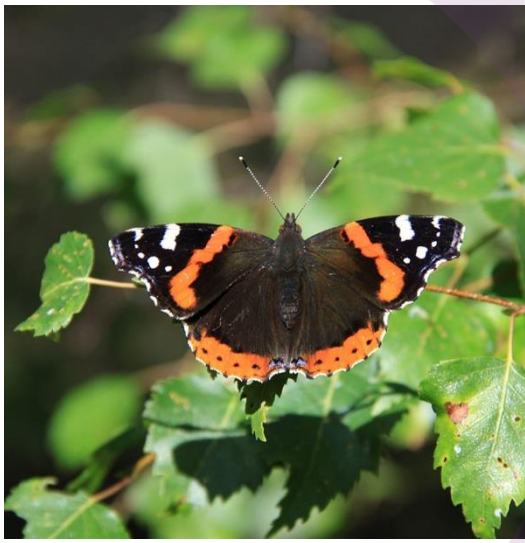
Mid Sussex District Council

Air quality modelling to inform the Site Allocations Development Plan Document

Non-Technical Summary



Wood Environment & Infrastructure Solutions UK Limited – September 2019

Non-Technical Summary:
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1. Introduction

This Non-Technical Summary (NTS) relates to the assessment of air quality related impacts to sensitive species and habitats in Ashdown Forest and to residential properties (human receptors) alongside the Stonepound Crossroads in Hassocks from changes in traffic flows as a result of proposed developments in the Mid Sussex District Council (MSDC) Site Allocations Development Plan Document (DPD).

Pollutant levels are compared to limit values that have been set by European and UK legislation as shown in Table 1.1. Concentration of a pollutant is the quantity of the pollutant in one metre cubed (1 m^3) of air. Deposition rate is the amount of pollution landing on a leaf over a specific amount of time, usually measured per year.

Table 1.1 Limit values used in this assessment

Pollutant	Standards and Targets	Limit Values	Averaging Period
Ecological receptors in Ashdown Forest			
Nitrogen oxides (NO_x) concentration	Air Quality Standard (AQS)	30 μgm^{-3}	Annual Mean
	Air Quality Standard (AQS)	200 μgm^{-3}	Daily Mean
Ammonia (NH_3) concentration	Target – Critical level	1 μgm^{-3} where lichens or bryophytes (including mosses, landworts and hornwarts) are present, where not present 3 μgm^{-3}	Annual Mean
Nitrogen deposition	Target – Critical load	10 kg N/ ha/ yr for European dry heaths as present in Ashdown Forest	Annual Mean
Acidity deposition	Target – Critical load	0.499 keq N/ ha/ yr	Annual mean
Residential receptors at Stonepound Crossroads			
Nitrogen dioxide (NO_2) concentration	Air Quality Standard (AQS)	200 μgm^{-3} not to be exceeded more than 18 times a year	1-hour mean
		40 μgm^{-3}	Annual mean

The values in Table 1.1 are the concentrations and critical loads which may cause harm to people, species or habitats. Some of the effects of high concentrations or deposition rates are outlined in Table 1.2. Harm may be caused when the limit value is exceeded. Also, it is important to look at how much additional pollution is

expected when the traffic from the proposed developments in Mid Sussex is considered. When the predicted change is more than 1% of the limit value, further investigations are required.

Table 1.2 Potential harm caused by high concentration of pollutants

Pollutant	Potential effect
	Ecological receptors in Ashdown Forest
Nitrogen oxides (NO_X)	The effects of high NO_X concentrations on sensitive species and habitats can be categorised as: • growth effects, for example causing unnatural growth (both speeding and slowing natural growth rates) and competition by other species that prefer high NO_X concentrations; • the function of different parts of the plant (e.g. ability to absorb gases); and • chemical effects, for example changes in the amount of chlorophyll, which allows a plant to absorb sunlight.
Ammonia (NH_3)	The direct uptake of NH_3 increases the amount of nitrogen within the plant. In addition, it is alkaline, which may not suit natural plant species and encourage growth of non-native species. Taller plants are considered to be less sensitive and, for this reason, the annual critical level for higher plants is 3 μgm^{-3} but is reduced to 1 μgm^{-3} where lower plants are a particular interest feature of a habitat, as in Ashdown Forest.
Nitrogen deposition	Although nitrogen (N) is good for plant growth, not all plants require the same quantities. In some cases where there is a build up of nitrogen, it can become toxic and hinder growth. Habitats most at risk from too much nitrogen are those rich in bryophytes (for example mosses) and species of slow growing species. This encourages competition by non-native species, leading to replacement of the native species.
Acid deposition	Acid deposition is most likely to affect vegetation indirectly through changes to soil properties, including: • nutrient deficiency by taking important nutrients out of the soil; • damage to roots; and • changes to the type of plants within a habitat.
	Residential receptors at Stonepound Crossroads
NO_2	Breathing air with a high concentration of NO_2 can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases, particularly asthma, leading to respiratory symptoms (such as coughing, wheezing or difficulty breathing), hospital admissions and visits to A&E departments. Longer exposures to elevated concentrations of NO_2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with asthma, as well as children and the elderly are generally at greater risk for the health effects of NO_2. NO_2 along with other NO_X reacts with other chemicals in the air to form both particulate matter and ozone. Both of these are also harmful when inhaled due to effects on the respiratory system.

2. Context

Transport modelling was carried out for eight different site allocation scenarios in total. However, only Scenarios 4, 7 and 8 were brought forward as potential site allocation options to be considered in terms of impact to air quality at Ashdown Forest and Stonepound Crossroads. The Scenarios modelled for air quality are as follows:

- Scenario 4 comprised 32 sites, plus a large site at Haywards Heath Golf Course (33 sites in total).
- Scenario 7 comprised 26 constant sites, plus a large site at Haywards Heath Golf Course (27 sites in total).
- Scenario 8 comprised 26 constant sites, plus four sites at Folders Lane, Burgess Hill (30 sites in total).

More detailed information on the three MSDC site allocation scenarios modelled (Scenarios 4, 7 and 8) are provided in the Transport Assessment[1]. Scenarios 7 and 8 relate to the refined options developed by the District Council as informed by a comprehensive site selection process and as considered by Sustainability Appraisal (SA), transport, air quality and Habitats Regulations Assessment.

This NTS should be read in conjunction with the four corresponding air quality assessment reports[2,3,4,5].

3. Ashdown Forest SAC/SPA

An air quality assessment has been undertaken for the Ashdown Forest Special Area of Conservation (SAC), Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI) to inform the Mid Sussex District Council Site Allocations Development Plan Document. This air quality assessment considers the impact from changes in traffic flows within Ashdown Forest arising from proposed development in Mid Sussex District that could affect certain protected species and habitats.

Atmospheric dispersion modelling, a technique which tracks how pollutants emitted to the atmosphere are moved around by wind and mixed with the surrounding air, is used to predict pollutants from traffic emissions. This prediction is undertaken up to 200 m from roadside locations across Ashdown Forest, including the main roads of interest the A22 and A26. Beyond 200 m pollutants from traffic emissions tend to be fully mixed in air and are not traceable. Concentrations and deposition rates are predicted for:

- Baseline 2018 – a dispersion model prediction of current conditions;
- Projected Baseline 2031 – a dispersion model prediction of pollutant concentrations in 2031 if no development occurs between 2018 and 2031;
- Do Minimum 2031 – a dispersion model prediction of pollutant concentrations in 2031 taking into account all planned development from Local Authorities, excluding Mid Sussex (i.e. extra

[1] Systra (2019) Mid Sussex Transport Study.
[2] Wood (2019) Air quality modelling to inform Mid Sussex District Council Site Allocations Development Plan Document – Scenarios 4 results.
[3] Wood (2019) Stonepound Crossroads AQMA – Site Allocations Development Plan Document – Scenarios 4 results.
[4] Wood (2019) Air quality modelling to inform Mid Sussex District Council Site Allocations Development Plan Document – Scenarios 7 and 8 results.
[5] Wood (2019) Stonepound Crossroads AQMA – Site Allocations Development Plan Document – Scenarios 7 and 8 results.

traffic on the roads associated with future housing developments and employment sites outside of Mid Sussex); and

- Do Something 2031 – a dispersion modelling prediction of pollutant concentrations in 2031 taking into account all planned development from other Local Authorities, including Mid Sussex.

When looking at the change in concentration or deposition, the difference between the Do Minimum 2031 and Do Something 2031 scenarios have been looked at.

A conservative approach has been adopted throughout, for example it is assumed that there will be no improvement in background pollutant concentrations. In reality, with improvements in technology and the uptake of newer vehicles it is very likely that background concentrations will decrease in the future, however there is uncertainty about how quickly concentrations will decline in future years. Therefore, it was decided to base the assessment on a worst-case scenario using current background concentrations and deposition rates.

3.1 Scenario 4

Nitrogen oxides annual mean concentrations were predicted to be below the Air Quality Standard (AQS) of 30 μgm^{-3} at all modelled locations between 5 m and 200 m from the roadside. There were no exceedances predicted at unclassified or B-roads through Ashdown Forest. As expected, the highest concentrations were predicted at receptors along the roads with the highest traffic flows, including A22, A26, A275 and Hindleap Lane. The greatest change in concentration due to the traffic associated with the Mid Sussex site allocations was predicted on the A26; the change in concentration is more than 1 % of the AQS. The daily mean AQS was not predicted to be exceeded at any modelled receptor locations.

For ammonia, the annual mean concentration is expected to exceed the critical level at most locations modelled in Ashdown Forest up to 2 – 5 m from the roadside. The greatest concentration was predicted on the A26 and was above the critical level up to 25 m from the kerbside.

The 10 kg N/ ha/ yr critical load for nitrogen deposition was breached at all modelled locations across Ashdown Forest due to the existing high background deposition rate. The change in deposition rate due to traffic from the Mid Sussex site allocations is higher than 1 % of the critical load on the A26 indicating that further investigations should be conducted by an ecologist to assess whether the predicted change can harm sensitive species and habitats.

The predicted acid deposition breached the critical load at all locations modelled in Ashdown Forest. At the A26 and B2026 (between Fairwarp and Duddleswell) the change in acid deposition rate is expected to be greater than 1 % of the critical load.

3.2 Scenario 7

Nitrogen oxides annual mean concentrations are predicted to exceed the AQS on the roads with the highest traffic flows. On Hindleap Lane the AQS is predicted to be breached up to 5 m from the kerbside and on some sections of the A22 and A26 up to 10 m from the kerbside. The greatest increase in concentration due to the traffic from the Mid Sussex site allocations is expected on New Road; the change is greater than 1 % of the AQS. The daily mean AQS was not predicted to be exceeded at any modelled receptor locations.

Annual mean ammonia concentrations were expected to breach the critical level up to 10 m from the roadside on B2026, A275 and New Road, and up to 25 m on the A22 and A26.

Due to the high background nitrogen deposition rate, the critical load for nitrogen deposition is exceeded at all locations across Ashdown Forest. However, the change in deposition rate due to additional traffic flows is

not greater than 1 % of the critical load, therefore it is not expected that harm will be caused to sensitive species and habitats due to nitrogen deposition.

The critical load for acid deposition is exceeded across Ashdown Forest due to the high background deposition rate. The change in deposition rate does not exceed 1 % of the critical load for acid deposition, so there are not expected to be adverse impacts to species and habitats due to acid deposition.

3.3 Scenario 8

Nitrogen oxides annual mean AQS was breached at up to 10 m from the kerbside on the A22 and A26, where the highest concentrations were predicted. The greatest change in concentration is predicted to be on New Road where concentrations are expected to increase by 1.3% of the 30 μgm^{-3} AQS. The daily mean AQS was not predicted to be exceeded at any modelled receptor locations.

The annual mean ammonia concentrations were predicted to exceed the critical level up to 25 m from the roadside on the A22 and A26, and up to 10 m from the roadside on B2026, A275 and Hindleap Lane.

The nitrogen deposition critical load for species at Ashdown Forest is predicted to be exceeded at all points across Ashdown Forest, mostly due to a high background deposition rate. The change in deposition rate of nitrogen due to the Mid Sussex site allocations is above 1% of the critical load at the kerbside at New Road and Crowborough Road, further ecological assessment is required to determine the likely impact.

The minimum critical load for acid deposition is breached at most locations before consideration of traffic associated with the Mid Sussex site allocation scenarios, however the change in acid deposition due to the Mid Sussex site allocations is less than 1% of the critical load at all modelled locations, so is not considered to be significant.

3.4 Summary

As the results of the air quality assessment demonstrate that the change in traffic flows associated with all the three site allocation scenarios has the potential to cause an adverse impact to sensitive species and habitats in Ashdown Forest, further assessment by qualified ecologists is required through the Habitats Regulations Assessment, and where necessary, appropriate mitigation should be proposed by them.

4. Stonepound Crossroads AQMA

The Stonepound Crossroads AQMA in Hassocks was declared in 2012 due to high levels of NO_2 (annual mean). Vehicular traffic is the main contributing source of air pollution, therefore, the potential impact of an increase in traffic flows due to the housing requirement outlined in the Mid Sussex Site Allocations DPD has been considered and a detailed assessment of air quality impacts has been performed. NO_2, PM_{10} and $PM_{2.5}$ are the pollutants most associated with traffic emissions. As the AQMA was declared due to high nitrogen dioxide (NO_2) concentrations, while particulate matter (PM_{10} and $PM_{2.5}$) are comfortably within the related AQS, the assessment focuses on concentrations of NO_2 only.

Atmospheric dispersion modelling is undertaken to evaluate the air quality impact of traffic emissions associated with three Mid Sussex site allocation scenarios for 2031 defined by the Transport Assessment at sensitive human receptors (i.e. residents living near Stonepound Crossroads) within and near the Stonepound Crossroad AQMA.

Predicted concentrations of NO_2 are calculated by adding together:

- Predicted NO_2 concentrations from road traffic, without and with traffic flows associated with the three scenarios for 2031, including consideration of in-combination traffic flows from adjoining local authorities' development plans; and
- Background concentrations for the UK, estimated by Defra, making projections for years from 2017 to 2030. Background concentrations are predicted to improve in future years, but concentrations for 2017 have been used in all three scenarios as a conservative approach.

Concentrations have been predicted at local residential properties within and near the AQMA, alongside roads potentially affected by the scenarios. It is likely that background levels of pollutants will decrease in future years thanks to the uptake of newer vehicles. However, due to uncertainty over the predicted decrease this assessment has assumed no improvement in the future and is therefore considered to be conservative.

IAQM/ EPUK guidance[6] is used to judge the potential impact to air quality at residential properties as a result of the change in concentration due to extra traffic from proposed developments. These impact descriptors are intended for application at individual residences and are not a conclusion on significance at all residences at Stonepound Crossroads.

4.1 Scenario 4

For Scenario 4, the largest predicted NO_2 annual mean concentration is 31.3 μgm^{-3} at a residential property located to the northeast of the Stonepound Crossroads on Keymer Road. This is below the 40 μgm^{-3} but does indicate some potential harm to some residents due to the increase in concentration from additional traffic. However, overall the impact is expected to be Negligible.

4.2 Scenario 7

For Scenario 7, the largest predicted NO_2 annual mean concentration is 33.5 μgm^{-3} at a residential property located to the northeast of the Stonepound Crossroads on Keymer Road; this is below the AQS. The change in concentration is expected to be Negligible at all residences.

4.3 Scenario 8

For Scenario 8 the largest predicted NO_2 annual mean concentration is 33.8 μgm^{-3} at a residential property located to the northeast of the Stonepound Crossroads on Keymer Road; this is also below the AQS. Overall the impact is expected to be Negligible.

4.4 Summary

The model has shown that concentrations are predicted to be well below the NO_2 annual mean AQS of 40 μgm^{-3} at all residential properties in the three scenarios modelled.

The overall effect at residential properties within and near Stonepound Crossroads AQMA of the proposed developments for all three scenarios is judged to be not significant.

Based on the result of the assessment no mitigation measures are deemed necessary.

[6] IAQM/ EPUK (2017) Guidance on land-use planning and development control: Planning for air quality.

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