

Chapter 18: Air Quality

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Glossary of Terms

Air Quality Standard	Concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to indicate whether air pollution is getting better or worse.
Air Quality Objective	An objective is the target date on which exceedences of a Standard must not exceed a specified number.
Annual Average Daily Traffic (AADT)	The total volume of vehicle traffic of a highway or road divided by 365 days.
Deposited Dust	Dust that is no longer in the air and which has settled out onto a surface.
Disamenity	Nuisance caused by an activity such as noise, odour, litter, vermin, visual intrusion and associated perceived discomfort.
Dust	Solid particles that are suspended in air, or have settled out onto a surface after having been suspended in air.
Dust Generating Activity	Any site activity which has the potential to result in the generation of dust emissions to atmosphere.
Dust Soiling	The effect of deposited dust upon surfaces, which can lead to annoyance.
Impacts	The changes in airborne concentrations and/or dust deposition. A scheme can have an 'impact' on airborne dust without having any 'effects', for instance if there are no receptors to experience the impact.
Effects	The consequences of the changes in airborne concentrations and/or dust deposition for a receptor.
Fugitive Dust	Fugitive emissions are those which are not collected and released under controlled physical conditions, e.g. emitted from a stack.
Magnitude of Effect	The likely severity of dust impacts at a receptor location, determined through a combination of the sensitivity of the receptor and the Risk of impact at that receptor. The magnitude of effect is defined as either negligible, slight, moderate or substantial and can be either adverse, or beneficial in nature.
Nuisance	Annoyance resulting from deposited dust.
Pathway Effectiveness	The effectiveness of dust transportation from the dust source to the receptor, based upon the distance between the dust source and receptor and the frequency at which the receptor is down-wind from the source on dry days.
Predicted Environmental Concentration (PEC)	Total concentration, i.e. the sum of the background concentration and any additional concentrations as a result of The Proposed Development.
Receptor	A location itself, or as a proxy for people, which might be affected by dust emissions during minerals activities. Human receptors include locations where people spend time and property which may be damaged by dust. Ecological receptors are habitats that might be sensitive to dust.
Receptor Sensitivity	The sensitivity of a receptor to potential dust impacts.
Residual Effect	The predicted dust impact following the implementation of mitigation measures.
Significance of Effect	The significance of effect is determined through a combination of the determined magnitude of change and the impact at each relevant receptor. The overall significance of effect requires the weighing of adverse and beneficial changes.
Trackout	The transport of dust and dirt from the mineral site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network. This arises when heavy goods vehicles (HGVs) leave the site with dusty materials, which may then spill onto the road, and/or when HGVs transfer dust and dirt onto the road having travelled over muddy ground on site.

18 Air Quality

18.1 Executive Summary

18.1.1 An Air Quality Assessment has been undertaken for the Revised Coire Glas Pump Storage Scheme ('The Proposed Development'). The assessment has considered the baseline environment within the Site Boundary ('the Site') and the surrounding area in terms of air quality, the potential impact on air quality arising from the construction of The Proposed Development, and recommendation of mitigation measures considered to be required within the scheme design to mitigate any significant effects.

18.1.2 Construction phase air quality impacts are likely to include the generation of dust during site works and the generation of emissions by off-site transportation. Mitigation measures are recommended, where relevant, in order to reduce dust impacts at sensitive receptors. Upon implementation of relevant mitigation measures, the residual dust impacts are predicted to be 'not significant', and the residual impacts from off-site vehicle emissions are also predicted to be 'not significant'.

18.1.3 As such, subject to the implementation of the recommended mitigation measures for dust emissions, it is not considered that air quality represents a material constraint to the development proposals, which conform to the principles of Scottish Planning Policy and the Highland-wide Local Development Plan.

18.2 Introduction

18.2.1 This Chapter details the specialist studies undertaken and the results of the assessment on air quality as a result of The Proposed Development, as described in Chapter 3: Description of Development. It outlines the methodologies used to assess potential effects on air quality, presents an assessment of the significance of effects, and suggests mitigation measures aimed at avoiding or reducing effects.

18.2.2 This Chapter includes emissions of fugitive dust from construction works and pollutant emissions from the additional vehicles generated on the local road network.

18.3 Scope of Assessment

Study Area

18.3.1 The study area encompasses the Site Boundary ('the Site') and up to 400 m from the location of all dust-generating activities. The study area also extends to the relevant road networks whereby additional vehicles would be generated as a result of the construction phase activities.

Scoping and Consultation

18.3.2 A scoping exercise was carried out and a Scoping Report submitted to the Scottish Government Energy Consents Unit in May 2017. A Scoping Opinion was received in July 2017. Relevant scoping responses to Air Quality are presented in Table 18.1 below.

Table 18.1: Consultation Response

Consultee	Summary Response	Comment/Action Taken
The Highland Council	<p>Key points from the Scoping Opinion include the below quotes:</p> <ul style="list-style-type: none"> • “the key matter is the issue of surplus rock disposal from the excavations to the surrounding area...” • “The Council as roads authority has a keen interest in this project and in particular its impact on the local road network. It will be necessary that any application be updated in respect of its potential impact on the Council’s road network and what level of mitigation is proposed” • “The above commentary highlights uncertainty in respect of rock removal and rock disposal. These raise concerns in respect to [...] the potential of dust pollution” 	An assessment of construction dust impacts are considered in this Chapter
Transport Scotland	<ul style="list-style-type: none"> • Stated acceptance of an assessment of potential construction dust effects in the EIA Report. 	An assessment on construction dust effects are considered in this Chapter

18.3.3 Following formal scoping, further consultation took place with The Highland Council (THC)¹ to discuss the scope of the air quality assessment. It was agreed that this would encompass the following:

- Evaluation of baseline conditions;
- An assessment of impacts associated with dust emissions during the construction phase;
- An assessment of impacts associated with off-site vehicle emissions during the construction phase; and
- Recommendation of mitigation measures, as required.

18.3.4 It was agreed that the assessment would be undertaken in accordance with the IAQM document ‘*Guidance on the assessment of dust from demolition and construction*’ was initially proposed. However, upon a detailed review of construction phase activities associated with The Proposed Development following this consultation, the use of the IAQM document ‘*Guidance on the assessment of mineral dust Impacts for planning*’ was instead considered more appropriate. The proposed change to the methodology was set out in the Gate Check Report (see also Section 18.5).

¹ Email correspondence between ASH (on behalf of SLR Consulting) and Ken McCorquodale, Principal Planner (Development Management) for the Development & Infrastructure Service team at THC, on 13th October 2017.

18.4 Policy, Legislation & Guidance

Air Quality Strategy

- 18.4.1 The United Kingdom Air Quality Strategy (UK AQS) 2007 for England, Scotland, Wales and Northern Ireland sets out the Government's policies aimed at delivering cleaner air in the United Kingdom (UK). It sets out a comprehensive strategic framework within which air quality policy will be taken forward in the short to medium term, and the roles that Government, industry, the Scottish Environmental Protection Agency (SEPA), local government, business, individuals and transport have in protecting and improving air quality.

Air Quality Standards

- 18.4.2 The Air Quality (Scotland) Regulations 2010 and subsequent Air Quality (Scotland) Amendments Regulations 2016 seek to simplify air quality regulation and provide a new transposition of the Air Quality Framework Directive, and also transpose the Fourth Daughter Directive within the UK. The Air Quality Limit Values are transposed into the updated Regulations as Air Quality Standards, with attainment dates in line with the European Directives. SI 2010 No. 1001 Regulation 14 extends powers, under Section 85(5) of the Environment Act (1995), for the Secretary of State to give directions to Local Authorities (LAs) for the implementation of these Directives.
- 18.4.3 The UK AQS is the method for implementation of the air quality limit values in England, Scotland, Wales and Northern Ireland and provides a framework for improving air quality and protecting human health from the effects of pollution. For each nominated pollutant, the UK AQS sets clear, measurable, outdoor air quality standards and target dates by which these must be achieved; the combined standard and target date is referred to as the Air Quality Objective (AQO) for that pollutant. The UK AQS includes more exacting Objectives for some pollutants than those required by EU legislation. This Air Quality Assessment refers to UK Air Quality Standards, as compliance with these standards will also ensure that the less demanding EU Air Quality limit values would also be met. The Air Quality Strategy defines 'standards' and 'objectives' in paragraph 17:

'For the purposes of the strategy:

standards are the concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. The standards are based on assessment of the effects of each pollutant on human health including the effects on sensitive subgroups or on ecosystems;

objectives are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedences, within a specified timescale.'

- 18.4.4 The Air Quality Standards and Objectives considered within this Air Quality Assessment are presented within Table 18.2.

Table 18.2: Relevant Air Quality Strategy Standards and Objectives

Pollutant	Standard ($\mu\text{g}/\text{m}^3$)	Measured As	Allowable Exceedance
Particulate matter within an aerodynamic diameter of less than $10\mu\text{m}$ (PM_{10}) (gravimetric)	18	Annual Mean	-
	50	24-hour Mean	7 exceedences per year
Particulate matter within an aerodynamic diameter of less than $2.5\mu\text{m}$ ($\text{PM}_{2.5}$) (gravimetric)	12	Annual Mean	-
Nitrogen dioxide (NO_2)	40	Annual Mean	-
	200	1-hour Mean	18 exceedences per year

Applicable Public Exposure

18.4.5 In accordance with the DEFRA and the Devolved Administrations (which includes the Scottish Executive) technical guidance on Local Air Quality Management (LAQM.TG(16)), the AQOs should be assessed at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. A summary of relevant exposure for the objectives presented in Table 18.2 are shown below in Table 18.3.

Table 18.3: Relevant Public Exposure

Objective Averaging Period	Relevant Locations	Objectives should apply at	Objectives should not apply at
Annual Mean	Where individuals are exposed for a cumulative period of 6-months in a year	Building facades of residential properties, schools, hospitals etc.	Facades of offices Hotels Gardens of residences Kerbside sites
24-hour mean	Where individuals may be exposed for eight hours or more in a day	As above together with hotels and gardens of residential properties	Kerbside sites where public exposure is expected to be short term
1-hour mean	Where individuals might reasonably be expected to spend one hour or longer	As above together with kerbside sites of regular access, car parks, bus stations etc.	Kerbside sites where public would not be expected to have regular access

Local Authority Review and Assessment

18.4.6 Local Authorities, including THC, have formal powers to control air quality through a combination of Local Air Quality Management (LAQM) and by use of their wider planning policies.

18.4.7 Section 82 of the Environment Act 1995 (Part IV) requires local authorities to periodically review and assess the quality of air within their administrative area. The reviews have to consider the present and future air quality and whether any AQOs prescribed in regulations are being achieved or are likely to be achieved in the future.

- 18.4.8 Where any of the prescribed AQOs are not likely to be achieved the authority concerned must designate an AQMA. For each AQMA the local authority has a duty to draw up an Air Quality Action Plan (AQAP) setting out the measures the authority intends to introduce to deliver improvements in local air quality in pursuit of the AQO. Updates to the LAQM process were implemented in 2016, which included adopting a more streamlined process approach which places greater emphasis on action planning to bring forward improvements in air quality and to include local measures as part of EU reporting requirements. It also introduces a single Air Quality Annual Status Report (ASR) requirement.
- 18.4.9 DEFRA and the Devolved Administrations, which includes the Scottish Government, have published technical guidance for use by local authorities in their review and assessment work². The results of THC's air quality Annual Status Reports (ASR) is summarised in Section 18.6.

Planning Policy

National Policy

- 18.4.10 Scottish Planning Policy (SPP), adopted in June 2014, sets out national planning policies to aid the operation of planning and development throughout Scotland. The SPP sits alongside a number of additional documents to help the design, implementation and spatial development. One of these documents is Scotland's Third National Planning Framework (NPF3).
- 18.4.11 The SPP states that development should contribute to a sustainable development:
- 'The planning system should support economically, environmentally and socially sustainable places by enabling development that balances the costs and benefits of a proposal over the longer term. The aim is to achieve the right development in the right place; it is not to allow development at any cost.'*
- This means that policies and decisions should be guided by the following principles:*
- [...] avoiding over development, protecting amenity of new and existing development and considering the implications of development for water, air and soil quality.'*
- 18.4.12 The policies within the SPP and accompanying NPF3 in relation to air pollution are considered within this Air Quality Assessment.

² DEFRA: Local Air Quality Management Review and Assessment Technical Guidance LAQM.TG(16), 2016.

Local Policy

18.4.13 The Highland-wide Local Development Plan (HwLDP), adopted on the 5th April 2012, identifies the overarching objectives for spatial planning and provides a framework for development within THC's area of administration up until 2030. THC are currently undergoing the process of replacing the HwLDP with a new Proposed Plan. As such, the HwLDP currently provides the context for planning decisions within THC's area of administration.

18.4.14 A review of the HwLDP indicated the following policies to be of relevance to air quality in the context of this assessment:

"Policy 28: Sustainable Design

The Council will support developments which promote and enhance the social, economic and environmental wellbeing of the people of Highland.

Proposed developments will be assessed on the extent to which they: [...]

Impact on the following resources, including pollution and discharge, particularly within designated areas: [...]

- Air quality."

"Policy 72: Pollution

Proposals that may result in significant pollution such as noise (including aircraft noise), air, water and light will only be approved where a detailed assessment report on the levels, character and transmission and receiving environment of the potential pollution is provided by the applicant to show how the pollution can be appropriately avoided and if necessary mitigated."

"Policy 73: Air Quality

Development proposals which, individually or cumulatively, may adversely affect the air quality in an area to a level which could cause harm to human health and wellbeing or the natural environment must be accompanied by appropriate provisions, such as an Air Quality Assessment, (deemed satisfactory to the Local Authority and SEPA as appropriate) which demonstrate how such impacts will be mitigated.

Some existing land uses may have a localised detrimental effect on air quality. Any proposals to locate development in the vicinity of such uses and therefore introduce receptors to these areas (e.g. housing adjacent to busy roads) must consider whether this would result in conflict with the existing land use. Proposals which would result in an unacceptable conflict with the existing land use to air quality impacts will not be approved."

18.4.15 The above policies relating to air quality have been addressed within this assessment.

General Nuisance Legislation

- 18.4.16 Part III of the Environmental Protection Act (EPA) 1990 (as amended by the Noise and Statutory Nuisance Act 1993) contains the main legislation on Statutory Nuisance and allows Local Authorities and individuals to take action to prevent a statutory nuisance. Section 79 of the EPA defines as a potential Statutory Nuisance amongst other things, smoke, fumes, dust and smells emitted from industrial, trade or business premises so as to be prejudicial to health or a nuisance. It also defines as a nuisance accumulation or deposit which is prejudicial to health.
- 18.4.17 In contrast to suspended particulate matter, there are no UK or European statutory standards that define the point at which deposited dust causes annoyance or disamenity. 'Nuisance' is a subjective concept and its perception is highly dependent upon the existing conditions and the change which has occurred.

Relevant Guidance

The Mineral Industry Research Organisation (MIRO)

- 18.4.18 A 'Good Practice Guide' issued on behalf of MIRO was released in 2011. The purpose of the Guide is to assist in the identification, control and management of dust arising from the extractive industries. The guidance provides a useful reference for available methods of mitigation and monitoring.

IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning

- 18.4.19 The Institute of Air Quality Management (IAQM) released the document '*Guidance on the Assessment of Mineral Dust Impacts for Planning*'³ in June 2016. Designed specifically for the planning process, the guidance is based upon the judgement of the IAQM Minerals Working Group. The IAQM guidance provides an effective methodology in the absence of any other guidance for the assessment of dust from mineral sites in Scotland.

Planning Advice Notes (PAN50)

- 18.4.20 The Scottish Office Development Department published PAN 50 in 1996 to provide advice on controlling the environmental effects of surface mineral workings. Annex B⁴ to PAN 50, published in 1998, is relevant to this assessment.

³ IAQM (2016) Guidance on the Assessment of Mineral Dust Impacts for Planning. Institute of Air Quality Management, London.

⁴ Scottish Government Planning Advice Note: PAN 50 ANNEX B Controlling the Environmental Effects of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings

Environmental Protection UK and Institute of Air Quality Management Guidance

18.4.21 Environmental Protection UK (EPUK) and the IAQM have together published guidance⁵ to help ensure that air quality is properly accounted for in the development control process. It clarifies when an air quality assessment should be undertaken, what it should contain, and how impacts should be described and assessed. Importantly, it sets out a recommended approach to assess the significance of impacts.

18.4.22 The guidance also states that best-practice design and operational measures should be recommended and applied to all developments that require an Air Quality Assessment, to reduce emissions and human exposure to poor air quality. Additional measures are also suggested to off-set emissions, depending on the nature and scale of the development proposals.

Design Manual for Roads and Bridges

18.4.23 The DMRB (207/07)⁶ considers the following criterion to determine 'affected roads' which have the potential to impact upon ambient air quality at surrounding receptors:

- Road alignment will change by 5 m or more;
- Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more;
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more;
- Daily average speed will change by 10 km/hour or more; or
- Peak hour speed will change by 20 km/hour or more.

18.4.24 The DMRB considers any receptor within 200 m of a road source to be potentially affected by that operation. Receptors, including ecological designations within 200 m of a road source require further assessment of potential impacts.

18.4.25 If none of the roads in the network meet any of the traffic / alignment criteria or there are no properties or relevant Designated Sites near the affected roads, then the impact of the scheme can be considered to be neutral in terms of local air quality and no further air quality assessment is required.

⁵ EPUK and IAQM, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

⁶ DMRB, Volume 11, Section 3, Part 1, HA 207/07 - Air Quality, Highways Agency, 2007.

18.5 Methodology

Assessment of Dust Impacts

- 18.5.1 It is considered the adoption of guidance tailored for mineral workings is the most appropriate guidance applicable to the activities required in the construction phase of The Proposed Development. Factors that have been taken into account when justifying the use of this guidance include the extent of the Site, the construction and excavation of material from the underground works and proposed borrow pits; the length of unpaved haulage routes; and, the volume of materials being handled on-site and the duration of the construction phase.
- 18.5.2 Based on professional judgement, the use of the assessment methodology presented within the IAQM mineral guidance is considered to provide a worst case assessment approach for The Proposed Development, as opposed to the IAQM construction guidance for the following reasons:
- 18.5.3 The primary difference between the two guidance documents is the nature of the activities for which the assessment methodology takes into account. The IAQM construction guidance uses the 4 categories of trackout, construction, earthworks and demolition. The IAQM minerals guidance takes into account the following:
- Site preparation and restoration;
 - Mineral extraction;
 - Materials handling;
 - On-site transportation;
 - Mineral processing;
 - Stockpiles and other exposed surfaces; and
 - Off-site transportation.
- 18.5.4 The IAQM mineral guidance takes into account the potentially significant dust generation of activities that would not typically be present on a construction site; at least not to the extent that they are proposed within The Proposed Development. This includes the distance and frequency of use of unpaved haulage routes traversed by on-site vehicles, extraction of spoil and material processing on site.
- 18.5.5 Furthermore, the screening criteria for further assessment of dust impacts are 400 m and 350 m from the Site boundary for the IAQM mineral guidance and construction guidance, respectively. By utilising the IAQM mineral guidance 'further assessment' of dust impacts is more likely to be required and a greater number of receptors are likely to be included within the assessment.

- 18.5.6 The assessment has therefore been undertaken in accordance with the IAQM 'Guidance on the Assessment of Mineral Dust Impacts for Planning'. Although aimed at developments in England, the guidance provides an effective methodology in the absence of Scottish guidance for the assessment of sites that encompass activities similar in nature, size and duration to that of mineral sites. Where appropriate, guidance from Annex B of PAN50 has also been used within the assessment to ensure all relevant guidance has been represented.

Screening Criteria

- 18.5.7 The IAQM uses a distance-based screening criteria for both airborne concentrations and dust soiling. The IAQM guidance states that adverse impacts from sand and gravel sites and hard rock sites are uncommon beyond 250 m and 400 m, respectively, measured from the nearest dust generating activity. Given the hard rock type at the Site and the requirement of blasting activities, the distance of 400 m as a conservative, worst case approach to the screening methodology has been applied.
- 18.5.8 As such, if there are relevant receptors within 400 m of dust generating activities, then a dust impact assessment for both dust deposition and PM₁₀ will be required.

Assessment of Ambient Suspended Particulate Matter (PM)

- 18.5.9 Concentrations of suspended dust particles in the air as a result of the construction of The Proposed Development have the potential to cause impacts on human health, if the process contribution is likely to cause an exceedence of the relevant Air Quality Objective. For quarry-related activities, most of this suspended dust is from the coarse sub-fraction (PM_{2.5}-PM₁₀) rather than the fine (PM_{2.5}) fraction. As such, health effects as a result of suspended PM have been assessed in the context of PM₁₀ only.
- 18.5.10 The IAQM guidance presents a screening methodology whereby further assessment is not considered to be a requirement if background PM₁₀ concentrations are below a specific value. This value is however based upon the AQO for England & Wales (40µg/m³) as opposed to the lower AQO relevant for Scotland (18µg/m³). As such, a review of the background PM₁₀ concentrations has been undertaken, alongside an estimation of the total Predicted Environmental Concentration (PEC) to assess the potential for the AQO to be exceeded, as a result of The Proposed Development.

Assessment of Dust Soiling Impacts

- 18.5.11 The IAQM method to assess dust soiling impacts is a qualitative risk based approach established on the source-pathway-receptor conceptual model, i.e. the hypothetical relationship between the source of the pollutant, the pathway by which exposure might occur, and the receptor that could be adversely affected. The key steps are to:
- **Assess Site Characteristics and Baseline Conditions:** this stage incorporates a review of baseline conditions, a description of site activities to inform the Source Term, characterisation of the site setting in terms of the location and sensitivity of representative receptors and meteorological conditions;
 - **Estimate Dust Impact Risk:** the Dust Impact Risk for each representative receptor is determined from the Source Term (residual dust risk after embedded mitigation) and Pathway. The 'pathway effectiveness' is based upon the distance of the receptor

from the dust source and the frequency at which it is down-wind from the source (factoring out the frequency of wet days); and

- **Estimate Likely Magnitude of Effect:** the risk predicted at each representative receptor is considered together with the sensitivity of that receptor, to give the likely magnitude of the effect that will be experienced.

18.5.12 Following determination of the magnitude of dust effects at each individual receptor location, the overall magnitude of effect from dust deposition on the surrounding area is determined.

18.5.13 In the event that significant impacts are predicted, mitigation measures are recommended in order to reduce impacts to an acceptable level. The residual effect, following implementation of mitigation measures, is then determined.

Assessment of Vehicular Emissions during Construction

18.5.14 Road traffic emissions on public road networks associated with off-site vehicle movements, particularly HDV movements, during the construction phase of The Proposed Development have the potential to result in increased concentrations of combustion related pollutants, such as NO₂ and PM₁₀.

18.5.15 The DMRB states that further assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- increase in 24-hour AADT flow of more than 1,000-vehicles; and/or
- increase in 24-hour AADT flow of more than 200-HDV.

18.5.16 Further guidance⁷ provided by EPUK and IAQM states that a detailed assessment of potential air quality impacts should be undertaken if the following criteria are met on any link affected by a proposed development:

- change in 24-hour LDV flows of:
 - more than 100 AADT within or adjacent to an AQMA; or
 - more than 500 AADT elsewhere.
- change in 24-hour HDV flows of:
 - more than 25 AADT within or adjacent to an AQMA; or
 - more than 100 AADT elsewhere.

18.5.17 If vehicle movements exceed either the DMRB or EPUK guidance criteria as a result of The Proposed Development, further assessment may be required.

⁷ EPUK and IAQM, 'Land-Use Planning and Development Control: Planning for Air Quality', v1.2 2017.

Desk Study

18.5.18 A desk study of the Site and surrounding area was conducted in order to identify relevant receptors which may be affected by construction phase air quality impacts and to assess baseline air quality in the vicinity of the site.

18.5.19 The sources consulted during the desk study are outlined in Table 18.4.

Table 18.4: Sources Consulted During Desk Study

Task	Sources Consulted
Identifying relevant sensitive receptors	<ul style="list-style-type: none"> • emapsite (https://www.emapsite.com/mapshop/) • Magic Maps (http://magic.defra.gov.uk/MagicMap.aspx/) • Google Maps (https://www.google.co.uk/maps) • Ordnance Survey (OS) mapping • Google Earth satellite imagery • Google Street View
Assessing baseline of study area in terms of air quality	<ul style="list-style-type: none"> • DEFRA Background Maps (https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2015); and • THC 2016 LAQM Air Quality Annual Progress Report.

Assessment of Effects

18.5.20 The IAQM assessment methodology predicts the likely magnitude of effect using a number of factors, including the receptor sensitivity and the risk of impact. The risk of impact is determined using the residual source magnitude of a dust generating activity and the pathway effectiveness, as described in Appendix 18.1. The determination of the magnitude of effect is presented below in Table 18.5.

Table 18.5: Descriptors for Magnitude of Dust Effects

Risk of Impact	Receptor Sensitivity		
	Low	Medium	High
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible	Negligible	Slight Adverse Effect
Negligible Risk	Negligible	Negligible	Negligible

Significance of Effect

18.5.21 For the dust impact assessment, the determined magnitude of effect at each sensitive receptor, as outlined in Table 18.5, is then combined in order to consider the overall significance of effect on the surrounding area.

18.5.22 In order to determine the overall significance of effects, the IAQM Guidance recommends the application of professional judgement and states that further guidance is provided within the EPUK and IAQM Guidance document *Land-Use Planning and Development Control: Planning for Air Quality*. The EPUK and IAQM Guidance document states that “where a single development can be judged in isolation, it is likely that a ‘moderate’ or ‘substantial’ impact will give rise to a significant effect and a ‘negligible’ or ‘slight’ impact will not have a significant effect, but such judgements are always more likely to be valid at the two extremes of impact severity.”

18.5.23 In the event that the impact of The Proposed Development is found to be ‘significant’, mitigation measures should be recommended in order to reduce the impact of the site to an acceptable level. The residual impact of The Proposed Development, following the implementation of mitigation measures, is then determined.

Limitations to the Assessment

18.5.24 Possible limitations to the assessment, and the ways in which they have been minimised, are outlined in Table 18.6.

Table 18.6: Limitations of Assessment

Potential Limitation	Reason	Ways in which limitation was minimised
Inaccuracies in measuring distances between receptor and dust generating activity	Inherent limitations of using satellite imagery	Distance was measured through multiple sources (OS Mapping and Google Maps) and the shortest distance was selected to ensure a worst-case assessment
Potential unidentified sensitive receptors	Outdated satellite imagery	Multiple sources were consulted, including Google Earth, Google Street View, emapsite and OS Mapping
Representative meteorological data for the area	Complexity of local topography and therefore local wind patterns	Worst case assumptions were applied during the assessment
Inaccuracies in determining the pathway effectiveness due to complex topography of area	The IAQM guidance determines the pathway effectiveness on the distance between source and receptor alone. However, there may be local topographic constraints to the pathway effectiveness which cannot be accounted for	Worst case assumptions were applied within the assessment, i.e. it was assumed that there were no topographical limitations to the dust dispersion

18.6 Baseline Conditions

Desk Study

Meteorology

- 18.6.1 It was not possible to obtain representative meteorological data of the locale of the Site. Two reputable distributors of meteorological data within the UK, ADM Ltd and AS Modelling & Data Ltd, were consulted. ADM Ltd advised that nearby meteorological stations within the elevation range of the Site were sheltered and therefore had relatively low annual wind speeds. AS Modelling & Data Ltd advised that it was difficult to model meteorological data for the area due to the varying topography of the site, and that any modelled data will only be applicable to particular cliff faces and would vary several hundred metres away.
- 18.6.2 Due to the difficulties in obtaining a representative meteorological dataset of the local area, the frequency of high winds from the direction of the dust source on dry days was assumed to be the highest IAQM category for frequency of wind speeds from the potential source ('very frequent') for all considered receptor locations. This is a worst-case assumption and is therefore likely to overestimate actual impacts at receptors.
- 18.6.3 Relevant rainfall data applicable to the site has been obtained from the Met Office website of UK mapped climate averages for 1981-2010. The average annual rainfall greater than 0.2mm/day for the area of the Site is 240-260+ days per year, equating to approximately 68% of the year.

Human Receptors

- 18.6.4 The IAQM Guidance states that the majority of impacts from fugitive dust emissions are experienced within 400 m of the dust generating activity. Dust impacts on receptors beyond 400 m of the dust source are predicted to be of minimal significance. As such, a desk study was undertaken to identify sensitive receptors within 400 m of each dust generating activities on-site.
- 18.6.5 A representative selection of dust-sensitive human receptors were identified as presented in Table 18.7 and Figure 18.1, following the criteria set out in Table A1 of Appendix 18.1. Where these are referenced within the report text, they are referred to as R1 – R40.

Table 18.7: Human Receptor Locations

Receptor		NGR (m)		Receptor Sensitivity
		X	Y	
R1	Residential – Kilfinnan	227700	795696	High
R2	Residential - Glenjade Cottage	228562	796334	High
R3	Residential - Laggan Locks	228582	796342	High
R4	Laggan Locks Car Park	228572	796279	Low
R5	West Highlands Sailing Shop	228571	796308	Medium
R6 ^(A)	Glengarry Lodges	228297	796414	High
R7	Residential - Balmaglaister	228462	796684	High
R8	Residential - Lintree Cottage	228574	796857	High

Receptor		NGR (m)		Receptor Sensitivity
		X	Y	
R9	Residential - Stoneyfield	228702	796965	High
R10	Residential - Rose Cottage	229375	797313	High
R11	Residential - Lilac Cottage	229406	797270	High
R12	Residential - Balalastair Cottage	229300	797260	High
R13	The Great Glen Youth Hostel	229363	797224	High
R14	Residential - Laggan Lea	229163	796974	High
R15	Residential - Laggan Cottage	229475	797484	High
R16	Residential - Mogwy Cottage	229252	797654	High
R17	Residential - North Laggan Farmhouse	229312	797864	High
R18	Leisure - Great Glen Water Park	230210	798373	High
R19	Residential - Bridge Cottage	230034	798320	High
R20	Residential - North Laggan	230045	798197	High
R21	Residential - Lochoich Lodge	230090	798197	High
R22	Residential - The Cypresses	230059	798175	High
R23	Residential - A82	229980	798581	High
R24	Residential - A82	229962	798561	High
R25	Residential - A82	229949	798537	High
R26	Residential - A82	229947	798520	High
R27	Residential - A82	229955	798496	High
R28 ^(A)	Highland Lodges	227287	795358	High
R29 ^(A)	Great Glen Lodges	227131	795229	High
R30	Residential - Forest Gate Cottage	228147	800509	High
R31	Residential - Faichem Wood House	228526	801412	High
R32	Residential - Grianach	228633	801469	High
R33	Residential - Faichem Lodge	228636	801432	High
R34	Residential - Glengarry Lodge	228645	801337	High
R35	Residential - Egilsay	228675	801255	High
R36	Residential - Glenulie	227401	800868	High
R37 ^(B)	Loch Lochy	225831	793765	Medium
R38 ^(B)	Loch Lochy	225913	793600	Medium
R39 ^(B)	Loch Lochy	226045	793514	Medium
R40	Residential - Forestry Commission	228169	800913	High
<p>Note:</p> <p>(A) The identified receptor is located at the closest lodge to the proposed dust generating activity and is therefore representative of worst-case impacts at all the lodges.</p> <p>(B) Loch Lochy is used for recreational boating and as such, users of the loch would expect to enjoy a reasonable level of amenity. Loch Lochy has therefore been considered as a sensitive receptor within this assessment. Three worst-case locations have been identified within 400 m of both the lower reservoir works and construction of new access tracks, at varying distances from the lower reservoir works.</p>				

18.6.6 The dust sensitive receptors identified in Table 18.7 represent worst-case locations and have been chosen as the closest receptors to the Site which may be affected by the generation of construction dust.

18.6.7 Table 18.8 presents the dust generating activities within 400 m of each considered receptor. It should be noted that 'paved' roads and tracks refer to those which would be covered by tarmac, and 'unpaved' roads and tracks would be constructed by locally excavated rock.

Table 18.8: Dust Generating Activities within 400m of Human Receptors

Receptor		Dust Generating Activities within 400 m	Approximate Distance from Dust Generating Activity (m) ^(A)	Approximate Direction from Dust Generating Activity (m) ^(B)
R1	Residential - Kilfinnan	Paved on-site haul route	62	South
		Unpaved on-site haul route	60	South east
		Upgrade of existing access track / road	60	South east
R2	Residential - Glenjade Cottage	Paved on-site haul route	310	East
		Upgrade of existing access track / road	310	East
R3	Residential - Laggan Locks	Paved on-site haul route	326	East
		Upgrade of existing access track / road	326	East
R4	Laggan Locks Car Park	Paved on-site haul route	331	East
		Upgrade of existing access track / road	331	East
R5	West Highlands Sailing Shop	Paved on-site haul route	324	East
		Upgrade of existing access track / road	324	East
R6	Glengarry Lodges	Paved on-site haul route	8	East
		Upgrade of existing access track / road	8	East
R7	Residential - Balmaglaster	Paved on-site haul route	33	South east
		Upgrade of existing access track / road	33	South east
R8	Residential - Lintree Cottage	Paved on-site haul route	27	South east
		Upgrade of existing access track / road	27	South east
R9	Residential - Stoneyfield	Paved on-site haul route	43	South east
		Upgrade of existing access track / road	43	South east
R10	Residential - Rose Cottage	Paved on-site haul route	331	South east
		Upgrade of existing access track / road	331	South east
R11	Residential - Lilac Cottage	Paved on-site haul route	376	South east
		Upgrade of existing access track / road	376	South east
R12	Residential - Balalastair Cottage	Paved on-site haul route	292	South east
		Upgrade of existing access track / road	292	South east
R13	The Great Glen Youth	Paved on-site haul route	362	South east

Receptor		Dust Generating Activities within 400 m	Approximate Distance from Dust Generating Activity (m) ^(A)	Approximate Direction from Dust Generating Activity (m) ^(B)
	Hostel	Upgrade of existing access track / road	362	South east
R14	Residential - Laggan Lea	Paved on-site haul route	390	South east
		Upgrade of existing access track / road	390	South east
R15	Residential - Laggan Cottage	Paved on-site haul route	299	South east
		Upgrade of existing access track / road	299	South east
R16	Residential - Mogwy Cottage	Paved on-site haul route	5	South east
		Upgrade of existing access track / road	5	South east
R17	Residential - North Laggan Farmhouse	Paved on-site haul route	19	North west
		Upgrade of existing access track / road	19	North west
R18	Leisure - Great Glen Water Park	Paved on-site haul route	303	South east
		Upgrade of existing access track / road	303	South east
R19	Residential - Bridge Cottage	Paved on-site haul route	235	South east
		Upgrade of existing access track / road	235	South east
		Off-site access road	40	East
R20	Residential - North Laggan	Paved on-site haul route	42	East
		Upgrade of existing access track / road	42	East
		Off-site access road	42	East
R21	Residential - Lochoich Lodge	Paved on-site haul route	355	South east
		Upgrade of existing access track / road	355	South east
R22	Residential - The Cypresses	Paved on-site haul route	350	South east
		Upgrade of existing access track / road	350	South east
R23	Residential - A82	Paved on-site haul route	17	South east
		Upgrade of existing access track / road	17	South east
		Off-site access road	25	North west
R24	Residential - A82	Paved on-site haul route	20	South east
		Upgrade of existing access track / road	20	South east
		Off-site access road	40	North west
R25	Residential - A82	Paved on-site haul route	26	South east
		Upgrade of existing access track / road	26	South east
		Off-site access road	44	North west

Receptor		Dust Generating Activities within 400 m	Approximate Distance from Dust Generating Activity (m) ^(A)	Approximate Direction from Dust Generating Activity (m) ^(B)
R26	Residential - A82	Paved on-site haul route	36	South east
		Upgrade of existing access track / road	36	South east
		Off-site access road	40	North west
R27	Residential - A82	Paved on-site haul route	58	South east
		Upgrade of existing access track / road	58	South east
		Off-site access road	26	North west
R28	Highland Lodges	Unpaved on-site haul route	26	South east
		Upgrade of existing access track / road	26	South east
R29	Great Glen Lodges	Unpaved on-site haul route	15	South east
		Upgrade of existing access track / road	15	South east
R30	Residential - Forest Gate Cottage	Unpaved on-site haul route	63	South east
		Upgrade of existing access track / road	63	South east
R31	Residential - Faichem Wood House	Unpaved on-site haul route	80	North east
		Upgrade of existing access track / road	80	North east
R32	Residential - Grianach	Unpaved on-site haul route	200	North east
		Upgrade of existing access track / road	200	North east
R33	Residential - Faichem Lodge	Unpaved on-site haul route	190	North east
		Upgrade of existing access track / road	190	North east
R34	Residential - Glengarry Lodge	Unpaved on-site haul route	181	East
		Upgrade of existing access track / road	181	East
R35	Residential - Egilsay	Unpaved on-site haul route	212	East
		Upgrade of existing access track / road	212	East
R36	Residential - Glenulie	Unpaved on-site haul route	394	North
		Upgrade of existing access track / road	394	North
R37	Loch Lochy	Lower reservoir works ^(C)	10	South east
		Creation of new temporary access track	185	South west
R38	Loch Lochy	Lower reservoir works ^(C)	180	South east
		Creation of new temporary access track	260	South

Receptor		Dust Generating Activities within 400 m	Approximate Distance from Dust Generating Activity (m) ^(A)	Approximate Direction from Dust Generating Activity (m) ^(B)
R39	Loch Lochy	Lower reservoir works ^(C)	380	South east
		Creation of new temporary access track	385	South
R40	Residential - Forestry Commission	Unpaved on-site haul route	18	North west
		Upgrade of existing access track / road	18	North west
<p>Note:</p> <p>(A) The reported distance is the distance between the closest point of the dust generating activity to the receptor.</p> <p>(B) The reported direction represents the direction of the receptor relative to the closest point of the dust generating activity.</p> <p>(C) Relevant construction activities within the lower control works include drill, blast, muck and haul techniques, rock cutting, the loading of HDVs and barges with excavated rock and tunnel spoil, the creation of new temporary access tracks, the upgrading of existing access tracks, the construction of infrastructure (including the jetty and tailrace), unpaved on-site haul routes and potential for some temporary stockpiles.</p>				

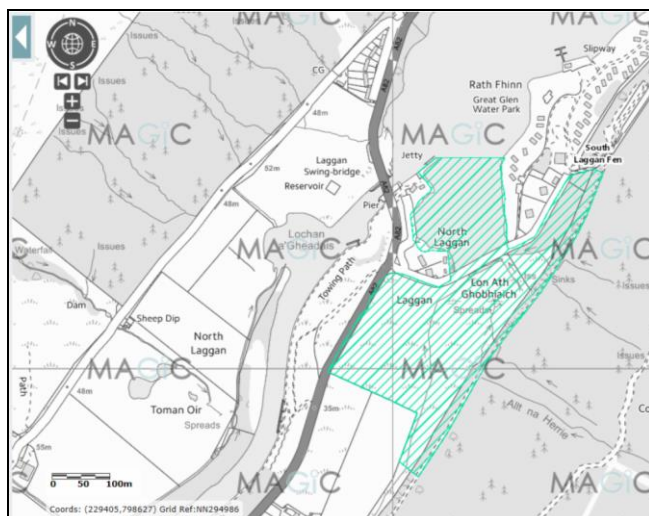
18.6.8 There are several human receptors which are located within 400 m of the Site, but not within 400 m of any dust generating activities. These receptors have therefore not been included in further assessment of dust impacts.

Ecological Receptors

18.6.9 The South Laggan Fen Site of Special Scientific Interest (SSSI) is located close to the A82 Site access junction, bordering the A82 and located approximately 25 m from the Site at its closest point. The South Laggan Fen SSSI comprises a common reed swamp alongside several other species typical of semi-swamp conditions and tall herb species. Flora found within the SSSI includes water horsetail, bog bean, several pond weeds, bladder sedge, meadowsweet and common valerian. Some bird species also breed on the site, including snipe, mallard and sedge warbler⁸.

⁸ Scotland Forestry, 2016. <http://scotland.forestry.gov.uk/images/corporate/design-plans/lochaber/south-laggan/south-laggan-imp-supporting-maps-pdf.pdf>. Accessed November 2017

Plate 18.1 Location of South Laggan Fen Site of Special Scientific Interest



18.6.10 The South Laggan Fen SSSI is not known to have any specific sensitivity to dust, however due to the SSSI status it has been given a dust-sensitivity of ‘Medium’ in accordance with the IAQM guidance.

18.6.11 Receptor locations representing the South Laggan Fen SSSI are presented in Table 18.9 and Plate 18.1; several locations across the designation have been considered within the assessment. Where these are referenced within the report text, they are referred to as ER1a – ER1d.

Table 18.9: Ecological Dust Sensitive Receptors

Receptor		NGR (m)		Receptor Sensitivity
		X	Y	
ER1a	South Laggan Fen SSSI	230046	798347	Medium
ER1b	South Laggan Fen SSSI	230033	798271	Medium
ER1c	South Laggan Fen SSSI	229968	798133	Medium
ER1d	South Laggan Fen SSSI	229912	798038	Medium

18.6.12 The dust generating activities within the 400 m screening distance of South Laggan Fen SSSI include the upgrading of existing on-site roads, the transportation on paved on-site haulage roads, and off-site access from vehicles using the local road network (specifically the A82 south of the Site Access).

Local Authority Review and Assessment of Air Quality

18.6.13 As required under Section 82 of the Environment Act (1995) (Part IV), THC have conducted an ongoing exercise to review and assess air quality within their area of administration. This process has indicated that concentrations of NO₂ are above, and likely to remain above, the annual mean AQO at locations of relevant public exposure within THC’s administrative area. As such, one AQMA has been declared within the Council’s Area, known as the “Inverness City Centre AQMA” and described as “The AQMA incorporates 6 Queensgate and 62 Academy Street, Inverness.”

18.6.14 The AQMA is located approximately 65 km north east of the Site and as such, the AQMA does not represent a constraint to The Proposed Development.

18.6.15 All other Air Quality Strategy pollutants, including PM₁₀ and PM_{2.5}, were below the relevant AQOs at locations of relevant public exposure, and as such no further AQMAs have been declared within the Council's administrative area.

Automatic Air Quality Monitoring

18.6.16 The UK Automatic Urban and Rural Network (AURN) is a countrywide network of air quality monitoring stations operated on behalf of the DEFRA. Monitoring data for AURN sites is available from the UK Air Information Resource website (UK AIR)⁹.

18.6.17 The closest AURN monitor to the development site is the Fort William AURN (NGR: 210850, 774419) located approximately 24.5 km south-west of the Site. Due to the distance between the Site and the AURN, similar pollutant concentrations are not anticipated and therefore this AURN site has not been considered within the context of this assessment.

18.6.18 No continuous monitoring is independently undertaken by THC.

Passive Diffusion Tube Monitoring

18.6.19 Passive diffusion tube monitoring is currently undertaken by THC at numerous locations throughout the Council's area as part of their commitment to LAQM. The diffusion tubes are located in areas which are deemed to require further assessment of NO₂ concentrations.

18.6.20 At the time of assessment, the closest diffusion tube to the site is IV10 – Glenurquhart Road, located at NGR: 266086, 844749, approximately 57.3 km north-east of the Site. Due to the distance between the Site and the monitoring location, similar pollutant concentrations are not anticipated and therefore this monitoring location has not been considered within the context of this assessment.

National Air Quality Archive

18.6.21 Background pollutant concentration data on a 1 km x 1 km spatial resolution is provided by DEFRA through the UK Air Information Resource (AIR) website and is routinely used to support LAQM and Air Quality Assessments.

18.6.22 Mapped background concentrations of PM₁₀ and PM_{2.5} based upon the 2015 base year DEFRA update¹⁰ were downloaded for the grid squares containing the Site and those receptors identified in Table 18.7 and Table 18.9.

18.6.23 Background pollutant concentrations for 2017 are displayed in Table 18.10.

⁹ DEFRA, UK Air Information Resource (UK-AIR) website, <http://uk-air.defra.gov.uk/>, accessed November 2017.

¹⁰ Background mapping data for local authorities – <http://uk-air.defra.gov.uk/data/laqm-background-home>, accessed November 2017.

Table 18.10: Background Concentrations

NGR Grid Square (m)	2017 Mapped Background Concentrations ($\mu\text{g}/\text{m}^3$)		
	PM ₁₀	PM _{2.5}	NO ₂
227500, 795500	5.23	3.34	1.45
228500, 796500	5.29	3.38	1.60
229500, 797500	5.40	3.48	1.71
229500, 796500	5.25	3.35	1.56
230500, 798500	5.26	3.38	1.60
229500, 798500	5.31	3.42	1.56
228500, 800500	5.18	3.32	1.40
228500, 801500	5.21	3.35	1.42
227500, 800500	5.13	3.28	1.34

18.6.24 As indicated in Table 18.10, background concentrations of PM₁₀, PM_{2.5} and NO₂ are predicted to be 'well below' the relevant AQOs.

Modifying Influences

18.6.25 There are no current or future modifying influences which are likely to change baseline air quality conditions at the Site or within the locale of the identified receptors.

18.7 Potential Effects

Health Effects (PM₁₀)

18.7.1 The assessment of PM₁₀ follows the key elements as recommended within the IAQM Minerals guidance, whilst incorporating the AQO for Scotland and relevant guidance within Annex B of PAN50. The likelihood that the AQO for PM₁₀ will be exceeded as a result of the construction of The Proposed Development has been assessed.

18.7.2 The existing air quality in terms of annual PM₁₀ has been taken from the DEFRA background maps in the absence of any background monitoring in proximity to the Site. The maximum background concentration for PM₁₀ is 5.40 $\mu\text{g}/\text{m}^3$.

18.7.3 To ensure a worst case scenario is presented, a process contribution of 5 $\mu\text{g}/\text{m}^3$ for PM₁₀ has been applied¹¹, thus resulting in a maximum Predicted Environmental Concentration (PEC) of 10.4 $\mu\text{g}/\text{m}^3$. This value is considered to be very conservative given the significant reduction in concentration that would occur with increasing distance from the Site boundary.

18.7.4 The calculated PEC is 'well below' the PM₁₀ AQO of 18 $\mu\text{g}/\text{m}^3$. It is therefore considered unlikely that any process contribution from the activities within the Site would lead to an exceedence of the annual objective. As such, no further assessment of the impact of PM₁₀ is required.

¹¹ Defra, 2003. Local Air Quality Management Technical Guidance LAQM.TG(03), January 2003.

Dust Soiling

Assess Site Characteristics and Baseline Conditions

- 18.7.5 A description of the baseline conditions surrounding the Site has been provided within Section 18.6 of this Chapter.
- 18.7.6 Table 18.11 provides a description of the site activities which may give rise to fugitive dust emissions during the construction phase.

Table 18.11: Description of Dust Generating Site Activities

Site Activity	Description
Site Preparation and Restoration	<ul style="list-style-type: none"> • Upgrading of existing minor road and forestry tracks for site access • Creation of new tracks for site access and to link the upper reservoir and lower reservoir works, constructed from locally won graded rock extracted from the borrow pits • Construction of required infrastructure • Use of raise boring machine during construction of surge shaft
Mineral Extraction	<ul style="list-style-type: none"> • Use of drilling and blasting for construction of the dam embankment as well as at the lower reservoir works, underground works, borrow pit locations and a small amount in the site establishment areas • Establishment of quarry in upper reservoir • Rock extraction/cutting at lower reservoir area
Materials Handling	<ul style="list-style-type: none"> • Mucking will take place both at the upper reservoir and the lower reservoir works • Loading of rock onto barges and HDVs • Material transfer at excavation and loading points
On-site Transportation	<ul style="list-style-type: none"> • Rock will be transported from the lower reservoir works to the upper reservoir via temporary track • Upper reservoir works will be accessed using existing forestry tracks (some of which require upgrading) and the creation of new tracks • Lower reservoir works would be accessed via minor public roads and forestry tracks, both of which require upgrading
Mineral Processing	<ul style="list-style-type: none"> • Use of a rock crushing, screening and washing plant within the upper reservoir footprint • Batching plant located in upper reservoir
Stockpiles and Exposed Surfaces	<ul style="list-style-type: none"> • Temporary stockpiles will be located within the upper reservoir footprint • Potential short term temporary stockpiles of excavated rock located at tailrace/jetty before rock is transported off-site via road/barge
Off-Site Transportation	<ul style="list-style-type: none"> • Off-site transportation of excavated rock and tunnel spoil for disposal by barge/HDVs • Transportation of required plant and equipment by HDVs • Maximum HGV generation on the local road network is 282 (24hr AADT)

- 18.7.7 It should be noted that the consideration of transportation and re-use options for excavated spoil material is included in Chapter 7: Spoil Management.

Estimate Dust Impact Risk

18.7.8 As indicated in Table 18.8, dust generating activities within 400 m of a sensitive receptor include the following:

- Site preparation and restoration:
 - Upgrading of existing access tracks / road; and
 - Creation of new temporary access track.
- On-site transportation:
 - Unpaved on-site haul routes; and
 - Paved on-site haul routes.
- Off-site transportation:
 - Off-site access road.
- Activities within the lower reservoir works:
 - Drill, blast, muck and haul techniques;
 - Rock cutting;
 - Loading of HDVs and barges with excavated rock and tunnel spoil;
 - Creation of new temporary access tracks;
 - Upgrading of the existing access tracks;
 - Unpaved on-site haul routes;
 - Infrastructure construction (including the jetty, administration building and tailrace); and
 - Temporary stockpiling of excavated rock and tunnel spoil prior to being loaded onto HDVs and barges.

18.7.9 It should be noted that there are no receptors located within 400 m of the upper reservoir or the borrow pits. As such, impacts from these activities do not require further consideration within this assessment.

18.7.10 The residual source emission magnitude of all dust generating activities located within 400m of the sensitive receptors identified in Table 18.7 is outlined in Table 18.12. Any designed-in environmental measures that have been taken into account within the assessment are identified within Table 18.12.

Table 18.12: Residual Source Emission Magnitude

Residual Source Emission Category	Site Activity Within 400m of Receptor	Residual Source Emission	Comments / Designed-in Measures
Site Preparation	Upgrading of access tracks / roads for lower reservoir works	Medium	Access tracks/haul routes will be constructed and upgraded in individual sections, and as such, emissions from any one section of the track will be temporary and short term
	Creation of new temporary haul road to connect lower reservoir works to upper reservoir works	Medium	Access tracks/haul routes will be constructed and upgraded in individual sections, and as such, emissions from any one section of the track will be temporary and short term

Residual Source Emission Category	Site Activity Within 400m of Receptor	Residual Source Emission	Comments / Designed-in Measures
	Construction at lower reservoir works (e.g. jetty, administration building, tailrace)	Medium	Majority of construction would take place in dry conditions using drill, blast, muck and haul techniques Area requiring construction is between 2.5 and 10 ha Administration building construction materials to include materials of high dust potential, such as concrete with natural stone cladding
Mineral Extraction	Rock extraction at lower control works	Large	<ul style="list-style-type: none"> Blasting methods to extract rock Cutting and grinding operations will be shielded and dampened down Annual excavation rate will vary, but is anticipated to be greater than 1,000,000 tonnes per annum at peak Excavated material will include fine sands and dust
Materials Handling	Loading of rock onto barges and HDVs and material transfer at excavation access points	Medium	<ul style="list-style-type: none"> Mobile truck mounted crane would be used to offload plant and materials as required Drop heights into haulage vehicles will be minimised Excavated material will include large rock pieces, as well as fine sands and dust
On-site Transportation	On-site haul routes	Paved haul routes: Small	<ul style="list-style-type: none"> On-site haul roads will be constructed from locally won graded rock extracted from the borrow pits, with the exception of Kilfinnan Road, which will be tarmac
		Unpaved haul routes: Medium	<ul style="list-style-type: none"> Speeds will be restricted to 20mph Main access tunnel linking upper and lower reservoir works will be underground
Stockpiles & exposed surfaces	Stockpiles at lower outlet area	Large	<ul style="list-style-type: none"> Stockpiles will be short term and temporary Stockpiled material will include fine sands and dust
Off-site Transportation	Use of barges and the local road network	Medium	<ul style="list-style-type: none"> Off-site access roads are paved (A82 and A87) Majority of off-site transportation rock removal will be via barge, transferred down the Caledonian canal Importing of rock from off-site locations is minimised as far as practical because rock would be sourced from the internal quarry within the upper reservoir footprint and tunnel spoil Fine or dry materials will be covered up or sheeted during transport Installation of wheel wash facilities at Site access locations Maximum movements (during peak operations) of 282 HGV (24hr AADT) on A82 Site Access

18.7.11 The pathway effectiveness of each sensitive receptor was determined through a combination of the distance to the source of emission and the frequency of potentially dusty winds towards that receptor (based on the criteria outlined in Appendix 18.1). Full results are presented in Appendix 18.2.

18.7.12 The dust impact risk of each receptor is determined through combining the residual source emission and the pathway effectiveness of each receptor, as presented in Appendix 18.2. No receptors are predicted to have an effect greater than that of Moderate Adverse.

Estimate Likely Magnitude of Effect

18.7.13 The resultant magnitude of dust effects at each sensitive receptor are presented in Appendix 18.2. A summary of the receptors and associated activities whereby a Slight adverse or Moderate adverse effect is predicted, is set out in Table 18.13 and 18.14.

Table 18.13: Receptors with a Potential of Adverse Dust Disamenity Effects

Receptor	Dust Generating Activity	
R35,R36	Use of unpaved on-site haul routes	Slight adverse
R1, R2,R6,R7,R8,R9,R16,R17,R23,R24,R25,R26,R27	Use of paved on-site haul roads	
R3,R10,R11,R12,R13,R14,R15,R18,R19,R20, R21,R22,R35,R36	Upgrade of existing access tracks	
ER1a-d	Off-site access road	
R39	Lower reservoir works	
R37	Creation of new temporary access track	
R1,R28,R29,R30,R31,R32,R33,R34,R40	Use of unpaved on-site haul routes	Moderate Adverse
R1,R2,R6,R7,R8,R9,R16,R17,R23,R24,R25,R26, R27,R28,R29,R30,R31,R32,R33,R34, R40	Upgrade of existing access tracks	
R19,R20,R23,R24,R25,R26,R27	Off-site access road	
R37,R38	Lower reservoir works	

Table 18.14: Magnitude of Dust Effect: Summary

Dust Generating Activity	Number of Receptors with Impacts		
	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Unpaved on-site haul routes	4	2	9
Paved on-site haul routes	14	13	0
Upgrade of existing access tracks	6	14	21
Creation of new access tracks	2	1	0
Off-site access road	4	4	7
Lower control works	0	1	2

18.7.14 From Table 18.13 and Table 18.14 it can be identified that the activities with the potential for greatest effect on local receptors are transportation on internal haul routes (paved and unpaved) and the upgrading of existing access tracks. The upgrading of existing access tracks would be completed within the first 24 months of the construction phase, with the transportation on paved and unpaved roads in the Site continuing throughout the core construction period.

18.7.15 It is important to note that the magnitude of effect has been based on a highly conservative worst-case assessment in terms of the pathway effectiveness. In reality, the pathway effectiveness is likely to be significantly reduced than that utilised within this assessment, due to both wind direction from the potential source and the suppression of dust on 'wet' days (days with rainfall greater than 0.2 mm).

Assessment of Vehicle Emissions during Construction

18.7.16 The upper reservoir works will be accessed off the A87 at White Bridge (Invergarry), and the lower reservoir works will be accessed off the A82 at North Laggan. During peak periods within the construction phase, the annual average daily traffic of HGVs from The Proposed Development is 282 (24hr AADT) onto the A82. Peak year construction vehicle generation on the surrounding road links is summarised below in Table 18.15.

Table 18.15: Summary of Construction Phase Vehicle Generation on Local Road Network (2026)

Road Link	Cars + Lights	HGV	Total
A82 North	18	182	200
A87 Invergarry	30	64	94
A82 Site Access	42	282	324
Kilfinnan Road	30	264	294
A82 Spean Bridge	24	119	143
A86	0	27	27

18.7.17 In accordance with the EPUK and IAQM Guidance, developments not located within or adjacent to an AQMA require consideration of potential air quality impacts where additional development trips are in excess of 500 AADT as LDV trips or 100 AADT as HDV trips.

18.7.18 Whilst it is noted that the construction phase of The Proposed Development is therefore predicted to exceed the 'indicative criterion' for assessment presented within EPUK and IAQM Guidance on the A82 North, A82 adjacent to the Site Access, Kilfinnan Road and the A82 Spean Bridge, the guidance states the following:

18.7.19 *"[...] exceeding a screening criterion [...] does not automatically lead to the requirement for a Detailed Assessment. The principle underlying this guidance is that any assessment should provide enough evidence that will lead to a sound conclusion on the presence, or otherwise, of a significant effect on local air quality. A Simple Assessment will be appropriate, if it can provide this evidence."*

18.7.20 Background concentrations at the Site are low; the 2015 DEFRA mapped background concentrations predict maximum annual mean NO₂ and PM₁₀ concentrations of 1.71µg/m³ and 5.40µg/m³, respectively, in the 1 x 1 km grid squares containing the Site. These concentrations represent <5% and 30% of the annual mean AQO for NO₂ and PM₁₀ respectively. There is therefore greater than 95% and 70% headroom between existing baseline concentrations and the relevant AQO and as such, it is considered that the area is less sensitive to incremental pollutant increases with respect of potential exceedences of the annual mean AQO.

18.7.21 On this basis, and in accordance with the stated EPUK and IAQM Guidance, it is considered that the applied screening assessment is appropriate for The Proposed Development and that dispersion modelling is not required. Potential effects on air quality as a result of construction phase impacts are therefore concluded to be 'not significant'.

18.8 Mitigation

Dust Emissions

18.8.1 A Construction Environmental Management Plan (CEMP) would be prepared which would apply to all construction activities required as part of the proposal. In particular, the CEMP would specify conditions to limit fugitive dust emissions. The final site-specific CEMP would be submitted to THC, following consultation with Scottish Environment Protection Agency (SEPA), and Scottish Natural Heritage (SNH), and the contractor (where appointed), once planning permission had been obtained. A Draft CEMP is included in Appendix 3.3.

18.8.2 The provision of a wheelwash at the site access points has been taken into account within this dust impact assessment.

18.8.3 It is recommended that the mitigation measures set out in the site-specific CEMP would include the following:

- Water spray to be used when weather conditions cause excessive dust;
- Shielding/damping down cutting and grinding operations;
- Reduce site speed limits to 20mph to reduce dust potential;
- Provide adequate protection for fine or dry materials from wind (e.g. cover up materials and lorries);
- Minimise drop heights into haulage vehicles;
- Screen plant where necessary;
- No burning of waste on site;
- Wheel wash to be used as and when required; and
- A screening barrier will be installed at the lower reservoir works to protect users of Loch Lochy during rock cutting.

18.8.4 As indicated in Table 18.13 and Table 18.14, the predicted magnitude of effect ranges between 'negligible effect' and 'moderate adverse effect' at the considered receptor locations. It has been identified that on-site transportation and the initial works required for upgrading existing on-site routes have the greatest potential for impact on local receptors.

18.8.5 On the basis of the dust impact assessment, a number of mitigation measures are proposed, as presented in Table 18.16.

Table 18.16: Mitigation Measures

Dust Generating Activity	Number of Receptors with Impacts
On-site transportation	<ul style="list-style-type: none"> • Location of wheelwash: ensure facilities are located on the paved haulage route, i.e. there should be no unpaved routes between the wheel wash facilities and the site access point • Establish a separate paved parking area for off-site vehicles, such as staff cars • Use of water bowser to wet unpaved roads, as required • Evenly loading (no overloading) of vehicles and barges to avoid spillages • Haul routes should be cleared, dampened down and maintained regularly
Upgrade/creation of access tracks	<ul style="list-style-type: none"> • During upgrading works on Kilfinnan Road: <ul style="list-style-type: none"> ○ Activities should be kept to discrete areas to minimise the area of potential dust generation on adjacent residential receptors; ○ Wind conditions (speed and direction) to be monitored; ○ In the event that winds are considered to be >5m/s and receptors within 100 m of activities are located downwind, water sprays should be used and activities relocated where practicable in the event that visible dust plumes are seen to be generated; and ○ Daily visual monitoring of dust emissions in dry weather • Water sprays and a reliable source of water should be made available at all times during activities, and utilised on dry days • Spillages of construction materials should be cleared as soon as possible
Off Site transportation	<ul style="list-style-type: none"> • All HGVs leaving the Site shall pass through the wheel wash, for the required time • The wheelwash shall be inspected daily and any settled silt cleared out and the water replenished • Off-site and roads utilised by the public shall be inspected regularly, and a road sweeper shall be used, as required • All loaded HGVs with material of <75 mm particle size leaving Site shall be sheeted
Lower Reservoir Works	<ul style="list-style-type: none"> • Water sprays and a reliable source of water should be made available at all times during activities, and utilised on dry days • Where possible, equipment used for blasting should be fitted with dust extraction systems • Stockpiles with material of particle sizes less than 75 mm should be stored under cover to protect from wind whipping • Stockpile areas should be clearly designated to ensure vehicles do not unnecessarily traverse across the base of the stockpile • Where practicable, stockpiles of material <75 mm particle size should be: <ul style="list-style-type: none"> ○ Located undercover with solid sides to minimise the effect of wind whipping; ○ Located >100 m from any sensitive receptor (whichever is closer); ○ Discharge heights during transfer operations kept to a minimum; ○ For short term stockpiles: a water source should be permanently available, and utilised to spray the surface of the stockpile to reduce the effect of wind whipping; and ○ For long-term stockpiles: material should be covered to prevent any wind whipping.
Monitoring	<ul style="list-style-type: none"> • Monitoring of wind direction and wind speeds in the site log book; • During prolonged dry and windy conditions, if an activity is identified as causing visible dust emissions or in proximity to a receptor, operations should be halted or modified where practicable until effective remedial actions can be

Dust Generating Activity	Number of Receptors with Impacts
	<p>undertaken.</p> <ul style="list-style-type: none"> • A visual assessment should be undertaken when dust generating activities are within 100 m of a sensitive receptor. In the event that visible dust plumes are observed, the source(s) of dust should be identified and corrective action undertaken where practicable. • Selected site personnel should be given the responsibility to take appropriate action on dust emissions, as a result of any operation of process on site.
General	<ul style="list-style-type: none"> • Record all dust and air quality complaints, identify causes and take appropriate measures to reduce emissions in a timely manner, and record the measures taken • Provide training to the site personnel on dust mitigation • Maintain good communication with local residents, holiday companies and boating companies to alleviate anxiety – consideration to be given to a local liaison group to communicate and respond to feedback on environmental concerns during the construction phase. • Maintain good standards for all plant and equipment, ensuring all servicing and routine inspections are undertaken as required and recorded in the site log book.

Vehicle Emissions during Construction

18.8.6 Potential air quality impacts associated with construction phase development trips have been screened out from further assessment with associated impacts on air quality predicted to be ‘not significant’ in accordance with the EPUK and IAQM Guidance. Therefore, mitigation measures are not considered to be required.

18.9 Residual Effects

18.9.1 Residual effects are those that cannot be reasonably mitigated. As set out above, appropriate dust mitigation and management measures have been identified and recommended for the construction phase of The Proposed Development. Such measures are generally accepted by regulatory bodies as providing effective control against the impacts of airborne dust.

PM₁₀

18.9.2 Based on the low background concentrations of PM₁₀ at the Site, the nature of the activities proposed and the mitigation measures recommended, there is not considered to be a potential for The Proposed Development to cause a breach of either the 24-hour or annual objectives for PM₁₀.

Dust Soiling

18.9.3 Assuming the mitigation measures recommended within Section 18.8 are implemented, residual effects from deposited dust generated during the construction phase are predicted to have a ‘negligible effect’.

Vehicle Emissions during Construction

- 18.9.4 Residual effects from off-site construction phase vehicle emissions are considered to be 'not significant', in the absence of further mitigation measures.

18.10 Cumulative Effects

- 18.10.1 It is understood that there are no other large scale planning applications in the vicinity of the Site with the potential to generate dust or potential cumulative vehicle movements on the local road network. As such, cumulative effects arising from construction dust or off-site vehicle movements from other nearby developments are considered unlikely.

18.11 Conclusions

- 18.11.1 An assessment of the potential air quality impacts during the construction of The Proposed Development has been undertaken.
- 18.11.2 Residual effects due to dust emissions are considered to be 'not significant', following the implementation of the recommended mitigation measures. Residual impacts of off-site vehicle emissions are considered to be 'not significant'.

18.12 Statement of Significance

- 18.12.1 This Chapter has assessed the likely effects of the construction phase of The Proposed Development on air quality on sensitive receptors in terms of emissions of dust and off-site vehicle emissions.
- 18.12.2 Assuming the implementation of mitigation measures recommended within this Chapter, the overall effect on local air quality is considered to be not significant.

18.13 References

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