# Appendix 11.7

## ASSESSMENT OF AIR QUALITY IMPACTS ON ECOLOGICAL SITES METHODOLOGY

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### Assessment approach

The impacts of air pollution on the integrity of ecological sites have been assessed following IAQM guidance on the assessment of air quality impacts on designated nature conservation sites[1].

The guidance sets out a collaborative approach with the project air quality specialist and ecologist. An outline of the stages for assessing the impact on designated sites is presented in Table 1.

Table 1 Outline of assessment stages for ecological assessment

| Stage | Who | What | Planning/permitting output (all sites) | HRA output (European sites only) |
|---|---|---|---|---|
| Scoping | Air quality specialist & ecologist | Initial evaluation of potential receptors, consultation with competent authority/ stakeholders | Study area, relevant receptors, pollutants | n/a |
| *Quantification & Screening* | | | | |
| Simple assessment | Air quality specialist | Compare traffic generation to screening threshold of an increase in annual average daily traffic (AADT) of 1000 vehicles or 200 heavy duty vehicles (HDVs) on a road within 200m of ecological site.<br><br>Calculate/estimate process contribution (PC)[2] and compare with screening thresholds of 1% of site critical level/load. | Identify if insignificant OR if further assessment required (e.g., detailed modelling) | Screening Identification of likely significant effects (project alone & in-combination) |
| | Ecologist | | Assessment of significance of effects (inter & intra project) | |
| Detailed assessment | Air quality specialist | Calculate PC & predicted environmental contribution (PEC)[3] and compare against critical levels/loads at relevant receptors | Identification of impacts (project alone & cumulative impacts) | Identification of adverse effects on integrity (project alone & in-combination) |
| | Ecologist | | Assessment of significance of the project alone and cumulative effect (i.e. inter and intra project effects) | |

[1] Holman et al. (2020). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Institute of Air Quality Management, London.
[2] Process contribution (PC) describes the incremental impact of the proposed development on the concentration or deposition flux.
[3] Predicted Environmental Contribution (PEC) describes the concentration or deposition (i.e. process contribution (PC) plus baseline)

| Stage | Who | What | Planning/permitting output (all sites) | HRA output (European sites only) |
|---|---|---|---|---|
| Mitigation & monitoring | Air quality specialist & ecologist | The application of measures to address air quality impacts and associated ecological effects following a mitigation hierarchy, and the use of monitoring | | Apply mitigation hierarchy. Identify imperative reasons of overriding public interest (IROPI) |

### Screening

The initial screening involves determining sensitive ecological sites within 200 m of roads predicted to experience an increase in annual average daily traffic of 1000 or more. As presented in the body of the ES chapter, Oxford Meadows and the Meadows West of Oxford Canal were screened in at this stage. Therefore, it is necessary to model air pollutant concentrations along the site boundary.

Initially, $NO_x$ and ammonia ($NH_3$) concentrations were modelled at discrete receptor locations along the ecological site boundaries. This was undertaken using ADMS-Roads following the same traffic modelling methodology as for the modelling at human receptor locations (detailed in section 11.3 of the ES chapter). Emissions factors for $NH_3$ have been calculated using CREAM tool V1A[4].

The process contribution (PC) exceeded the screening threshold of 1% of the critical load/level at multiple locations for multiple parameters. Therefore, pollutant concentrations have been modelled along transects perpendicular to the roadside. Concentrations have been modelled at discrete points at 10 m intervals up to 200 m from the roadside.

### Post processing

The required parameters (NOx concentration, $NH_3$ concentration, total nutrient nitrogen deposition and total acidification due to nitrogen) have been calculated following the flow chart in Figure 1. The required factors used in the calculations are summarised in Table 2. This process follows AQTAG technical guidance[5].

NOx background concentrations at each receptor were obtained from Defra background maps (as for human receptors). The background concentrations are presented in Appendix 11.6.

These parameters were calculated for each traffic scenario. The impact was determined by calculating the difference in concentration and deposition flux between the future scenarios with and without the Proposed Development.

[4] Air Quality Consultants. (2020). Ammonia Emissions from Roads for Assessing Impacts on Nitrogen-sensitive Habitats. https://www.aqconsultants.co.uk/resources/ammonia-emissions-from-roads-for-assessing-impacts

[5] Air Quality Advisory Group. (2014). AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air. https://ukwin.org.uk/files/ea-disclosures/AQTAG06_Mar2014%20.pdf

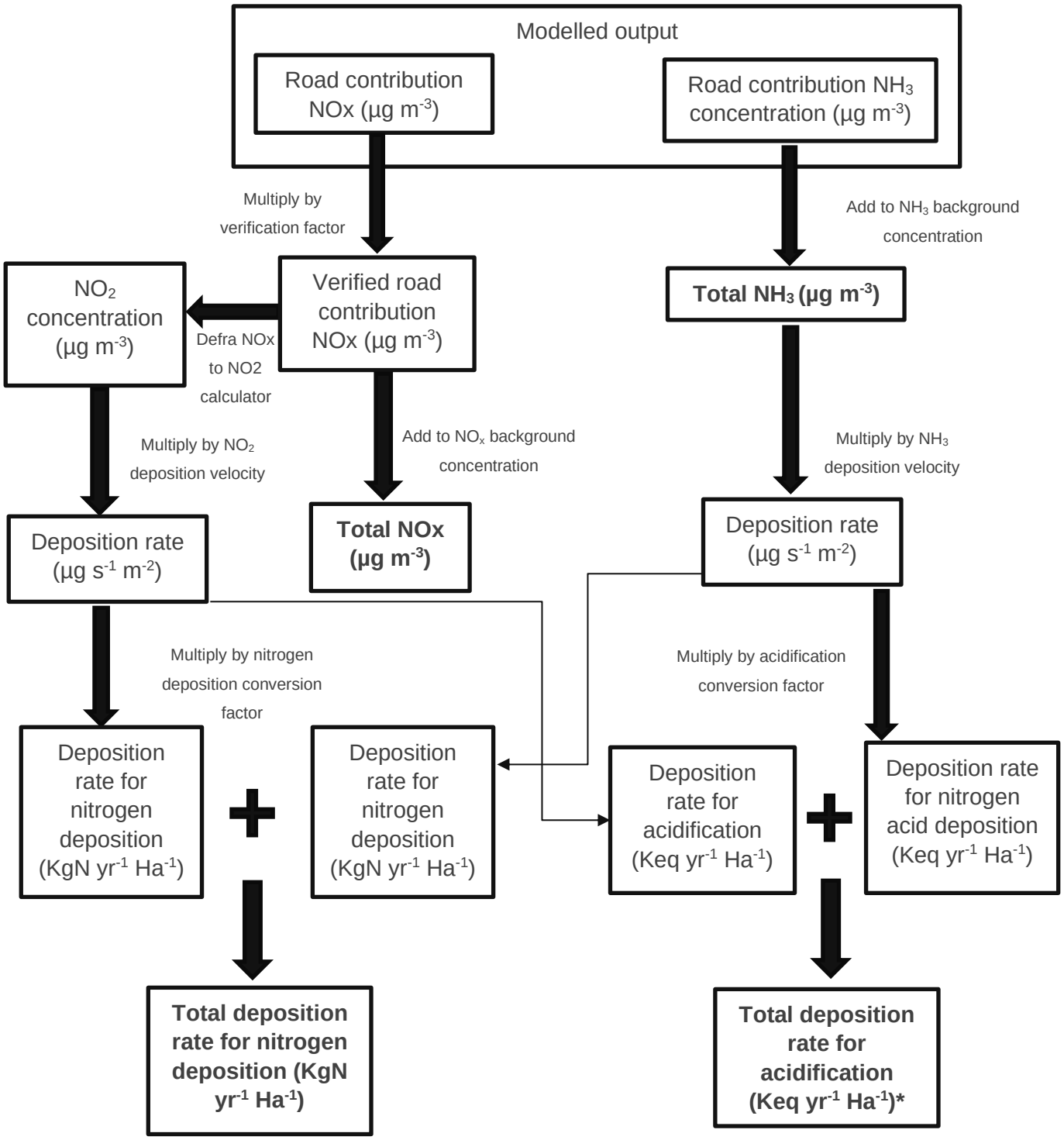


Figure 1 Flowchart outlining how required output for ecological assessment were obtained.

* Keq refers to the kilo H+ equivalent of acidification

Table 2 Factors used in obtaining required outputs for ecological assessment.

| Factor | Value | Source |
|---|---|---|
| NOx verification factor | 2.426 | Calculated for project specific modelling (see Appendix 11.8) |
| $NH_3$ background concentration ($\mu g\ m^{-3}$) | 2.17 | Modelled background concentration at Oxford Meadows from APIS website[6] |
| Deposition velocity $NO_2$ for grassland (m/s) | 0.0015 | AQTAG guidance |
| Deposition velocity $NH_3$ for grassland (m/s) | 0.020 | AQTAG guidance |
| Nitrogen deposition conversion factor for $NO_2$ ($\mu g\ s^{-1}\ m^{-2}$ to KgN $yr^{-1}\ Ha^{-1}$) | 95.9 | AQTAG guidance |
| Nitrogen deposition conversion factor for $NH_3$ ($\mu g\ s^{-1}\ m^{-2}$ to KgN $yr^{-1}\ Ha^{-1}$) | 260 | AQTAG guidance |
| Nitrogen acidification conversion factor for $NO_2$ ($\mu g\ s^{-1}\ m^{-2}$ to Keq $yr^{-1}\ Ha^{-1}$) | 6.84 | AQTAG guidance |
| Nitrogen acidification conversion factor for $NH_3$ ($\mu g\ s^{-1}\ m^{-2}$ to Keq $yr^{-1}\ Ha^{-1}$) | 18.5 | AQTAG guidance |

[6] CEH. (2022). Air Pollution Information System. Site relevant critical loads https://www.apis.ac.uk/srcl