2018)$^3$. These data were collected by analysing the chemical composition of exhaust plumes from large numbers of individual vehicles$^4$. In Figure 5, Rose (2018) showed how NH$_3$ emissions are tending to increase in more modern diesel vehicles. However despite this, NH$_3$ emissions from diesel vehicles remain small when compared with those from petrol vehicles (Figure 6). It is highly significant that NH$_3$ emissions, even from the most modern (Euro 6) petrol cars, are so much greater than those from diesel cars. One of the key reasons which has been put forward at the EIP as to why there should be confidence that traffic-related NOx emissions will fall in the future is that a shift from diesel to petrol cars can be anticipated. It is clear from Figure 6 that any shift from diesel to petrol cars is likely to also cause significant increases to traffic-related NH$_3$ emissions.

Rose (2018)$^3$ also observed that petrol cars with cold engines emit appreciably more NH$_3$ than petrol cars with warm engines (Figure 7). Another reason presented to the EIP as to why there should be


$^4$ Termed “remote sensing”.

Figure 4 – Relative Importance of Local Traffic-related Increment of Deposition from NH$_3$ as a Percentage of the Total Local Traffic-related Deposition Beside the A22 (Ecological Transects J and K) from the Detailed “AQC” Modelling. Derived from the Values Presented in Figures 9.40 and 9.41 of doc I6.
confidence that traffic-related NOx emissions will fall is the increased use of hybrid-electric vehicles. Hybrid vehicles spend part of their time using an electric motor and part of their time using an internal combustion engine. When a vehicle is using its electric motor, the internal combustion engine is allowed to cool. Thus, there is a significant potential for a hybrid vehicle to emit more NH₃ than a non-hybrid vehicle at locations where the internal combustion engine is first used.

Taking all of these points together, it is clear that there can be no confidence in the assumption that traffic-related NH₃ emissions will fall in the future. Instead, there are reasons to believe that such emissions may increase. It has not, however, been possible to factor this effect into the modelling in document I6 and the HRA, which assumes no change in NH₃ emissions per vehicle over time.

![Figure 5 – Measured Increase in NH₃ Emissions per Diesel Vehicle with Year of Vehicle Manufacture (from Rose, 2018)](image)

Figure 5 – Measured Increase in NH₃ Emissions per Diesel Vehicle with Year of Vehicle Manufacture (from Rose, 2018).
Figure 6 – Comparison of NH$_3$ Emissions from Different Vehicle Types (from Rose, 2018)$^3$.

Figure 7 – Difference Between NH$_3$ Emissions from Warm and Cold Petrol Engines (from Rose, 2018)$^3$. 

$^3$ Rose, 2018