

A83 Rest and Be Thankful

LTS EIAR VOLUME 4, APPENDIX 7.2 - AIR QUALITY
METHODOLOGY

Transport Scotland

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A7-2. Air Quality Methodology

A7-2.1. Assessment Approach

A7-2.1.1. The air quality assessment for the Design Manual for Roads and Bridges (DMRB) Stage 3 Assessment of the Proposed Scheme has been undertaken in line with [Design Manual for Roads and Bridges \(DMRB\) LA 105 air quality \(DMRB LA 105\)](#).

A7-2.1.2. The assessment comprises:

- review of existing baseline conditions
- qualitative assessment of the potential for particulate matter (dust) to be generated during construction of the Proposed Scheme as a result of planned construction activities
- quantitative assessment of the likely changes in air pollutants (NO_x concentrations and nitrogen deposition) at ecological receptors during Proposed Scheme construction, due to construction traffic and traffic management
- commentary on the effects scoped out of the Environmental Impact Assessment (EIA) as agreed with the A83 Environmental Steering Group (ESG) at DMRB Stage 3 Scoping and
- identification of the need for mitigation measures where appropriate.

A7-2.2. Study Area

A7-2.2.1. The air quality study area for construction assessment is defined in accordance with DMRB LA 105.

A7-2.2.2. For the potential effects of construction dust, the study area is defined as the area within 200m of all construction activity (DMRB LA 105 paragraph 2.57). The study area for air quality during construction is provided in Volume 3, Figure 7.1.

A7-2.2.3. For the potential effects of traffic emissions during the construction phase, the study area comprises an area within 200m of the Affected Road Network (ARN), as defined by roads with changes in construction traffic and traffic management that meet the screening criteria in DMRB LA 105 (see section A7-2.4) and adjoining roads within 200m.

A7-2.3. Existing Air Quality

A7-2.3.1. Information on existing air quality has been reviewed to understand baseline conditions in the air quality study area. Ambient air quality data potential air

quality constraints to the Proposed Scheme have been determined through reference to the following sources:

- [Air Quality Management Areas \(AQMA\) mapping](#)
- [Department for Environment, Food and Rural Affairs \(Defra\) Pollution Climate Mapping \(PCM\) model data \(2018 reference year\)](#)
- [Local Air Quality Management \(LAQM\) reports](#) including local monitoring data for the local authorities included in the study area
- mapped background pollutant concentrations for the UK from [Defra UK-Air website](#)
- [Multi-Agency Geographic Information for the Countryside \(MAGIC\) website](#), for boundaries of national and internationally designated ecological sites
- [Woodland Trust Ancient Tree Inventory](#) to identify veteran trees
- [critical loads and habitat types from the Air Pollution Information System \(APIS\) website](#) and
- Ordnance Survey base mapping to identify locations of sensitive receptors (residential properties, schools and hospitals).

A7-2.4. Effects on Air Quality During Construction

- A7-2.4.1. A qualitative assessment of the effects on air quality from construction dust has been undertaken in line with DMRB LA 105, taking into account the nature of proposed construction activities that have the potential to generate dust and the location of sensitive receptors.
- A7-2.4.2. Both human health receptors and designated ecological sites have been included in this qualitative assessment. The number of sensitive receptors and their distance from the footprint of the construction works have been considered to determine the risk of potential construction dust impacts. Receptor locations are shown in Volume 3, Figure 7.1.
- A7-2.4.3. DMRB LA 105 also states that where construction is expected to last for more than two years, the traffic management measures and the effect of the additional construction vehicles should be assessed quantitatively. The overall duration of construction is expected to be up to four years. Therefore, further consideration of construction phase traffic impacts has been undertaken.
- A7-2.4.4. The effect of construction traffic and traffic management during the construction phase has been considered with reference to the duration of construction works, the expected volume of construction vehicles and expected vehicle queue length and times. Changes were screened against DMRB LA 105 traffic screening criteria. Where the relevant criteria were met then quantitative assessment of the effect on air quality has been undertaken.

- A7-2.4.5. The air quality assessment of the construction phase follows the guidance given in DMRB LA 105, with reference to [Defra's Local Air Quality Management Technical Guidance](#) (LAQM.TG22).
- A7-2.4.6. A 'simple' quantitative assessment of construction vehicle emissions of NO_x, utilising the Overseeing Organisations air quality spreadsheet model has been undertaken to examine the potential impact on pollutant concentrations in the earliest Proposed Scheme construction year (2026) and the latest Proposed Scheme construction year (2033). The assessment has used the latest Defra air quality assessment tools and datasets (released 19 August 2020 and December 2023) and updated speed band emission rates which account for the December 2023 Defra tools update (released by National Highways in January 2024). The speed band emission rates in the National Highways' speed band tool are based the fleet composition as derived from national statistics for England as embedded in the Defra's Emission Factor Toolkit (EFT). Fleet composition may differ for Scotland; however, the use of the National Highways' speed band emission factors is considered appropriate given the conservative assumptions used throughout the assessment. The use of emission rates based on Scottish fleet assumptions would not be expected to change the conclusions of the assessment.
- A7-2.4.7. There is one designated ecological site within the study area, Beinn an Lochain Site of Special Scientific Interest (SSSI). The SSSI contains various habitats that are sensitive to nitrogen deposition including blanket bog, neutral grassland and wetland within 200m of the road edge. Given the volumes of material required to be transported, and critical loads for nitrogen deposition that are currently exceeded, there is potential for adverse impacts from construction traffic on designated habitats. The quantitative assessment of construction traffic focuses on the section of the A83 immediately to the north of the Proposed Scheme extent.

A7-2.5. **Effects on Air Quality Scoped Out of Assessment**

Construction

- A7-2.5.1. Given the existing good air quality and the distance of the construction traffic and traffic management routes to human health receptors, it is unlikely that the impact of traffic management and construction vehicles would have a significant effect on local air quality at human health receptors within the study area. Therefore, these effects are scoped out of the DMRB Stage 3 EIA as agreed at DMRB Stage 3 Scoping.

Operation

A7-2.5.2. During operation, there is not expected to be a change in speed band, fleet composition or volume of traffic on the A83 nor a change in road alignment that would exceed DMRB screening criteria. The Proposed Scheme is not therefore expected to have a significant air quality effect at sensitive receptors once operational. Therefore, these effects are scoped out of the DMRB Stage 3 EIA as agreed at DMRB Stage 3 Scoping.

A7-2.6. Traffic data

A7-2.6.1. The scenarios included in the assessment are:

- base year (2024)
- projected base year (2026 – the earliest year of construction of the Proposed Scheme) – for long term trends assessment
- projected base year (2033 – the latest year of construction of the Proposed Scheme) – for long term trends assessment
- construction year (2026 the earliest year of construction of the Proposed Scheme) - without construction traffic management (Do Minimum (DM)) with construction traffic management (Do Something (DS))
- construction year (2033 the latest year of construction of the Proposed Scheme) - without construction traffic management (Do Minimum (DM)) with construction traffic management (Do Something (DS)) and

A7-2.6.2. The ARN for the construction phase has been determined through comparison of the change between DS and DM with the DMRB LA105 screening criteria (paragraph 2.1):

- road alignment change of 5m or more or
- daily traffic flows (two way) change by 1,000 annual average daily traffic (AADT) or more or
- Heavy Duty Vehicle (HDV) flows (two way) change by 200 AADT or more or
- a change in speed band.

A7-2.6.3. The air quality study area for the construction phase is the area within 200 m of the roads meeting these criteria and adjoining roads.

A7-2.7. Air Quality Assessment

A7-2.7.1. The air quality assessment was undertaken using the Overseeing Organisation's air quality spreadsheet model, which uses:

- National Highways speed band emission factors (based on Defra's Emission Factor Toolkit (EFT) v12.0.1)

- AADT flows of Light Duty Vehicles (LDV) and HDV and
- average traffic speed as a speed band category, determined in accordance with DMRB LA 105 (paragraph 2.29 – 2.38 and Appendix A).

A7-2.7.2. In addition, information on road alignment and road width (taken from detailed mapping, Proposed Scheme design and aerial photography) was used.

A7-2.8. Receptors

A7-2.8.1. Sensitive human health and ecological receptors for the purposes of air quality assessment are defined in DMRB LA 105 (paragraph 2.18 and 2.25) as:

- Residential properties, locations of susceptible populations e.g. schools, hospitals and care homes for the elderly, or any other location where a member of the public may be exposed to an air pollutant for the relevant regulated time period.
- Designated ecological sites with statutory designations (Special Protection Areas (SPA), Special Areas of Conservation (SAC), SSSI and with non-statutory designations (local nature reserves (LNR), local wildlife sites (LWS), nature improvement areas (NIA), ancient woodland (AW) and veteran trees) containing habitats sensitive to nitrogen deposition.

A7-2.8.2. A selection of representative residential receptors for both human health and designated ecological sites were assessed. These include those within 200m of the boundary of the footprint of the Proposed Scheme's construction activities (for the dust assessment) and those closest to the roads that trigger the traffic change criteria and are likely to be most affected by changes (for construction traffic effects on the designated ecological site only).

A7-2.8.3. The Beinn an Lochain SSSI is located immediately to the north of the Proposed Scheme extent therefore the quantitative assessment has focused on this section of the A83. No other relevant sites have been identified within the air quality study area. Transect receptor points at 10m intervals up to 200m from the road within the SSSI have been considered, in accordance with DMRB (paragraph 2.26).

A7-2.9. Background Concentrations

A7-2.9.1. The output from the National Highways spreadsheet model has been used to provide estimates of the contribution from road traffic emissions to annual mean concentrations of NO₂ at receptors. These concentrations must be combined with estimates of background concentrations, to account for other sources of air pollution, to derive total annual mean concentrations. Background concentrations have been derived from Defra's background maps (2018 reference year) for the base year (2024) and for the earliest and latest construction years of the Proposed Scheme (2026 and 2033).

A7-2.9.2. The background nitrogen deposition rates at the designated site have been obtained from the APIS website.

A7-2.10. NO_x to NO₂ Conversion

A7-2.10.1. Annual mean concentrations of total NO₂ and road NO₂ were derived from modelled road NO_x concentrations and background NO₂ concentrations using the [Defra NO_x to NO₂ calculator](#) (version 8.1, August 2020). The traffic mix selected was “all non-urban UK traffic” and local authority “Argyll and Bute” was selected.

A7-2.11. Verification

A7-2.11.1. Model verification is the process of determining the local area performance of the base year model in comparison with measured data. The verification step would involve comparison of modelled pollutant concentrations at suitable monitoring sites with monitored values that are representative of the base model period.

A7-2.11.2. Where there is a disparity between modelled and measured concentrations, and where further improvements to input data are not possible, then if required, an appropriate adjustment factor would be determined to correct for systematic bias. This adjustment would be applied to the base year and future year model outputs.

A7-2.11.3. In the absence of monitoring data located within the air quality study area, an adjustment factor was not applied to the modelled road-NO_x.

A7-2.12. Trends

A7-2.12.1. An assessment has been undertaken in accordance with DMRB LA 105 (paragraph 2.47 – 2.55) using the Long Term Trends (LTT) approach, to account for future year uncertainties in emissions projections of NO_x. Air quality assessments following the latest Defra vehicle emission factors have been considered to be overly optimistic in the past. An additional assessment scenario (projected base year) is required to enable a gap analysis to be completed. The projected base year scenario is modelled using the base year traffic data with the opening year vehicle emission factors and background concentrations. The results for the opening year are then adjusted to represent the observed long-term trend profile.

A7-2.12.2. The National Highways gap analysis tool (LTT v1.1) has been used to estimate annual mean total NO_x and road NO₂ at ecological receptors.

A7-2.13. Designated Habitat Assessment

- A7-2.13.1. An assessment of the potential effects of changes in road NO_x emissions on nitrogen deposition rates has been undertaken within the SSSI, in accordance with DMRB LA 105 (paragraph 2.43 - 2.46). The background nitrogen deposition rate, relevant habitat types and critical loads have been obtained from the APIS website.
- A7-2.13.2. The modelled road NO₂ concentration was converted to a dry nutrient nitrogen deposition rate in kg N/ha/year using the relevant conversion rates for “woodland” and “grassland” habitats given in DMRB LA 105 (para 2.44.1).
- A7-2.13.3. The background and road nitrogen deposition rates were combined to give a total nitrogen deposition rate for each ecological receptor and the change in nitrogen deposition with the Proposed Scheme was calculated.

A7-2.14. Evaluation of Significance

- A7-2.14.1. There is no requirement to evaluate significance for construction dust in accordance with DMRB LA 105. The assessment provides the likely risk of effects in order to recommend appropriate mitigation.
- A7-2.14.2. Evaluation of the significance of the effect of the Proposed Scheme construction traffic on designated habitats has been undertaken in accordance with DMRB LA 105 (paragraph 2.97 to 2.102, and Figure 2.98) with a significant effect assessed by the competent expert for biodiversity and defined as where the increase in nitrogen deposition with the Proposed Scheme would lead to the theoretical loss of one species with reference to Table 21 of the published nitrogen deposition dose response report by Natural England.
- A7-2.14.3. Where the lower critical load of the nitrogen deposition for the relevant habitat is exceeded, and the change in nitrogen deposition is expected to be greater than 1% of the lower critical load then the magnitude of change of the nitrogen deposition was considered further. Where the change is greater than 0.4 kg N/ha/yr then the significance of effect is assessed by a competent expert for biodiversity within Chapter 11 - Biodiversity.

A7-2.15. Assumptions

- A7-2.15.1. The following worst-case assumptions have been embedded in the assessment to ensure a robust and conservative approach:
- The maximum extent of queuing traffic at the junction of the A83 and the B828 has been estimated based on peak hour traffic in the existing OMR, high growth policy scenario, in the peak week of the “worst-case” construction year (2033).

- Both 2026 (earliest first year of construction) and 2033 (latest last year of construction) have been assessed to confirm which presents the 'worst case' year in terms of traffic flows (increases between 2026 and 2033) and emission rates (reduce between 2026 and 2033). Results for 2033 are presented in Chapter 7 Air Quality as the 'worst case' year.
- LTT approach has been used to account for future year uncertainties in Defra emissions projections of NO_x (see section A7-2.12 Trends).
- The maximum background nitrogen deposition rate (three year average for 2020-2022 taken from APIS) from across the SSSI has been used and assumed constant over time (i.e. not allowing for future reductions).
- The results of the assessment of the impacts on designated habitats were screened against the lowest critical load for the qualifying features within the SSSI site (i.e. 5 kg N/ha/yr for blanket bogs) despite this habitat being further away from the road edge than other qualifying features.