

## 16. Air Quality

### 16.1. Introduction

- 16.1.1. This chapter presents the Stage 3 air quality assessment for the Proposed Scheme. The assessment has been carried out following guidance provided in the DMRB Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 1 Air Quality, May 2007 (referred to as DMRB HA207/07<sup>1</sup>) and relevant Interim Advice Notes (IANs) as listed in the Legislation, Policy and Guidance section (see Section 16.2).
- 16.1.2. There is the potential for air quality impacts to arise during both the construction and operational phases of the Proposed Scheme.
- 16.1.3. During the construction phase, dust and particulate matter emissions may be generated during on-site construction activities; minor, temporary increases in concentrations of air pollutants may occur due to emissions from construction vehicles and plant. The assessment has identified residential and other sensitive receptors that could potentially be affected, the construction activities to be carried out and their duration. Appropriate mitigation has been identified, where relevant.
- 16.1.4. Once operational, changes in traffic flows, speeds and composition associated with the Proposed Scheme may result in changes in concentrations of air pollutants at sensitive receptors, both in the vicinity of the Proposed Scheme itself and adjacent to affected roads. The operational assessment includes: the definition of the air quality assessment study area; review of the existing baseline conditions and constraints; the determination of impacts on local air quality and regional emissions, and interpretation of significance.
- 16.1.5. The local air quality assessment has focused on the impacts of the air pollutants nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM) at human health receptors as the air quality criteria for these two pollutants are likely to be most difficult to achieve in the vicinity of roads. In addition, concentrations of oxides of nitrogen (NO<sub>x</sub>) and nitrogen deposition have been included in the assessment of ecological receptors. The regional assessment of emissions considers NO<sub>x</sub>, carbon dioxide (CO<sub>2</sub>) and particulate matter.

#### Study Area

- 16.1.6. The air quality study area for operational effects has been defined based on changes in traffic data as a result of the Proposed Scheme (i.e. the “with Proposed Scheme” or Do-Something [DS] scenario compared to the “without Proposed Scheme” or Do-Minimum [DM] scenario) in the first full year of operation of 2026. The air quality study area has been determined in accordance with traffic change criteria set out in DMRB HA207/07 which defines affected road networks (ARN) for local (paragraph 3.12) and regional (paragraph 3.20) air quality assessments.
- 16.1.7. The ARN for the purposes of a local air quality assessment is defined as those roads that meet any of the traffic change criteria, whereby:
- Road alignment will change by 5 metres (m) or more; or
  - Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more; or
  - Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
  - Daily average speed will change by 10 kilometres per hour (km/hr) or more; or

- Peak hour speed will change by 20 km/hr or more.
- 16.1.8. For the assessment of local air quality (human health and statutory ecological designated sites), the air quality study area is limited to 200m either side of each road carriageway section identified in the local air quality ARN. This distance of 200m is industry best practice specified in DMRB HA207/07, having been derived from calculations using atmospheric dispersion modelling and reviewed in a series of field measurements. In practice, all major road sources within 200m of receptors are considered, whether in the affected road network or not.
- 16.1.9. The ARN for the purposes of a regional air quality assessment is defined as those roads that meet any of the traffic change criteria, whereby:
- Daily traffic flows will change by 10% AADT or more; or
  - HDV flows will change by 10% AADT or more;
  - Daily average speed will change by 20 km/hr or more.
- 16.1.10. Traffic data were provided in terms of total vehicles and the percentage of heavy goods vehicles (HGV) whereas the DMRB HA207/07 change criteria, as given above, relates to change in HDV (which also includes buses and coaches). For the purpose of this assessment, in the absence of further information on fleet composition, the HDV change criteria has been applied to the HGV data. This approach may result in a slight underestimation of both the ARN and calculated road emissions, discussed further below (paragraph 16.2.44) on the limitations of the assessment within section 16.2.
- 16.1.11. The extent of the ARN for the local air quality assessment includes the A9 mainline carriageway, slip roads, and parts of the A938, A95 and B9152, whereas the ARN for the regional assessment also includes the A938 east of Carrbridge (due to the use of percentage change as criteria rather than absolute vehicle numbers). The ARN and study area for the local air quality assessment (defined as the area within a 200m buffer of the local air quality ARN) is shown in Figure 16.1.
- 16.1.12. The study area for the construction dust assessment has been determined in accordance with the Institute of Air Quality Management (IAQM) Construction Dust Guidance<sup>ii</sup> (referenced in Section 16.2 below and described in detail in Appendix 16.1). It comprises areas that are within 350m of the site works boundary and within 50m of roads used by construction vehicles on the public network (assumed to be the A9), to access the site up to 500m from the site works boundary. The study area for the construction dust assessment is shown in Figure 16.2.

## 16.2. Approach and Methods

### Legislation, Policy and Guidance

- 16.2.1. Relevant air quality legislation, policy and guidance, including relevant Air Quality Strategy (AQS) objectives, are provided in Appendix 16.1.
- 16.2.2. The air quality assessment of the Proposed Scheme has been assessed using relevant guidance outlined in DMRB HA207/07, associated IANs, Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16))<sup>iii</sup> and IAQM guidance. The guidance documents referred to are listed below:
- HA207/07 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 Air Quality, May 2007 (DMRB HA207/07)<sup>i</sup>;

- IAN 170/12 v3 Updated air quality advice on the assessment of future NO<sub>x</sub> and NO<sub>2</sub> projections for users of DMRB HA207/07, November 2013<sup>iv</sup>;
- IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB HA207/07, June 2013<sup>v</sup>;
- IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users DMRB HA207/07<sup>vi</sup>;
- Defra's Local Air Quality Management Technical Guidance (LAQM.TG(16))<sup>iii</sup>, where appropriate; and
- Institute of Air Quality Management (IAQM) 'Guidance on the assessment of dust from demolition and construction', February 2014<sup>ii</sup> (IAQM Construction Dust Guidance).

16.2.3. IAN 185/15 Updated traffic, air quality and noise advice on the assessment of link speeds and generation of vehicle data into 'speed-bands' for users of DMRB HA207/07<sup>vii</sup> has not been adopted by Transport Scotland, other than when the Proposed Scheme passes through an Air Quality Management Area (AQMA). As detailed in Section 16.3 of this chapter there are no AQMA in the vicinity of the Proposed Scheme and therefore IAN 185/15 has not been used for the assessment.

### Baseline Data Collection

16.2.4. Information on existing baseline air quality conditions within the study area was obtained from the following sources:

- The Highland Council's air quality review and assessment reports<sup>viii</sup>.
- Air quality background concentrations, monitoring data (including scheme specific NO<sub>2</sub> diffusion tube survey), emissions data and Pollution Climate Mapping (PCM) baseline modelling data acquired from the Scottish Environment Protection Agency (SEPA)<sup>ix</sup>, Defra's UK Air Quality Information Resource (UK-AIR)<sup>x</sup> and The Highland Council.
- Designated ecological site information from Magic GIS<sup>xi</sup> and Scottish Natural Heritage (SNH) Information Service<sup>xii</sup>.
- Information on critical loads for nutrient nitrogen of sensitive habitats within the study area was obtained from the Air Pollution Information System (APIS) website<sup>xiii</sup>.

### Impact Assessment

#### Construction Phase

16.2.5. Construction impacts have been considered in qualitative terms, in accordance with industry accepted practice within the IAQM Construction Dust Guidance. Detailed methodology for the assessment is provided in Appendix 16.1.

#### Operation Phase

16.2.6. The air quality assessment consists of:

- determination of the air quality study area;
- discussion of existing baseline conditions, identification of sensitive receptors and constraints;

- assessment of the likely changes in local air pollutant concentrations and nitrogen deposition rates during operation and their significance;
- assessment of the likely changes in regional air pollutant emissions during operation; and
- identification of the need for mitigation measures where appropriate.

16.2.7. For the assessment of operational impacts, DMRB HA207/07 and relevant IANs provide methodologies for undertaking simple and detailed levels of assessment. Given the insignificant changes expected with the Proposed Scheme, a simple level of assessment of the local air quality impacts has been undertaken using the DMRB air quality screening tool methodology detailed in Annex D of DMRB HA207/07. The potential effects on NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> (defined in Appendix 16.1) concentrations at human health receptors, and NO<sub>x</sub> and nitrogen deposition at designated ecological sites in the first full year of operation, has been determined. The total concentrations have been estimated and compared with the AQS objectives for these pollutants, to indicate whether the Proposed Scheme results in any new exceedances of any AQS objective or worsening of existing exceedances. A simple level of assessment has also been undertaken for regional emissions for the first full year of operation and design year.

16.2.8. Traffic data were provided for a base year (2016), to allow verification of the air quality model against scheme specific monitoring, and the first full year of operation (2026).

16.2.9. For assessment of impacts on local air quality, four scenarios were modelled:

- base year (2016);
- projected base year (2026);
- first full year of operation Do-Minimum (2026); and
- first full year of operation Do-Something (2026).

16.2.10. For assessment of impacts on regional emissions assessment scenarios the design year is also included:

- base year (2016);
- first full year of operation Do-Minimum (2026);
- first full year of operation Do-Something (2026);
- design year Do-Minimum (2041); and
- design year Do-Something (2041).

### Local Air Quality Assessment

16.2.11. The assessment of the potential air quality impacts of the Proposed Scheme has been undertaken using the simple assessment method detailed in Annex D of DMRB HA207/07. The method consists of a spreadsheet-based approach to modelling pollutant concentrations at receptor locations.

16.2.12. The DMRB spreadsheet does not contain the most up-to-date version of Defra's Emissions Factors Toolkit (EFT, version 8.0.1, November 2017)<sup>xiv</sup>. The contribution, in µg/m<sup>3</sup> (atmospheric concentration) per g/km/hr (emission), of the traffic on each modelled link to pollutant concentrations at receptors has therefore been calculated using the dispersion equations stated in DMRB HA207/07 Annex C3.2 in combination with the latest EFT values. The emission calculations assumed a Scotland "Motorway –

Not London” road type for all modelled A9 links and Scotland “Rural – Not London” for all other roads.

- 16.2.13. The DMRB model estimates the contribution from road traffic emissions to annual mean concentrations of pollutants at discrete receptors; these concentrations were then combined with estimates of background concentrations (taken from the Defra Background Maps for NO<sub>x</sub>, NO<sub>2</sub> and the ratio of PM<sub>10</sub> to PM<sub>2.5</sub>, and Air Quality in Scotland background maps for PM<sub>10</sub> and derived PM<sub>2.5</sub> for the relevant assessment year), to derive total annual mean concentrations. More detail on the background concentrations used in the modelling is provided in Section 16.3 and Appendix 16.1.
- 16.2.14. Total annual mean NO<sub>2</sub> concentrations were calculated from estimated road NO<sub>x</sub> and background NO<sub>2</sub> concentrations, using the latest version of the ‘NO<sub>x</sub> to NO<sub>2</sub> conversion spreadsheet’ (version 6.1)<sup>xv</sup> available from the Defra UK-AIR website.
- 16.2.15. In addition to the estimated road NO<sub>x</sub> and background NO<sub>2</sub> data, Defra’s NO<sub>x</sub> to NO<sub>2</sub> conversion spreadsheet requires a local authority area to be specified to determine regional oxidant concentrations, and a traffic mix to determine the proportion of primary NO<sub>2</sub>. The local authority specified in the conversion tool was “Highland”; the traffic mix selected was “All non-urban UK traffic” for all roads included in the model.
- 16.2.16. The assessment has been undertaken in accordance with the IAN 170/12 on future NO<sub>x</sub> and NO<sub>2</sub> projections, to account for variations in future year NO<sub>2</sub> predictions<sup>iv</sup>, given the gap between projected vehicle emission reductions and projections on the annual rate of improvements in ambient air quality in Defra’s previously published technical guidance and observed trends. Air quality assessments following Defra LAQM.TG(16) guidance are considered to be overly optimistic in some cases. IAN 170/12 requires that steps are taken to adjust the estimated total NO<sub>2</sub> concentrations from modelling, termed “gap analysis” in order to better reflect future trends.
- 16.2.17. An additional scenario (projected base year) is required to enable the 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 first full year of operation background concentrations. Total NO<sub>2</sub> concentrations for the projected base year are calculated as described above. The results for the first full year of operation are then adjusted using gap analysis to represent the observed long term trend profile.
- 16.2.18. Annual mean NO<sub>2</sub> concentrations based on both Defra LAQM.TG(16) and IAN 170/12 gap analysis factors are presented for comparison in Appendix 16.1. Annual mean NO<sub>2</sub> concentrations based on IAN 170/12 have been used in the core case for determining the impacts of the Proposed Scheme on local air quality.

#### *Calculation of Nitrogen Oxides and Nitrogen Deposition*

- 16.2.19. NO<sub>x</sub> concentrations were estimated within relevant designated ecological sites up to a distance of 200 metres from the existing and new road centreline for comparison against the annual mean AQS objective of 30 µg/m<sup>3</sup>. The assessment was carried out using the IAN 170/12 gap analysis factors and the results are presented in Appendix 16.1.
- 16.2.20. To enable a comparison against critical loads, nitrogen deposition rates for the first full year of operation scenarios have been calculated following DMRB HA207/07 Annex F. The road contribution to nitrogen deposition at each transect receptor was calculated as the difference between the total modelled NO<sub>2</sub> concentration at the receptor and the average background NO<sub>2</sub> concentration, and converted to a nitrogen deposition following DMRB Annex F.



- 16.2.21. The road increment was then added to the average background nitrogen deposition rate available from the APIS website for the relevant 5 km grid square, to give the expected total nitrogen deposition rate at each transect location. The total deposition rate was compared to the relevant critical load for the type of ecosystem present. The change in deposition rate due to the Proposed Scheme was also examined.

#### *Verification*

- 16.2.22. Model verification is the process by which uncertainties in the modelling process are investigated and, wherever possible, minimised. The verification step involves a comparison of model estimated pollutant concentrations with measured values that are representative of the base year assessment (for this assessment, 2016). Verification was undertaken in accordance with Defra Technical Guidance LAQM.TG(16).
- 16.2.23. A scheme specific NO<sub>2</sub> monitoring survey has been undertaken for the purposes of obtaining data suitable for the verification of the model findings (see Section 16.3). Survey locations are provided in Table 16.5 and details of the verification provided in Appendix 16.1.
- 16.2.24. Monitoring of particulate matter is not carried out within the study area; therefore, the model performance for this pollutant has not been verified. This is a common position for many scheme assessments given that the road contribution of particulate matter is much smaller than that of NO<sub>x</sub>. Given the extremely low background particulate matter concentrations in the study area, this is considered to be a proportionate approach relative to the risk.

### **Assessment of Impacts**

#### *Value/Sensitivity*

- 16.2.25. Receptors that are potentially sensitive to changes in air quality are defined in DMRB HA207/07 as residential properties, schools, hospitals and statutory designated ecological sites (containing habitats sensitive to NO<sub>x</sub> and/or nitrogen deposition) located within 200m of the ARN.
- 16.2.26. The following types of designated sites are relevant (where these contain habitats or species sensitive to NO<sub>x</sub> and/or nitrogen deposition): Site of Special Scientific Interest (SSSI), Special Area of Conservation (SAC), Special Protection Area (SPA) and Ramsar sites.

#### *Receptors*

- 16.2.27. Relevant locations with public exposure (including residential, medical and educational premises if present) have been identified from Ordnance Survey MasterMap® data<sup>xvi</sup>. The Magic GIS website and datasets available from Scottish Natural Heritage (SNH) Information Service were used to identify relevant designated ecological sites in the vicinity of the Proposed Scheme and its ARN (SSSI, SAC, SPA and Ramsar sites).
- 16.2.28. Designated ecological sites need only be considered in terms of air quality where they are located within 200m of the Proposed Scheme or ARN. There were 4 designated ecological sites identified within the study area, at Alvie SSSI, River Spey SAC/SSSI, Craigellachie SSSI and Loch Vaa SPA/SSSI. Transects of receptor points from the closest point within the designated site and at set distances of approximately 25m, 50m, 100m, 150m and 200m from the nearest road were assessed. Further details of the designated ecological sites, including habitat types and applicable critical loads are provided in the Baseline (Section 16.3).

- 16.2.29. A total of 17 discrete human health receptors and 13 monitoring locations (8 of which have been used for model verification) were included in the air quality model. The assessed human receptors are listed in Table 16.1 and the designated ecological site transects are listed in Table 3.1 in Appendix 16.1. Both human health and ecological receptors are shown on Figure 16.1.

**Table 16.1: Human Health Receptors**

Receptor	Grid Reference	Description
1	NH8451924204	Slochd, Sandilands, Blackmount - Slochd Road, Carrbridge
2	NH8480723798	4 Slochd Railway Cottages, Blackmount - Slochd Road, Carrbridge
3	NH8967322502	Dunelm, Station Road - Dalnahaitnach, Carrbridge
4	NH9178419086	Croft Of Kinveachy, A95T B9153 Junction - Skye Of Curr Junction, Boat Of Garten
5	NH8929513945	1, Carn Elrig View, Aviemore
6	NH8899611042	Lower Kinakyle, B9152 A9T Sliproad - B970 Junction, Aviemore
7	NH8909611330	3, March Cottage, Grampian Road, Aviemore
8	NH8918411642	17, High Range House, Grampian Road, Aviemore
9	NH9038116725	Avielochan, Avielochan Road, Aviemore,
10	NH9123018435	Meikle Of Kinveachy, A95T B9152 Junction - B9153 Junction, Boat Of Garten
11	NH8997814920	Granish, Shunem Cottage, Granish, B9152 Grampian Road - A95T Junction, Aviemore
12	NH8988415048	Red Stag Lodge, B9152 Grampian Road - A95T Junction, Aviemore
13	NH8785410511	Lynwilg Farm Cottage, Kinrara, B9152 A9T Sliproad - B970 Junction, Aviemore
14	NH8795110426	Farmhouse, Easter Lynwilg, B9152 A9T Sliproad - B970 Junction, Aviemore
15	NH8804710162	Lynwilg Railway Cottages, Lynwilg, B9152 A9T Sliproad - B970 Junction, Aviemore
16	NH8714010168	Loch Alvie, Druim-Mhor, Loch Alvie, B9152 A9T Sliproad - B970 Junction, Aviemore
17	NH9037023083	Bogroy, Dalrachney Road, Carrbridge

### *Magnitude of Change*

- 16.2.30. Evaluation of the significance of the local air quality assessment findings has been undertaken in accordance with IAN 174/13, based on results using IAN 170/12 as the most likely case.
- 16.2.31. Descriptors for magnitude of impact due to changes in ambient concentrations of NO<sub>2</sub> and PM<sub>10</sub> are provided in the IAN 174/13. Current DMRB assessment guidance does not require the assessment of PM<sub>2.5</sub>, and so PM<sub>2.5</sub> is not addressed within IAN 174/13. As there is an annual mean objective for PM<sub>2.5</sub> in Scotland, criteria set out in IAN174/13 for the assessment of change to annual mean concentrations of NO<sub>2</sub> and PM<sub>10</sub> have also been applied to PM<sub>2.5</sub>.

- 16.2.32. The changes in magnitude, which are based on an assumed measure of uncertainty (MoU) of 10%, may be described as 'small', 'medium', 'large' or 'imperceptible', depending on the change in concentration relative to the air quality criterion.
- 16.2.33. Table 16.2 presents magnitude of change criteria for application to annual mean pollutant concentrations. According to IAN 174/13, only those receptors that are at a reasonable risk of exceeding relevant air quality thresholds need to be considered when determining significance.
- 16.2.34. In line with guidance within IAN174/13, the magnitude categories within Table 16.2 have also been applied to changes in annual mean concentrations of NO<sub>x</sub> for the assessment of designated ecological sites.

**Table 16.2: Magnitude of Change Criteria for Local Air Quality**

Magnitude of change in concentration	Percentage change in annual mean NO <sub>x</sub> , NO <sub>2</sub> , PM <sub>10</sub> and PM <sub>2.5</sub>
Large	Greater than full MoU value of 10% of the air quality objective
Medium	Greater than half of the MoU value of 5%, but less than the full MoU of 10% of the air quality objective
Small	More than 1% of objective and less than half of the MoU i.e. 5%. The full MoU is 10% of the air quality objective
Imperceptible	Less than or equal to 1% of objective

### *Impact Significance*

- 16.2.35. According to IAN 174/13, only those receptors that are at a reasonable risk of exceeding relevant air quality thresholds need to be considered when determining significance. The assessment of significant air quality impacts is therefore only applied to receptors where air quality thresholds are exceeded in either the Do-Minimum (without Proposed Scheme) and/or Do-Something (with Proposed Scheme) scenarios.
- 16.2.36. In order to assess the significance of impacts for annual mean NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>, the number of receptors that fall within the 'small', 'medium' and 'large' magnitude of change categories is calculated and compared to the guidelines presented in Table 16.3 (note, an imperceptible magnitude of change is not considered to result in a significant impact).
- 16.2.37. As outlined in IAN 174/13, for the determination of significance for NO<sub>x</sub> impacts on designated ecological sites, where the difference in concentrations is less than 0.4 µg/m<sup>3</sup> for annual average NO<sub>x</sub> then the change at this receptor is considered to be 'imperceptible' and can be scoped out of the judgement on significance.

**Table 16.3: Guideline to Number of Receptors Constituting a Significant Impact for Air Quality**

Magnitude of change in concentration	Number of receptors with	
	Worsening of air quality objective already above objective or creation of a new exceedance	Improvement of an air quality objective already above objective or the removal of an existing exceedance
Large	1 to 10	1 to 10
Medium	10 to 30	10 to 30
Small	30 to 60	30 to 60



### *Compliance with EU Directive on Ambient Air Quality*

- 16.2.38. An assessment of whether the Proposed Scheme may impact on the risk of non-compliance with the EU Directive on ambient air quality is required in accordance with IAN 175/13.
- 16.2.39. PCM model link data were obtained from Defra's UK Ambient Air Quality Interactive Map for the Proposed Scheme air quality study area. The PCM model link data were overlaid with the Proposed Scheme local air quality ARN to determine the Compliance Risk Road Network (CRRN).
- 16.2.40. There are no PCM model links within the study area and therefore no assessment of compliance risk could be undertaken. This is in accordance with IAN 175/13, which states that "where the two road networks intersect, only this subset of the road network should be used to inform the compliance risk". No further assessment is therefore required as it can be concluded that there is no risk of the Proposed Scheme being non-compliant with the EU Directive on ambient air quality.

### *Regional Emissions Assessment*

- 16.2.41. A regional assessment was undertaken in accordance with DMRB HA207/07 to determine the pollutant emissions for the affected road network for the base year, first full year of operation and design year. Emission calculations were undertaken using the Defra's EFT, version 8.0.1, to ensure the use of the latest vehicle emissions factors.
- 16.2.42. The pollutants included in this assessment were CO<sub>2</sub>, NO<sub>x</sub> and particles (including PM<sub>10</sub> and PM<sub>2.5</sub>). Emissions of CO and hydrocarbons have not been calculated as these pollutants are no longer included in current vehicle emission factors supported by Defra and DfT.

### **Limitations of the Assessment**

- 16.2.43. A simple level of assessment of the impacts on local air quality using the DMRB air quality screening tool detailed in Annex D of DMRB HA207/07 has been undertaken. The spreadsheet-based model uses a simple distance drop off calculation to estimate pollutant concentrations at receptor locations. The model has been combined with the latest emission factors and other supporting tools.
- 16.2.44. The model does not take meteorological conditions into account, specifically wind speed or road alignment relative to wind direction. The extent of the ARN and road emissions may have been underestimated given the use of HGV data (excludes buses and coaches) as opposed to HDV data (all vehicles >3.5tn). Model verification and adjustment has however, been undertaken to minimise uncertainties in the modelling and correct for bias in the calculation. Given the extremely low background concentrations in the study area and lack of PCM model links above the air quality limit values, this is considered to be a proportionate approach relative to the risk.

## **16.3. Baseline Conditions**

### **Local Air Quality Management**

- 16.3.1. The Proposed Scheme lies within the administrative boundaries of The Highland Council. The Highland Council has declared one AQMA within Inverness city centre due to exceedances of the NO<sub>2</sub> annual mean AQS objective. The AQMA incorporates two properties and is located approximately 25km to the northwest of the Proposed Scheme.

It is not expected to be affected by changes in traffic associated with the Proposed Scheme or its ARN.

- 16.3.2. The 2017 Air Quality Annual Progress Report concluded that no other exceedances of the relevant AQS objectives were identified at other monitoring locations within The Highland Council area.

### Air Quality Monitoring

- 16.3.3. Measurements of pollutant concentrations can be made by using analytical instruments that can measure across a continuous time frame and record average, minimum and maximum concentrations over specified periods. Simpler sampling equipment, such as passive diffusion tubes, absorb pollutants over a longer time period and are subsequently analysed at an accredited laboratory to give an average concentration over the course of the monitoring term.
- 16.3.4. Survey results from continuous monitoring are made available on UK-AIR and the Air Quality in Scotland website<sup>xvii</sup> whereas results from local passive monitoring are available through The Highland Council. There is no ongoing continuous or passive monitoring in the immediate vicinity of the Proposed Scheme and its ARN.
- 16.3.5. The closest continuous monitoring location relative to the Proposed Scheme is at a roadside site within Inverness city centre, approximately 25 km to the northwest of the Proposed Scheme (Telford Street). The site is included within the UK Automatic Urban and Rural Network (AURN). A new continuous monitoring station was installed at Queensgate (within the AQMA) in September 2016. The most recent monitoring data for the sites, taken from The Highland Council 2017 Annual Progress Report and the Air Quality in Scotland website are presented in Table 16.4 below for NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. In all cases the AQS objectives were met indicating that within the more rural Proposed Scheme study area the AQS objectives are also likely to be met.

**Table 16.4: Continuous monitoring results from Telford Street, Inverness ( $\mu\text{g}/\text{m}^3$ )**

	Pollutant	2010	2011	2012	2013	2014	2015	2016
<b>Annual mean concentration</b>								
Inverness, Telford Street	Nitrogen Dioxide ( $\text{NO}_2$ )	24.5 <sup>^</sup>	27.0	29.2	21.0	21.0	25.3	26.4
Inverness, Queensgate								36.8 <sup>^</sup>
Annual Mean Objective		40 $\mu\text{g}/\text{m}^3$						
Inverness, Telford Street	Particulate Matter ( $\text{PM}_{10}$ )	14.0	11.8	11.0	11.7	10.9	9.0	8.6
Annual Mean Objective		18 $\mu\text{g}/\text{m}^3$						
Inverness, Telford Street	Particulate Matter ( $\text{PM}_{2.5}$ )	7.0	6.0	6.0	6.0	6.0	5.0	4.8
Annual Mean Objective		10 $\mu\text{g}/\text{m}^3$						
^Data capture <90%.								
<b>Short term mean concentrations (exceedances of the standard)</b>								
Inverness, Telford Street	Nitrogen Dioxide ( $\text{NO}_2$ )	0	0 (118)	0	0	0	0 (106)	0
Inverness, Queensgate								0 (115)
Hourly Mean Objective		200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times per year						
Inverness, Telford Street	Particulate Matter ( $\text{PM}_{10}$ )	0	2 (24.9)	1	0	0	0	0
Daily Mean Objective		50 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 7 times per year						
Where the data capture was less than 90% the relevant percentile displayed in brackets								

### *Scheme Specific Baseline Monitoring*

- 16.3.6. DMRB HA207/07 requires the consideration of whether there is sufficient existing monitoring data to assess the impact of the Proposed Scheme against a baseline. At present, no existing permanent monitoring is undertaken within 200m of the Proposed Scheme or within 1km of the local air quality study area.
- 16.3.7. DMRB HA207/07 recommends that if there are insufficient monitoring data within the study area, passive diffusion tubes for  $\text{NO}_2$  should be deployed as a minimum. A six month survey is considered a representative period of time to allow for seasonal variability, provided data is annualised.
- 16.3.8. As such, a six month baseline air quality monitoring survey commenced on 20<sup>th</sup> November 2015 and ended on 25<sup>th</sup> May 2016. The diffusion tubes used in the survey were the same type as used by The Highland Council, i.e. 20% TEA (triethanolamine) in water, supplied by Gradko Ltd, in order to ensure consistency between results.
- 16.3.9. Results from the six month baseline monitoring survey were annualised using data from three background AURN monitoring sites (Aberdeen, Dundee and Fort William), in accordance with Defra guidance within LAQM.TG16. Following annualisation, the baseline monitoring survey results were bias corrected by applying the national bias adjustment factor obtained from the National Diffusion Tube Bias Adjustment Factor

Spreadsheet<sup>xviii</sup> (a database of bias adjustment factors determined from local authority co-location studies throughout the UK).

- 16.3.10. Monitoring locations are shown on Figure 16.1. Details and annualised mean concentrations for 2016 for each location are presented in Table 16.5. Details of the annualisation process are provided in Table 1.6 in Appendix 16.1. The adjusted, annualised concentrations at all the diffusion tube sites were below the air quality criterion for NO<sub>2</sub>.

**Table 16.5: Scheme Specific NO<sub>2</sub> Monitoring Locations and 2016 annual mean**

ID	Grid Reference	Height (m)	Site Type	Description	2016 Annual Mean (µg/m <sup>3</sup> )
1	NH8101627078	2.8	Background	Drumbain Cottage	2.3
2	NH8285626206	2.6	Roadside	Slochd Summit Layby 152	11.7
3	NH8475223913	2.4	Roadside	Slochd Mhor Lodge	3.9
4	NH8633023890	2.8	Roadside	A9 Layby 149	8.5
5	NH9066322909	2.8	Roadside	Station Road, Bogroy / Carrbridge	7.3
6	NH9246319161	2.9	Background	Deshar Primary School	5.4
7	NH9100118175	2.8	Roadside	A9 Layby 137	13.7
8	NH9052916708	2.8	Roadside	Leading to Avielochan	11.0
9	NH8965513746	2.9	Roadside	Jct of Grampian Rd and Grampian View, Aviemore	14.6
10	NH8959612841	2.8	Roadside	Adjacent to 8, Myrtlefield, Aviemore	14.5
11	NH8910311388	2.3	Roadside	Road near Craig Dhu, March Cottage & Lagnacallich	9.0
12	NH8818410677	2.4	Roadside	Alltnacriche Hostel	3.9
13	NH8649109084	2.8	Roadside	Alvie / Loch Beag / Glebe Cottage	9.0

## Emission Sources

- 16.3.11. The UK National Atmospheric Emissions Inventory (NAEI) provides source sector emissions data by 1km squares for local authorities<sup>xix</sup>. To provide context to the study area, NO<sub>x</sub> and PM<sub>10</sub> emissions by source sector are presented in Table 16.6 for an average of the grid squares in which the Proposed Scheme is located, between Slochd and Dalraddy. Emissions of NO<sub>x</sub> and PM<sub>10</sub> are primarily attributable to road transport (around two thirds of total).

**Table 16.6: Emissions of Air Pollutants in 2015 (tonnes) from Different Sectors**

Source Sector	NO <sub>x</sub> (tonnes)	NO <sub>x</sub> % of total	PM <sub>10</sub> (tonnes)	PM <sub>10</sub> % of total
01 – Combustion in energy production and transfer	<0.01	<1	0.50	3
02 – Combustion in commercial, institutions, residential and agricultural sectors	4.13	5	3.70	19
03 – Combustion in industry	16.34	18	9.78	49
04 – Production processes	<0.01	<1	0.26	1
05 – Extraction / Distribution of Fossil Fuels	N/A	N/A	N/A	N/A
06 – Solvent Use	N/A	N/A	0.02	<1
07 – Road transport	55.61	62	3.91	20
08 – Other transport and machinery	13.71	15	0.90	5
09 – Waste treatment and disposal	0.03	<1	0.26	1
10 – Agricultural, forests and land use change	N/A	N/A	0.21	1
11 – Other sources and sinks	0.10	<1	0.30	2

## Ecological Designations

- 16.3.12. All 4 designated ecological sites contain habitats sensitive to NO<sub>x</sub> and nitrogen deposition. Critical loads for nitrogen deposition are available from the APIS website. The recommended UNECE critical loads for the main habitat type have been selected. The critical loads for nitrogen deposition along with background nitrogen deposition and NO<sub>x</sub> at the designated ecological sites considered in the assessment are shown in Table 16.7.
- 16.3.13. The River Spey SAC/SSSI is included in the table as the rivers and streams habitat is stated on APIS as being potentially sensitive to nitrogen. There are, however, no critical loads available for the River Spey. Source apportionment data available on APIS indicates that in 2012 Scottish road transport contributed just 2% of the total nitrogen deposition within the designated site, with Scottish livestock contributing 28%. Any increase in nitrogen deposition resulting from an increase in atmospheric NO<sub>x</sub> due to the Proposed Scheme is considered to be immaterial when considered in relation to local agricultural sources and the nature of the habitat which is a free-flowing water course with a large buffering capacity. Given the above and following discussion with the project ecologists change to nitrogen deposition as a result of the Proposed Scheme is not considered to be of concern within the site. The River Spey is therefore not considered further within the assessment.



**Table 16.7: Critical loads for nutrient nitrogen and background nitrogen deposition**

Designated Site	Habitat Type of Species	Critical Load (kg N ha <sup>-1</sup> yr <sup>-1</sup> )	Average Background Nitrogen Deposition* (kg N ha <sup>-1</sup> yr <sup>-1</sup> ) <sup>^</sup>	2016 Average Background NO <sub>x</sub> (µg/m <sup>3</sup> )
Alvie SSSI	Valley mires, poor fens and transition mires	10-15	4.2	3.0
	Upland oak woodland	10-15	7.3	3.0
Craigellachie SSSI	Upland birch woodland	10-15	8.3	3.0
Loch Vaa SPA/SSSI	Broadleaved deciduous woodland (SPA habitat of Common Goldeneye)	10-20	8.5	3.0
River Spey SAC/SSSI	Rivers and streams	n/a	6.8	3.0

\*Nitrogen deposition varies by land cover type, with habitats with a larger surface area of vegetation (e.g. woodland) having higher deposition.  
<sup>^</sup>The background nitrogen deposition rate was taken from the APIS website (based on a 3-year mean for 2013-15).

## Background Concentrations

- 16.3.14. Maximum, minimum and average adjusted background concentrations for the study area for the years 2016 (base year) and 2026 (first full year of operation) are given in Table 16.8 and Table 16.9 for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. Unadjusted background concentrations are also provided for comparison. Details of sector removal and adjustment of the background maps is provided in Appendix 16.1. The study area comprises 40 grid squares from the northern most grid square 282500, 826500 to southern most grid square 285500, 809500.

**Table 16.8: 2016 Annual Mean Background Concentrations (µg/m<sup>3</sup>)**

	Unadjusted				Adjusted (Sectors Removed)			
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Minimum	2.8	2.3	5.4	3.6	2.4	1.9	5.4	3.6
Maximum	6.3	5.0	8.5	6.3	5.3	4.2	8.5	6.3
Average	3.6	2.9	5.9	4.0	2.8	2.3	5.9	4.0

**Table 16.9: 2026 Annual Mean Background Concentrations (µg/m<sup>3</sup>)**

	Unadjusted				Adjusted (Sectors Removed)			
	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	NO <sub>x</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Minimum	1.9	1.6	5.2	3.4	1.8	1.4	5.2	3.4
Maximum	4.8	3.8	8.2	6.0	4.4	3.5	8.2	6.0
Average	2.4	2.0	5.7	3.8	2.1	1.7	5.7	3.8

- 16.3.15. Mapped and measured concentrations at background locations in the vicinity of the ARN suggest that air quality in the immediate vicinity of the ARN is likely to be very good. Results from the scheme specific air quality survey show that the concentrations at

properties in the immediate vicinity of the Proposed Scheme are less than a quarter of the AQS objectives.

## 16.4. Potential Impacts

### Construction

- 16.4.1. The screening stage of the construction dust assessment showed that there are a number of 'human receptors' within 350m of the site boundary. These include residential dwellings, places of work and places of worship located in:
- Allt-na-Criche;
  - Aviemore;
  - Avielochan;
  - Ellan;
  - Granish;
  - Kinveachy; and
  - Slochd.
- 16.4.2. There is also a Primary School within 350m of the Site boundary located in Aviemore.
- 16.4.3. There are three relevant designated ecological sites (Alvie SSSI, River Spey SAC/SSSI and Craigellachie SSSI) within 50m of the site boundary.
- 16.4.4. There are no sensitive human receptors within 50m of the likely haul roads (assumed to be the A9), however there is one designated ecological site within 50m of the likely haul roads.
- 16.4.5. Figure 16.2 shows the 350m buffer around the site boundary and the 50m buffer around routes likely to be used by construction vehicles accessing and egressing the site up to 500m from the assumed entrances to the construction site.

### Dust Assessment

- 16.4.6. Having established the requirement for assessment, the dust emission magnitudes for the four IAQM activity categories, demolition, earthworks, construction and trackout (transport of dust and dirt onto the public road network), were determined. Where detailed information was not available, a precautionary approach was taken. It should also be noted this is a worst case assessment in that it is conservatively assumed all construction occurs at once while in practice it will be phased.
- 16.4.7. The estimated volume of reinforced concrete structures to be demolished as a result of the scheme is 600m<sup>3</sup>, well below the suggested threshold value (20,000m<sup>3</sup>) in the IAQM Construction Dust Guidance. These are expected to be less than 10m above ground level, therefore, although involving a potentially dusty material, the dust emission magnitude for demolition is defined as 'small'.
- 16.4.8. Earthworks activities associated with the Proposed Scheme may include excavating of vegetation/soils/rock, haulage, tipping and stockpiling as part of the landscaping and levelling of land. The majority of the construction area (>10,000m<sup>2</sup>), will require some form of earthworks). The earthworks dust emission magnitude is therefore classified as 'large'. This is a precautionary approach as it uses the entire area of earthworks whereas that which could affect an individual receptor will be much smaller.

- 16.4.9. As the construction area measures approximately 2.5km<sup>2</sup>, the associated dust emission magnitude for construction is also classified as 'large'. This is again a precautionary approach as the area relevant to an individual receptor will be much smaller.
- 16.4.10. The peak offsite HDV (>3.5 tonne) movements are expected to be greater than 50 movements per day, therefore the dust emission magnitude for trackout is classified as 'large'.
- 16.4.11. The dust emission magnitude derived for each activity is summarised in Table 16.10.

**Table 16.10: Dust Emission Magnitude for the Proposed Development**

Activity	Dust Emission Magnitude
Demolition	Small
Earthworks	Large
Construction	Large
Trackout	Large

- 16.4.12. The sensitivity of the surrounding area to potential dust soiling and human health impacts takes into account the:
- sensitivity of receptors;
  - distance to dust source;
  - background PM<sub>10</sub> concentrations; and
  - number of affected receptors.
- 16.4.13. The majority of human receptors identified are classed as highly sensitive to both dust soiling impacts and health impacts of dust emissions.
- 16.4.14. As there are between 10 and 100 highly sensitive receptors within 20m of the site boundary, the sensitivity of the surrounding area to dust soiling is classed as 'high' for demolition, earthworks and construction. There are no sensitive receptors within 50m of the trackout route and therefore it has not been addressed further.
- 16.4.15. As background PM<sub>10</sub> concentrations, taken from Defra background maps, are expected to be below 14 µg/m<sup>3</sup> during construction and again there are between 10 and 100 highly sensitive receptors within 20m of the site boundary, the sensitivity of the surrounding area to human health impacts is classed as 'low' for these activities.
- 16.4.16. Sensitive receptors within 20m of the site boundary include 20 residential properties, the closest of which is located approximately 5m from the site boundary at Sandilands, Blackmount. As there are sensitive ecological sites within 20m of the Site boundary (River Spey SAC/SSSI, Craigellachie SSSI and Alvie SSSI) and construction vehicle route (Alvie SSSI), the sensitivity of the surrounding area to ecological impacts is classed as 'high'.
- 16.4.17. The area sensitivity is summarised in Table 16.11.

**Table 16.11: Sensitivity of the Surrounding Area**

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling	High	High	High	N/A
Human Health	Low	Low	Low	N/A
Ecological	High	High	High	High

16.4.18. Table 16.12 presents a summary of the overall dust risks associated with each activity before mitigation measures are applied. There is a 'high' risk of dust soiling impacts, a 'low' risk of human health impacts and a 'high' risk of ecological impacts.

**Table 16.12: Summary of Risk of Dust Soiling and Ecological and Human Health Impacts**

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Low Risk	Medium Risk	Medium Risk	N/A
Human Health	Negligible	Low Risk	Low Risk	N/A
Ecological	Medium Risk	High Risk	High Risk	High Risk

- 16.4.19. Taking the highest risk rating for the potential impacts identified, as suggested by the IAQM guidance, mitigation measures for a 'high' risk construction site are deemed appropriate to manage potential dust impacts on the surrounding area for all construction activities. It should be noted this is a worst case assessment that conservatively assumes all construction occurs at the same time along the whole route. Instead, activities will likely be phased. Phasing will be determined by the appointed contractor; therefore, further details are not currently available.
- 16.4.20. It should also be noted that the 'high risk' applies only to sensitive receptors and the areas of the designated ecological sites within 20m of the site boundary. Given the small number of sensitive receptors affected and the small area (relative to the total designated site area) affected by the 'high risk' category and the very low particulate concentrations in the area, it is considered appropriate to apply mitigation measures for a 'medium' risk construction site. It is however, recommended that the conclusion is verified once more detailed information is available and mitigation measures commensurate with the risk are applied.
- 16.4.21. It is anticipated that with the implementation of effective site-specific mitigation measures the effect of emissions associated with dust raising activities will not be significant.

### Construction Emissions

- 16.4.22. There may be a temporary increase in local air pollutant concentrations in the vicinity of the site, due to exhaust emissions from plant used on the construction site. Typical plant could include excavators of various sizes for cutting and filling operations, pilling rigs, bulldozers, and pavers and rollers for laying the road surface and compacting. The emissions temporarily generated by such plant are likely to be substantially less than those generated by traffic on the roads in the area. They are therefore not considered to have the potential to result in a significant impact on local air quality. No significant impact is therefore predicted.
- 16.4.23. In the UK, the Non-Road Mobile Machinery (Emission of Gaseous and Particulate Pollutants) Regulations 1999, as amended, govern emissions produced by engines fitted in construction plant.

- 16.4.24. Changes in vehicle emissions due to construction traffic movements and any temporary traffic diversions are not considered to have the potential to result in a significant impact on local air quality because:
- the current background concentrations surrounding the Proposed Scheme are well within the respective AQS objectives; and
  - the number of construction vehicles likely to be attending the site during the construction period (averaged over an annual period) is relatively small in relation to existing annual average daily HGV flows on the A9.

## Operation

### Local Air Quality

- 16.4.25. Verification of the 2016 base model has been undertaken through a comparison of modelled concentrations against the measured values at eight monitoring sites in the study area (see Table 1.10 in Appendix 16.1 and Figure 16.1). Model adjustment factors were derived for two domains; those locations adjacent to the A9 and A-Roads, and those locations within the settlement of Aviemore. The adjusted model gives a sufficiently improved overall performance that can be deemed satisfactory in accordance with LAQM.TG(16).
- 16.4.26. The estimated road contributions to concentrations at receptors have been combined with background concentrations to derive estimates of total annual mean concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub>. The results have been compared with relevant air quality thresholds to determine whether there are likely to be any exceedances of relevant AQS objectives. Annual mean NO<sub>2</sub> concentrations used in the core case are based on the IAN 170/12 gap analysis situation. The significance of changes in concentrations has been evaluated in line with IAN 174/13. Results are presented in detail in Appendix 16.1 Table 2.1 to Table 2.3.
- 16.4.27. There are no exceedances of the NO<sub>2</sub>, PM<sub>10</sub> or PM<sub>2.5</sub> AQS objectives at any human receptor in the base year or first full year of operation with and without the Proposed Scheme.
- 16.4.28. As concentrations at all receptors are below the AQS objectives in all scenarios, in accordance with IAN 174/13, the impact on local air quality can be assessed as 'not significant'.

### Designated Ecological Sites

- 16.4.29. The assessment has shown that there are no exceedances of the annual mean NO<sub>x</sub> AQS objective of 30 µg/m<sup>3</sup> for the protection of vegetation either with and without the Proposed Scheme at all locations within Craigellachie SSSI and Loch Vaa SPA/SSSI. In accordance with IAN 174/13, the impact on these designated ecological sites can be assessed as 'not significant'. Results are presented in Appendix 16.1 Table 3.1 to 3.4.
- 16.4.30. Of the designated ecological sites assessed, only one is modelled to have an exceedance of the annual mean AQS objective for NO<sub>x</sub> of 30µg/m<sup>3</sup>. This occurs at the closest point to the road on the Alvie SSSI transect, approximately 11m from the A9 centreline. The change in annual mean NO<sub>x</sub> concentration at this receptor (E1) is considered to be 'Large' according to IAN 174/13 (i.e. change greater than 3 µg/m<sup>3</sup>). The receptor moves further from the road centreline with the Scheme, however there is a considerable increase in traffic flow on the adjacent road link.



- 16.4.31. The maximum total nitrogen deposition calculated within Alvie SSSI for a habitat type of valley mires, poor fens and transition mires is estimated to be  $4.5 \text{ kg N ha}^{-1} \text{ yr}^{-1}$  (E1), or less than half the most stringent critical load of  $10 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ . This is the same as the upland oak woodland at the location which also has a lower critical load of  $10 \text{ kg N ha}^{-1} \text{ yr}^{-1}$ . The change in nitrogen deposition modelled as a result of the scheme is equal to 6% of the critical load of both habitats.
- 16.4.32. Given that the total nitrogen deposition rate is below the relevant critical loads, and following discussion with the project ecologists, the impact on sensitive habitats within Alvie SSSI can also be assessed as 'not significant'.

## Regional Emissions

- 16.4.33. Emissions from roads included in the regional assessment study area have been estimated for  $\text{CO}_2$ ,  $\text{NO}_x$ ,  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  in the base year (2016) and with and without the Proposed Scheme in both the first full year of operation (2026) and the design year (2041). The results are presented in Appendix 16.1 (Table 4.1) and are discussed below.
- 16.4.34. In 2026, the changes in regional air pollutant emissions due to the Proposed Scheme are expected to result in an increase of between 52% and 79% when compared to the Do Minimum scenario. This is due to an expected 52% increase in vehicle kilometres travelled in the Do-Something scenario.
- 16.4.35. By 2041, the Proposed Scheme is expected to result in an increase in emissions of all pollutants by between 51% and 78%, compared to the equivalent Do Minimum. This is again due to the 51% increase in vehicle kilometres travelled.
- 16.4.36. When compared to the 2016 base year, emissions of  $\text{NO}_x$  reduce across all scenarios. Emissions for both  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  in the Do Minimum in the first full year of operation are reduced when compared with the base year, however only  $\text{PM}_{2.5}$  reduces in 2041 when compared to the base.
- 16.4.37. For the greenhouse gas  $\text{CO}_2$ , increases in emissions relative to the 2016 base year are calculated for all scenarios. Whilst the magnitude of change relative to the 2016 base year may appear substantial, in terms of mass emissions the change due to the Proposed Scheme can be considered small within the context of national emissions (presented in Appendix 16.1). The change in  $\text{CO}_2$  emissions with the scheme represents approximately 0.03% of the total reported national emissions of  $\text{CO}_2$  in 2015<sup>xx</sup>).

## 16.5. Mitigation

### Mitigation during Construction

- 16.5.1. Mitigation measures to control dust during construction will be specified within contract documentation and incorporated into a Construction Environmental Management Plan (CEMP), which would be prepared by the Contractor in advance of any construction works. Suitable mitigation measures to be employed for a 'medium' risk category site have been identified from the IAQM Dust Guidance and are provided in Appendix 16.1. These mitigation measures are applied more generally in the Chapter 21 (Schedule of Environmental Commitments) including general standard construction mitigation items SMC-S1, SMC-S2 and SMC-S3 as well as standard air quality items SMC-AQ1, SMC-AQ2 and SMC-AQ3. The precise measures to be employed will depend on intended construction operations, phasing and location, and should reflect that the assessment shown is very worst case.

16.5.2. The below table details standard mitigation measures to minimise impacts as far as possible.

**Table 16.13: Air Quality Mitigation**

Mitigation Item	Description
SMC-AQ1	<p>In relation to minimising fugitive dust emissions from earthworks, material storage and concrete batching the following mitigation items will be implemented:</p> <ul style="list-style-type: none"> <li>• stockpiles and mounds will be at a suitable angle of repose to prevent material slippage, will be enclosed or securely sheeted, and/or kept damped as necessary during dry weather;</li> <li>• the surfaces of any long-term stockpiles which give rise to a risk of dust or air pollution will be covered with appropriate sheeting or will be treated to stabilise the surfaces;</li> <li>• mixing of large quantities of concrete will be carried out only in enclosed or shielded areas;</li> <li>• all handling areas will be maintained in a dust free state as far as is practicable with sprinklers and hoses used to prevent dust escaping from the site boundaries; and</li> <li>• procedures will be established so that the site is regularly inspected for spillage of dusty or potentially dusty materials and any such spillage would be dealt with promptly where necessary to prevent dust nuisance.</li> </ul>
SMC-AQ2	<p>In relation to minimising dust from vehicle movements within the site the following mitigation items will be implemented:</p> <ul style="list-style-type: none"> <li>• the Contractor will employ appropriate measures, such as covering materials deliveries or loads entering and leaving the construction site by a fixed cover or sheeting appropriately fixed and suitable for the purposes of preventing materials and dust spillage;</li> <li>• where unsurfaced routes are identified as creating dust emissions during periods of dry weather, surfaces will be regularly dampened down using water bowsers; and</li> <li>• appropriate speed limits will be established and enforced over all unmade surfaces.</li> </ul>
SMC-AQ3	<p>In relation to appropriate cleaning of public roads the following mitigation items will be implemented:</p> <ul style="list-style-type: none"> <li>• the edges wheel washing facilities will be installed as required and heavy vehicles will be required to use the facilities prior to leaving the site;</li> <li>• subject to approval from Transport Scotland and the network operator, public roads immediately outside the site entrance will be cleaned using vacuum sweeper brushes and other specialised road cleaning equipment as necessary to maintain an appropriate state of cleanliness; and</li> <li>• roads and footpaths adjacent to the proposed scheme will be cleaned, with damping if necessary.</li> </ul>
P11-AQ4	<p>Suitable mitigation measures to be employed for a 'medium' risk category site have been identified from the IAQM Construction Dust Guidance.</p>
SMC-S1	<p>A Construction Environmental Management Plan (CEMP) will be prepared by the Contractor. The CEMP will set out how the Contractor intends to operate the construction site, including construction-related mitigation measures identified below in Tables 21.2 to 21.11. The relevant section(s) of the CEMP will be in place prior to the start of construction work.</p> <p>The CEMP will include, but not be limited to, subsidiary plans relating to: agricultural soils, geology and land contamination; surface water and groundwater (including a Flood Response and Pollution Incident Response Plan); ecology (including specific Species and Habitat Management Plans); landscape, cultural heritage, air quality and noise and vibration.</p>

Mitigation Item	Description
SMC-S2	Prior to construction an Environmental Coordinator and team of suitably qualified Environmental Clerk of Works (EnvCoW) (i.e. professionally qualified in a relevant environmental discipline) will be appointed by the Contractor. The EnvCoW(s) will report to the Environmental Coordinator and be present on site, as required, during the construction period to monitor the implementation of the mitigation measures identified and ensure that activities are carried out in such a manner to prevent or reduce impacts on the environment.
SMC-S3	Throughout the construction period the Contractor will, as required, contribute towards the overall communications strategy for the A9 Dualling Programme. As part of this the Contractor will appoint a Community Liaison Officer supported by a liaison team as necessary who will: <ul style="list-style-type: none"> <li>• liaise with the following: relevant local authorities; other statutory bodies and regulatory authorities; community councils and relevant community groups; and businesses and residents in local communities affected by the construction works;</li> <li>• notify occupiers of nearby properties a minimum of two weeks in advance of the nature and anticipated duration of planned construction works that may affect them;</li> <li>• support the production of project communications such as the project website and newsletters; and</li> <li>• establish a dedicated freephone telephone helpline together with a dedicated email address and postal address for enquiries and complaints during the construction phase. The relevant contact numbers, email and postal addresses will as a minimum be displayed on signs around the construction site and will be published on the project website. Enquiries and complaints will be logged in a register and appropriate action will be taken in response to any complaints.</li> </ul>

- 16.5.3. Ensuring the use of established good site management practices, including where appropriate the proposed measures, should effectively control and minimise dust generation such that there will be no significant dust impacts beyond the site boundary

### Mitigation during Operation

- 16.5.4. The air quality assessment indicates that the Proposed Scheme would not result in any new exceedances of AQS objectives or worsening of existing exceedances. No air quality mitigation for the operational phase of the Proposed Scheme is therefore required.

## 16.6. Residual Impacts

- 16.6.1. Construction dust impacts will be managed through the application of suitable mitigation and management techniques commensurate with the dust risk category.
- 16.6.2. There is not predicted to be a significant impact on local air quality as a result of construction traffic. No mitigation measures other than standard mitigation measures are therefore considered necessary.
- 16.6.3. There are no significant changes in concentrations of NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> as a result of the Proposed Scheme at human health receptors.
- 16.6.4. There are no significant changes in concentrations of NO<sub>x</sub> or nitrogen deposition as a result of the Proposed Scheme at ecological receptors that are tied to exceedances of limit values or critical loads.

- 16.6.5. There will be an increase in regional emissions due to an increase in vehicle kilometres travelled. The changes in regional emissions of CO<sub>2</sub> can be considered to be insignificant when put in the context of regional or national emissions.
- 16.6.6. A summary of the Proposed Scheme in relation to national and local policy objectives is provided in Chapter 19 Policies and Plans. The Proposed Scheme is compliant with the objectives of both local and national air quality policy objectives.

<sup>i</sup> Scottish Government (2007), Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 1 Air Quality (HA207/07).

<sup>ii</sup> IAQM (2014), Guidance on the assessment of dust from demolition and construction [v1.1 updated 01/06/16]. <http://iaqm.co.uk/text/guidance/construction-dust-2014.pdf>

<sup>iii</sup> Defra (2018) Local Air Quality Management Technical Guidance (LAQM.TG (16)).  
<http://laqm.defra.gov.uk/documents/LAQM-TG16-February-18-v1.pdf>

<sup>iv</sup> Highways England (2013), IAN 170/12 v3 Updated air quality advice on the assessment of future NO<sub>x</sub> and NO<sub>2</sub> projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality.

<sup>v</sup> Highways England (2013), IAN 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 Air Quality (HA207/07).

<sup>vi</sup> Highways England (2013), IAN 175/13 Updated advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for users DMRB HA207/07.

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