Kyleakin Fish Feed Factory

Marine Harvest

Environmental Impact Assessment - Volume 2 of 4: Main Report

Chapter 6: Air Quality and Odour

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Contents

6. Air Quality and Odour

6.1 Background

This chapter considers the potential air quality and odour effects associated with the Kyleakin Fish Feed Plant.

The chapter sets out the methods used to assess the construction and operational effects; the baseline conditions currently existing at the site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.

The primary effects in relation to air quality and odour associated with the Proposed Development are the release of dust emissions during the construction phase of the development, process odour emissions and combustion emissions to air from the gas-fired boiler. In addition, the assessment considers the impact of vehicle exhaust emissions from the vehicles accessing the site.

A full technical description of the Proposed Development is provided in **Chapter 2: Project Description.**

6.2 Scope

The Proposed Development is located at Allt Anavig Quarry on the outskirts of Kyleakin on the Isle of Skye. The Development Area is water-bound to the north. The A87 runs to the south of the Proposed Development and provides the only road access to the Scottish mainland via Skye Bridge. Land use surrounding the Development Area is predominantly open agricultural land with no significant commercial / industrial activity. Kyleakin is the largest settlement.

Construction of the Proposed Development has the potential to generate fugitive dust. The operation of the plant has the potential to generate odours and emit combustion products to atmosphere, which may affect local air quality.

The air quality impact assessment focuses upon the following potential environmental impacts associated with the Proposed Development.

- Potential effects from dust during the demolition and construction works associated with the Proposed Development upon sensitive areas adjacent to the Development Area.
- Potential effects of road traffic emissions (principally nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$, particles smaller than 10 and 2.5 micrograms, respectively) from additional road traffic movements on the local road network associated with the Proposed Development during construction and operation. If there are additional movements, road traffic emissions could impact upon existing residential properties in the vicinity of the site.
- Potential effects of emissions to air of oxides of nitrogen (NO_x), in the form of NO_2, and carbon monoxide (CO) from the natural gas boiler. Emissions could potentially impact upon human health at existing residential areas or sensitive locations in the vicinity of the site.
- Potential impact on sensitive vegetation and ecosystems due to emissions to air of NO_x.
- Potential effects of odours, which may give rise to nuisance effects.

The scope of the assessment has been agreed with The Highland Council (THC) (**Ref. 6-1**).

6.3 Methodology

The methodology is presented for the assessment of the potential impacts during the construction phase and operational phase of the Proposed Development.

6.3.1 Emissions of Dust during Demolition and Construction (Construction Phase)

6.3.1.1 Introduction

Construction sites can give rise to increasing long term and short term PM_{10} concentrations at off-site locations and may also cause annoyance due to the soiling of surfaces by dust unless the appropriate mitigation measures are implemented. The impacts of dust therefore need to be addressed.

The assessment of dust during construction has been carried out using a qualitative risk-based appraisal with reference to the Proposed Development site in relation to sensitive locations, the planned activities and site characteristics, as described by Institute of Air Quality Management Guidance (**Ref. 6-11**).

The IAQM guidance aims to estimate the impacts of both PM_{10} and nuisance dust together, through a single risk-based assessment procedure. The IAQM guidance provides a methodological framework, but notes that professional judgement is required to assess impacts. This assessment does not consider the air quality impacts of dust from any contaminated land or buildings as the area is currently considered a low risk site.

6.3.1.2 Potential Sources

Emissions from any single construction site can be expected to have a definable beginning and end, and to vary substantially over different phases of the construction process and over different tasks within each phase. The main construction activities with potential for dust source risks are typically:

- demolition activities;
- earthworks and excavation;
- demolition and construction vehicle movement: vehicles moving on and around the site emitting exhaust particulate and re-suspending loose material on the road;
- material transfer: spillage from transferring material around the site, wind picking up dust from material stock piles, particulate lifted from open container vehicles by the wind generated from the vehicle movement; and
- passing vehicles: material tracked out on the wheels of site traffic and re-suspended by passing traffic.

The temporary nature of construction differentiates it from other fugitive dust sources as to the estimation and control of emissions. The construction process consists of a series of different operations, each with its own duration and potential for dust generation. Emissions from any single construction site can be expected to have a definable beginning and end and to vary substantially over different phases of the construction process and over different tasks within each phase. There are potentially sensitive locations near to the Proposed Development. If the construction phase were to produce excessive emissions of dust, the impact on these sensitive locations could potentially be significant due to their close proximity.

The construction dust assessment comprises a qualitative risk-based appraisal of potential sources of dust and the impacts at the sensitive locations close to the Proposed Development. If required, a suite of recommended mitigation measures can be used to minimise the impact of dust during the construction phase of the development. The mitigation measures are generally suitable for inclusion in a Construction Environmental Management Plan (CEMP) which would normally be agreed with the Council prior to commencement of activity on the site, usually by a condition on the planning permission.

6.3.1.3 Assessment Methodology

The assessment is based on the IAQM guidance (**Ref. 6-11**). The methodology in the guidance provides an assessment on three separate dust effects, which are:

- annoyance due to dust soiling;
- harm to ecological receptors; and
- the risk of health effects due to a significant increase in exposure to PM_{10}.

Full details of the methodology used for the assessment of construction dust emissions, and the relevant study inputs, are set out in **Appendix 6.1: Air Quality Technical Appendix**.

In addition a review of existing ambient air quality data in the area was undertaken to understand the baseline conditions with respect to PM_{10}.

6.3.2 Emissions to Air from Road Vehicles Travelling To and From the Site (Construction Phase)

6.3.2.1 Introduction

Construction of the Proposed Development will have associated construction traffic, comprising Contractors' vehicles, Heavy Duty Vehicles (HDVs), diggers, and other diesel-powered vehicles. This would result in additional emissions of NO_x, particles and other combustion related pollutants on the local network in the vicinity of the Proposed Development.

6.3.2.2 Assessment Methodology

An average of 40 additional light duty vehicles (LDVs) per day (LDVs include cars and small vans <3.5 tonnes gross vehicle weight) is predicted during the construction phase. Based on the current construction programme, likely size, duration and type of construction works, an average of less than 20 heavy duty vehicles (HDV) per day is estimated for this assessment.

These movements represent a very small increase in traffic on the local road network and are compared against the indicative criteria set out in the IAQM / EPUK guidance (**Ref. 6-10**) which suggests an air quality assessment is required when the following criteria are met:

- the change in LDV flows is greater than 100 Annual Average Daily Traffic (AADT) within or adjacent to an AQMA or greater than 500 AADT elsewhere; and
- the change in HDV flows is greater than 25 AADT within or adjacent to an AQMA or greater than 100 AADT elsewhere.

It should be noted that HDV movements throughout the majority of the works would be lower than the above maximum used in this assessment. Based on the above, and assuming standard levels of vehicle maintenance and best practice operation on site, emissions from construction related vehicles on the local road network and non-road mobile machinery (NRMM) on the road network or on the site are expected to be negligible in terms of the effect on local air quality. Therefore, only the impacts arising from construction activities (namely PM_{10} as nuisance dust) are considered in detail in this assessment.

6.3.3 Emissions to Air from Road Vehicles Travelling To and From the Site (Operational Phase)

The Proposed Development is expected to generate a maximum of 35 HDVs to site per day (70 movements) and 30 LDVs (60 movements). These are well below the maximum values specified within the guidance criteria. Therefore the operational phase is unlikely to contribute to any significant changes in concentrations of NO_2 or PM_{10} at locations adjacent to the local road network and any impacts would be described as negligible, therefore no specific assessment is required.

6.3.4 Emissions to Air from On-Site Combustion Plant and Odour Sources (Operational Phase)

6.3.4.1 Introduction

The proposed development will introduce new point source emissions to air. This includes combustion emissions from a natural gas boiler and process emissions of odour.

The proposed air cleaning system consists primarily of three main streams. Stream 1 is exhausted directly via the main stack (E3) whilst streams 2 and 3 pass through a biofiltration system where odour is removed prior to release to atmosphere via the stack. It has been assumed that the abatement efficiency of the biofiltration system is 85%. A full project description is provided in **Chapter 2: Project Description**.

The boiler proposed to be installed on site will be gas-fired with the power generation plant planned at the site with an estimated capacity of up to 7 megawatts (MW).

In addition, there are three other emission points to air. These are filters associated with the bulk tank lorry material intake (E2) and the ship material intakes (E4 and E5). These sources are only operational whilst materials are being delivered to the site, each operating for less than 400 hours per year (less than 5% of the year). Therefore, based on the short operating hours of these sources, and the location of two sources on the pier these sources have been screened out from this assessment.

The aim of this assessment is to identify whether the emissions would result in a significant effect on local air quality and odour. **Table 6.1** summarises the emission points to air associated with the Proposed Development. Full details of the emission parameters are contained in **Appendix 6.1.**

Table 6.1 : Emission Points to Air

Emission Point	Description	Emission Description
A1	Process odour emissions	Process odour emissions from Stream 1 and Stream 2 and 3 discharged at a height of 60m.
A2	Bulk tank lorry intake filter	This source operates periodically during bulk tank lorry delivery. It is expected that this process takes place for just 250 hours per year (i.e. 2.8% of the year). Therefore, this is considered to be a fugitive release and has not been included in this assessment.
A3	Boiler Emissions	Combustion emissions of NO_x and CO from the gas-fired boiler discharging at a height of 19m.
A4	Ship bulk raw material intake filter	This source operates periodically during ship material delivery. It is expected that this process takes place for just 400 hours per year (i.e. 4.6% of the year). Therefore, this is considered to be a fugitive release and has not been included in this assessment. It is also located on the pier and away from sensitive receptors.
A5	Ship bulk raw material intake filter	This source operates periodically during ship material delivery. It is expected that this process takes place for just 400 hours per year (i.e. 4.6% of the year). Therefore, this is considered to be a fugitive release and has not been included in this assessment. It is also located on the pier and away from sensitive receptors.

6.3.4.2 Assessment Methodology

The air quality impact assessment considers the potential impacts associated with the emission and dispersion of combustion gases and odour. The potential impacts were determined for the following aspects:

- the potential impact on human health due to emissions of NO_x in the form of NO_2; and CO;
- the potential impact on vegetation and ecosystems due to emissions of NO_x; and
- the potential impact on sensitive receptors due to odour emissions.

The assessment was carried out using an atmospheric dispersion modelling package. An industry standard atmospheric dispersion model ADMS version 5.1 was used to model releases of the identified substances. The ADMS model predicts the dispersion of emissions from a specific source (e.g. a stack), and the subsequent concentrations over an identified area (e.g. at ground level across a grid of receptor points) or at specified points (e.g. residential properties). The ADMS modelling package was selected because this model is fit for the purpose of modelling the emissions from the types of sources on the site (i.e. point source emissions from a combustion source) and is accepted as a suitable assessment tool by local authorities and SEPA.

The dispersion model used (ADMS 5.1) is described in more detail in **Appendix 6.1**. The modelling assessment was undertaken with due consideration to relevant guidance including the SEPA H1 guidance (**Ref. 6-8**) and SEPA odour guidance (**Ref. 6-9**). A summary of the dispersion modelling procedure is set out below.

1) Information on plant location, plant emission characteristics and building layout was obtained from Marine Harvest.
2) The meteorological data used for this assessment was taken from Skye / Lusa Meteorological Station for 2011 to 2015 (**Ref. 6-14**). The site is approximately 3.5km south south-west from the Proposed Development and is the closest and most representative site for the assessment.
3) Ground level concentrations were calculated on a grid of receptor points and also at specified receptor locations in the vicinity of the site. The grid data is also used for the generation of dispersion contour plots.
4) The above information was entered into the dispersion model.
5) The dispersion model was run to provide the Process Contribution (PC) or indicative odour concentration. The PC is the estimated maximum environmental concentration of substances due to releases from the combustion process alone. The results were then combined with baseline concentrations to provide the Predicted Environmental Concentration (PEC) of the substances of interest. The indicative odour results were compared directly to odour benchmarks within the odour guidance.
6) The PECs were then assessed against the appropriate air quality standards or objectives for each substance to determine the nature and extent of any adverse effects.
7) The predicted levels of NO_x were also used to assess the potential impact from acid deposition and nutrient nitrogen deposition at sensitive ecological receptors. Details of the deposition assessment methodology are provided in **Appendix 6.1**.

In addition a review of existing ambient air quality in the area was undertaken to understand the baseline conditions with respect to NO_2, NO_x and CO, including the location and nature of existing sources of emissions in the locality of the proposed development site. These existing conditions were determined by review of the monitoring data already available for the area and other relevant sources of information.

Where appropriate, a conservative approach has been adopted throughout the assessment to increase the robustness of the model predictions. A full description of the study inputs and assumptions are provided in **Appendix 6.1**.

6.4 Assessment Criteria and Significance

6.4.1 Air Quality

As discussed previously, in the UK the focus on local air quality is reflected in the AQOs set out in the AQS (**Ref. 6-5**). The objectives set for the protection of human health and vegetation and ecosystems of relevance to the project are summarised in Table 3.2 and Table 3.3.

For the assessment of long-term average concentrations (i.e. the annual mean NO_2 concentrations), impacts are described using the following criteria.

- If the PC is less than 1% of the long term EAL the contribution can be considered as insignificant.
- If the PC is greater than 1% of the EAL but the PEC is less than 70% of the long-term air quality objective, this would be classed as not significant.

For the assessment of short-term average concentrations (i.e. the 1-hour mean NO_2 concentrations and the 1-hour and 8-hour mean CO concentrations), impacts are described using the following criteria.

- If the PC is less than 10% of the short-term EAL, this would be classed as insignificant.
- If the PC is greater than 10% of the EAL but less than 20% of the headroom between the short term background concentration and the EAL, this can also be described as not significant.

In addition, IAQM / EPUK guidance (**Ref. 6-10**) has also been used to determine the severity of any potential impacts on air quality. Impacts on air quality, whether adverse or beneficial, will have an effect on human health that can be judged as 'significant' or 'not significant'. An impact is the change in the concentration of an air pollutant, as experienced by a receptor as the result of a proposed development. This may have an effect on the health of a sensitive receptor, depending on the severity of the impact and other factors that may need to be taken into account. Judging the severity of an impact is generally easier than judging the significance of an effect.

Table 6.2 presents impact descriptors, which provide the level of severity of an impact and help inform the judgement of significance for changes to long term predicted concentrations, as outlined within IAQM / EPUK guidance (**Ref. 6-10**).

Table 6.2 : Impact Descriptors for Changes in Annual Mean Concentrations of Pollutants Considered

Long term average Concentration at Receptor	% Change in Concentration Relative to Environmental Quality Standard (EQS)			
	1%	2-5%	6-10%	>10%
75% or less of EQS	Negligible	Negligible	Slight	Moderate
76-94% of EQS	Negligible	Slight	Moderate	Moderate
95-102% of EQS	Slight	Moderate	Moderate	Substantial
103-109% of EQS	Moderate	Moderate	Substantial	Substantial
110% or more of EQS	Moderate	Substantial	Substantial	Substantial

The predicted percentage change is rounded to a whole number, so it is clear which category the impact falls within, so a change of 0.5% is considered as 1%. Changes of 0%, i.e. less than 0.5% are described as negligible.

For point sources such as emissions from a boiler stack, consideration should also be given to short term average concentrations (e.g. concentrations which are averaged over the period of 1-hour). The guidance recommends the use of the SEPA threshold criterion of 10% of the short term EQS for identifying emissions which are negligible and would have an insignificant effect. The EPUK / IAQM guidance recommends that for determining the severity of an impact for short-term concentrations, the background concentrations are less critical as any peak concentrations from the modelled source are not directly additive to the background concentrations. The guidance provides a method for assigning a magnitude of change and also how this relates to an impact descriptor. This approach has been applied to the modelling of NO_2 and CO emissions from the Proposed Development and is shown in **Table 6.3**.

Table 6.3 : Severity of Impact Based on Magnitude Associated with Short Term Peak Concentrations of Pollutants

% Change in concentration relative to Environmental Quality Standard (EQS)			
<10% (Negligible)	10 – 20% (Small)	>20 – 50% (Medium)	>50% (Large)
Negligible	Slight	Moderate	Substantial

*Source – IAQM / EPUK panning guidance, may 2015 v.1.1 Section 6.8, *based on maximum concentrations experienced in any year.*

The above framework for describing the impacts was used as the initial basis for making the judgement on the overall significance of the effects of air quality at human receptors. The judgement was made using

professional judgement and the EPUK / IAQM guidance states that the reasons for reaching the conclusions on significance should be transparent and set out logically. The judgement included consideration of the following:

- the description of the impacts at the receptors and number of properties affected by slight, moderate or substantial air quality impacts and a judgement on the overall balance (i.e. it will be more straightforward to conclude that a development is "not significant" if all the impacts are described as "Negligible");
- whether or not an exceedence of an air quality objective is predicted to arise in the study area where none existed before or an exceedence area is substantially increased as a result of the development; and
- uncertainty, including the influence and validity of any assumptions adopted in undertaking the assessment.

With regard to NO_x concentrations at local nature sites (such as ancient woodlands and local wildlife sites), the relevant Environmental Agency guidance document (**Ref. 6-15**) states that if the short term and long term PC is less than 100% of the relevant critical level then the contribution can be considered to be insignificant and no further assessment is required. This criterion has been used in the assessment in the absence of specific SEPA guidance.

6.4.2 Critical Loads

Critical Loads for nitrogen and acid deposition at the ecological sites sensitive to nitrogen and acid deposition are included in **Table 6.4**.

Table 6.4 : Critical Load ranges for Ecological Sites

ID	Name	Priority Habitat	Critical Load Range (kgN/ha/yr)	Critical Load Range (Keq/ha/yr)
E1	Kinloch and Kyleakin Hills	Blanket Bogs	5-10	0.32-1.13
E2	Loch Ashaig	Designated due to geological nature and not sensitive to acid / nitrogen deposition		
E3	Ob Lusa to Ardnish			
E4	Mointeach nan Lochain Dubha	Blanket Bogs	5-10	0.32-1.19
E5	Rubha' an Eirennaich	Designated due to geological nature and not sensitive to acid / nitrogen deposition		
E6	Ard Hill			
E7	Coille Mhor	Upland Oak Woodland	10-15	0.357-2.34
E8	Lochs Duich, Long & Alsh Reefs	Designated as a Reef and not sensitive to acid / nitrogen deposition		
E9	Lochs Duich, Long & Alsh Reefs			
E10	Unnamed Ancient Woodland	Ancient Woodland	10-20	0.36-2.30
E11	Unnamed Ancient Woodland	Ancient Woodland	10-20	0.28-2.39
E12	Inner Hebrides & Minches	Harbour porpoise	5	N/A

Highlighted rows are not sensitive to nitrogen or acid deposition; N/A Site is a proposed SAC (pSAC) and data is unavailable from Air Pollution Information System (APIS).

6.4.3 Odour

There are three process streams for odour that are release via the stack (A1). Two of these streams (releases from the dryer, airlift and hammer mill) pass through a biofilter and the third steam (intake filters) is released directly via the stack. The releases from the Proposed Development are unlikely to be considered 'highly offensive' and the odour from similar facilities has been described as being bread dough / yeasty type odour and not persistent or offensive. Therefore, odour from the Proposed Development has been considered to be a 'moderately offensive' odour. Therefore, the predicted impacts from the Proposed Development at receptors have been assessed against the C_{98} 3.0 ou_E/m^3 criterion. It is noted that the Stack Height Assessment, provided in **Appendix 6.1,** adopted a more conservative approach and was based on an odour criterion of 1.5 ou_E/m^3. In addition, the IAQM matrix to describe the odour effects has also been used.

6.5 Baseline Conditions

6.5.1 Site Location

The Proposed Development is located at Allt Anavig Quarry on the outskirts of Kyleakin on the Isle of Skye. The site is water bound to the north. The A87 runs to the south of the Proposed Development and provides the only road access to the Scottish mainland via Skye Bridge. Land use surrounding the site is predominantly open agricultural land with no significant commercial / industrial activity. Kyleakin is the largest settlement with a ferry terminal. The site is centred on National Grid Reference (NGR): 173747, 826423.

6.5.2 Sensitive Human Receptors

The air quality and odour assessment was carried out to identify the highest levels of air pollutants and odour that would arise at potentially sensitive off-site locations such as houses, schools etc. Modelled concentrations at other similar sensitive locations further away from the facility will be lower than those presented in this report. 20 potentially sensitive locations were identified in the vicinity of the Proposed Development, as detailed in **Table 6.5** and shown in **Figure 6.1**. Pollutant concentrations were predicted at these specific locations. These are mainly residential receptors and places of business or leisure where people may be exposed to air pollutants for the short and long term averaging periods stipulated in legislation.

Table 6.5 : Sensitive Human Receptor Locations

ID	Name	Receptor Sensitivity [A]	Grid Reference		Distance from Site Centre (km)	Direction
			x	y		
R1	Taste of India Restaurant	Medium	174112	826315	0.38	ESE
R2	Les Fleur (shops)	Medium	174252	826363	0.51	E
R3	Old Kyle Farm Road 1	High	174338	826296	0.60	ESE
R4	Residence on A87 by roundabout	High	174299	826376	0.55	E
R5	Mackinnon Country House Hotel	High	174393	826387	0.65	E
R6	Old Kyle Farm Road 2	High	174299	826181	0.60	ESE
R7	Old Kyle Farm Road 3	High	174330	826047	0.69	ESE
R8	Old Kyle Road Farm	High	174309	825930	0.75	SE
R9	Kyle House	High	174412	826507	0.67	E
R10	Community Centre	Medium	174671	826501	0.93	E
R11	Lochaish Road (mainland)	High	175740	827213	2.14	ENE
R12	Achmore Road	High	174787	826407	1.04	E
R13	Kyleside	High	174849	826489	1.10	E
R14	Kyleakin Primary School	High	174752	826424	1.01	E
R16	King Street	High	175054	826437	1.31	E
R17	Strath Street	High	174965	826347	1.22	E
R18	Meuse Lane	High	175150	826367	1.40	E
R15	Crannog Lodge	High	175513	826481	1.77	E
R19	Old Kyle Farm Road 4	High	174354	826401	0.61	E
R20	Station Road	High	176105	827254	2.50	ENE

Based on the IAQM Odour Guidance (**Ref. 6-12**).

6.5.3 Sensitive Ecological Receptors

Point source emissions of acidic compounds and nitrogen-containing species from the Proposed Development could potentially affect sensitive habitat sites such as Sites of Special Scientific Interest (SSSIs) which are designated at a national level, Special Protection Areas (SPA), Special Areas of Conservation (SAC), designated at a European level. In accordance with the SEPA guidance (**Ref. 6-8**) and the Environment Agency Guidance (**Ref. 6-15**) for local nature sites, this assessment examines the potential for emissions of oxides of nitrogen to impact upon the protected sites within the following distances from the site:

- European sites (i.e. SACs and SPAs) within 10km;
- SSSIs within 10km;
- Local nature sites (National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Ancient Woodlands and Local Wildlife Sites) within 2km.

The habitat sites within the distances specified above have been included in the model are displayed in **Table 6.6**.

Table 6.6 : Sensitive Ecological Receptors

ID	Name	Receptor Sensitivity	Grid reference		Distance from Site Centre (km)	Direction
			x	y		
E1	Kinloch and Kyleakin Hills	SSSI, SAC	174805	825247	1.58	SE
			173955	825054	1.38	S
			170148	824133	4.27	SSW
E2	Loch Ashaig	SSSI	169217	823248	5.53	SW
E3	Ob Lusa to Ardnish	SSSI	170236	825346	3.67	SSW
E4	Mointeach nan Lochain Dubha	SSSI, SAC	167474	821742	7.83	SW
E5	Rubha' an Eirennaich	SSSI	164675	824816	9.21	S
E6	Ard Hill	SSSI	181480	826776	7.74	E
E7	Coille Mhor	SSSI, SAC	180243	829029	7.00	ENE
E8	Lochs Duich, Long & Alsh Reefs	SAC	180357	827023	6.64	E
E9	Lochs Duich, Long & Alsh Reefs	SAC	174597	826707	0.90	ENE
			175517	825512	1.99	ESE
E10	Unnamed Ancient Woodland	AW	173887	826400	0.14	E
			173828	826325	0.13	SE
			173679	826247	0.19	WSW
E11	Unnamed Ancient Woodland	AW	174046	824858	1.59	S
			174456	825005	1.59	SSE
			174847	825157	1.68	SE
E12	Inner Hebrides & Minches	pSAC	173706	826573	0.16	NNW
			173896	826589	0.22	NE
			173980	826568	0.28	ENE
			174387	826689	0.69	ENE
			173286	826441	0.46	W
			174490	826971	0.92	NE

Highlighted rows are not sensitive to nitrogen or acid deposition.

6.5.4 Background Air Quality

In order to complete the assessment, it was necessary to combine modelled concentrations of substances emitted from the Proposed Development with background concentrations present in the environment due to emissions from other sources. The background air quality used in the assessment represents the current levels of air quality in the vicinity of the Development Area in the absence of the Proposed Development.

A review of baseline air quality was carried out prior to undertaking the air quality assessment was carried out to determine the availability of baseline air quality data in the area and also if data from other regional or national sources such as the Scottish Air Quality website could be used to represent background concentrations of the relevant substances in the vicinity of the Proposed Development.

Information on baseline air quality in the vicinity of the development is contained in **Table 6.7**, derived from the Scottish Air Quality national background maps for the area (**Ref. 6-16**), as there are no suitable national of local monitoring stations providing data locally. The highest concentrations for the grid squares containing the site and the eight surrounding grid squares have been used, on a conservative basis.

Table 6.7 : Background Map Air Pollutant Concentrations

Pollutant	Annual Mean Concentration ($\mu g/m^3$)	Description
Nitrogen Oxides (NO_x)	2.12	Maximum value for the 3km x 3km area surrounding the site from the Scottish Air Quality website, centred on grid square (173500, 826500) scaled from 2001 to 2016 concentration.
Nitrogen dioxide (NO_2)	1.63	
PM_{10}	9.62	
CO	44.4	Maximum value for the 3km x 3km area surrounding the site from the Scottish Air Quality website, centred on grid square (173500, 826500) scaled from 2001 to 2016 concentration.

The long-term baseline levels of air quality were doubled to estimate short-term baseline concentrations, as recommended in the SEPA H1 Guidance.

Existing concentrations of NO_x were selected for each habitat using the pollutant mapping data held on the Air Quality in Scotland website (**Ref. 6-16**). The existing background NO_x concentrations are set out in the assessment results tables (see **Appendix 6.1)**.

6.5.5 Existing Deposition at Habitat Sites

Existing acid and nutrient nitrogen deposition levels were obtained from the Air Pollution Information System (APIS) (**Ref. 6-17**). These were selected for each habitat site at the locations modelled and the maximum deposition value for each vegetation type (e.g. tall vegetation such as trees or woodland or short vegetation such as grasses or plants) present at each designated site was used, regardless of whether that feature is present at that location. As for the approach adopted for the selection of critical loads, this represents a conservative approach. The existing deposition values at habitat sites are set out in **Appendix 6.1**.

6.6 Predicted Impacts

6.6.1 Emissions of Dust during Demolition and Construction (Construction Phase)

An assessment of construction impacts was undertaken in accordance with the IAQM methodology described in the methodology section.

Step 1- Screen the Need for a Detailed Assessment

There are receptors within 350m of the site boundary and receptors within 50m of the main construction access roads to the Proposed Development (up to 500m from the site entrance). Therefore, further assessment is required and so needs to proceed to Step 2 – Step 4.

The risk of impacts on ecological receptors is also required as there is an ancient woodland adjacent to the southern Development Area boundary.

Step 2A - Define the Potential Dust Emission Magnitude

Using the definitions of dust emission classes provided in the methodology, the descriptor of each activity is summarised below.

Demolition: The volume of demolition works associated with the development is limited and is expected to be less than 20,000m^3. On this basis, the assessment for demolition is based on a dust emission class of "**Small**".

Earthworks: The construction site area for earthworks is greater than 10,000m^2. Therefore, the proposed earthworks have been classified as a dust emission class of "**Large**".

Construction: The total building volume is calculated to be greater than 250,000m^3. Therefore the assessment for construction is based on a dust emission class of "**Large**".

Trackout: Based on the current construction programme, likely size, duration and type of construction works, an average of less than 20 heavy duty vehicles (HDV) per day is estimated for this assessment. On this basis, the assessment for trackout is based on a dust emission class of "**Medium**".

Table 6.8 presents the dust emission magnitude for each activity based on the criteria set out in the methodology.

Table 6.8 : Dust Emission Magnitude

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

Step 2B - Define the Sensitivity of the Area

The Development Area is generally bordered by agricultural land with a single residential receptor within 350m of the Development Area boundary. If the construction phases of the development were to produce excessive dust emissions, it is possible that significant impacts may be experienced at this property if suitable mitigation measures are not employed. **Diagram A** in **Appendix 6.1** shows windroses for Skye Lusa meteorological station between 2011 and 2015. This shows that the predominant wind direction is from the south-west, which means that based on this wind direction it is likely that most dust is blown towards the sea and not towards residential properties. The background PM_{10} concentration is 9.62µg/$m^{3.}$

There are no sensitive receptors within 100m of the construction works and 33 properties within 350m of the construction activities. For trackout activities there is one property within 20m and three properties within 50m of site access roads up to 500m from the site entrance.

The adjacent ancient woodland is classed as a low sensitive receptor due to its designation.

Table 6.9 : Sensitivity of the Surrounding Area

Potential impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Low	Low	Low	Medium
Human health	Low	Low	Low	Low
Ecological	Low	Low	Low	Low

Table 6.9 shows that based on the baseline PM_{10} concentrations, the number of receptors in the area and the distance to the various sources, the sensitivity of the Proposed Development is "**Low**" for human health impact and "**Low**" for dust soiling during all stages of the development. However, for trackout the sensitivity due to dust soiling is "**medium**". This is due to the small number of receptors and their respective proximity to site.

Step 2C Define the risk of impacts

Using the dust emission magnitude for the various activities in **Table 6.8** and the sensitivity of the area provided in **Table 6.9** and the methodology set out in **Appendix 6.1**, the definition of the risk for each activity is provided in **Table 6.10**.

Table 6.10 : Summary Dust Risk Without Mitigation

Potential impact	Summary of Dust Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Negligible	Low Risk	Low Risk	Low Risk
Human health	Negligible	Low Risk	Low Risk	Low Risk
Ecological	Negligible	Low Risk	Low Risk	Low Risk

Table 6.10 shows that there is a low risk of dust from earthworks, construction and trackout activities. Dust mitigation measures relative to these low risk activities are detailed in Section 7.1.

Table 6.10 also shows that there is a negligible risk of dust from demolition activities and no additional dust mitigation measures are required.

It should be noted that most impacts have been assessed based on the distance between the Development Area boundary and the receptor location. The majority of dust-generating activities are unlikely to be undertaken at the Development Area boundary and therefore the distance to the sensitive area would usually be greater than those used in the assessment.

6.6.2 Emissions to Air from On-Site Combustion Plant and Odour (Operational Phase)

The full results of the air quality and odour detailed dispersion modelling are presented in **Appendix 6.1**. The assessment predicted the concentrations at representative and worst case sensitive receptor locations. Contour plots showing the annual mean and 99.79th percentile of hourly mean concentrations and 98th percentile of hourly mean odour concentrations are provided in **Figure 6.2, Figure 6.3** and **Figure 6.4**, respectively.

6.6.2.1 Air Quality – Human Health

The assessment showed that for all pollutants, the modelled PECs are well within the relevant EALs for the protection of human health at both the modelled receptor grid and at sensitive receptor locations. The maximum annual mean nitrogen dioxide concentration is less than 1% of the EAL. The maximum 1-hour nitrogen dioxide concentration and 1-hour and 8-hour carbon monoxide concentrations are all less than 10% of the relevant EALs. Therefore, based on the SEPA guidance emissions from the boiler at are considered to be insignificant.

In addition, based on the EPUK / IAQM guidance the predicted magnitude of impact on annual mean NO_2 concentrations is imperceptible (<1% change in the annual mean EAL). The unmitigated impact significance is predicted to be negligible at considered receptors in accordance with the stated assessment methodology.

6.6.2.2 Air Quality – Ecological Receptors (Assessment Against Critical Levels)

The assessment shows that the maximum contribution from the boiler to the annual mean Oxides of Nitrogen EAL at the existing European designated habitat sites is less than 1%. These contributions are considered to be insignificant. In addition, the maximum contribution at the proposed SAC is 4.77% of the EAL. However, as the total PEC is only 10.9% of the EAL the risk of the EAL being exceeded is not considered to be significant.

The maximum contribution from the boiler to the annual mean Oxides of Nitrogen EAL at the identified local nature sites is 8.66%. As this is less than 100% of the EAL the contribution is not considered to be significant.

The results also shows that the maximum contribution from the boiler to the daily mean Oxides of Nitrogen EAL at the existing European designated habitat sites is less than 10% of the EAL. These contributions are considered to be insignificant. In addition, the maximum contribution at the proposed SAC is 15.8% of the EAL. However, as the total PEC is only 20.7% of the EAL the risk of the EAL being exceeded is not considered to be significant.

The maximum contribution from the boiler plant to the daily mean Oxides of Nitrogen EAL at the identified local nature sites is 40.0%. As this is less than 100% of the EAL the contribution is not considered to be significant.

6.6.2.3 Air Quality – Ecological Receptors (Assessment Against Critical Loads)

The assessment shows that the contribution to acid deposition at all of the existing European designated habitat sites is less than 1% of the relevant critical loads. In addition, the contribution to acid deposition at the ancient woodlands is less than 100% of the relevant critical loads. Therefore, the contribution of the Proposed Development to acid deposition is considered to be insignificant.

The contribution from the Proposed Development to nitrogen deposition critical load at the proposed Inner Hebrides & Minches (pSAC) is 4.1%. However, the existing deposition rates alone exceed the critical load at this site. Therefore, the contribution from the Proposed Development is not considered to be significant.

6.6.2.4 Odour

The assessment of odour from the Proposed Development shows that the maximum concentration occurs at receptor 1, the Taste of India Restaurant, which is a Medium Sensitivity receptor. The concentration predicted at this receptor is $2.06ou_E/m^3$. This value complies with the Odour Criterion of $3.0ou_E/m^3$. As described in **Section 3.3.2** research suggests that concentrations less than $3ou_E/m^3$ are unlikely to cause complaints and are unlikely to constitute significant pollution or significant detriment to amenity. In addition the odour has been described as a non-persistent bread dough / yeasty odour. The maximum concentration at any other receptor included in the assessment, including the High Sensitivity receptors, is less than $1.5ou_E/m^3$. In addition, based on the IAQM Odour Guidance (**Ref. 6-12**) and assuming the odour is moderately offensive, there is predicted to be a '*negligible*' effect at all of the receptors included in this assessment. In accordance with the guidance, slight adverse and negligible impacts are considered to be not significant. Therefore, taking into account the worst case approach such as the use of the most stringent criterion and the maximum concentration from the five years of met data included in the assessment the impact of odour from the Proposed Development is considered to be '*not significant*'. However, as part of the PPC application an Odour Management Plan might need to be developed to support the application, which would include consultation with the local community.

6.7 Mitigation Measures

6.7.1 Emissions of Dust during Demolition and Construction (Construction Phase)

As presented in Table 6.3, the risk of dust soiling, human health impact and ecological impact during the construction stage was assessed to be '*low risk*' for earthwork, construction and trackout activities and negligible for demolition activities. Therefore, during the construction phase of the Proposed Development it will be important to control dust levels from these low risk activities. In order to avoid the potential for significant impacts from dust during the construction phase, a number of mitigation measures and dust control actions will need to be put in place at the site.

These measures have been specified in the IAQM guidance (**Ref. 6-11**), specifically for the risk level identified, and are suitable to mitigate dust emissions for sites such as the Proposed Development. Measures such as those specified in the above guidance would normally be sufficient to reduce construction dust nuisance to a minor or negligible impact. These measures are listed in **Table 6.11**.

Table 6.11 : Construction Dust Mitigation Measures

Mitigation Measure	Highly recommended / Desirable
Communications	
2. Display the name and contact details of person(s) accountable for air quality and dust issues on the Development Area boundary. This may be the environment manager / engineer or the site manager.	Highly recommended
3. Display the head or regional office contact information.	Highly recommended
Dust Management	
4. Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk, and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.	Desirable
Site management	
5. Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	Highly recommended
6. Make the complaints log available to the local authority when asked.	Highly recommended
7. Record any exceptional incidents that cause dust and / or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	Highly recommended
Monitoring	
9. Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	Desirable
10. Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	Highly recommended
11. Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	Highly recommended
Preparing and maintaining the site	
13. Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	Highly recommended

Mitigation Measure	Highly recommended / Desirable
14. Erect solid screens or barriers around dusty activities or the Development Area boundary that are at least as high as any stockpiles on site.	Highly recommended
15. Fully enclose site or specific operations where there is a high potential for dust production and the site is activities for an extensive period.	Desirable
16. Avoid site runoff of water or mud.	Highly recommended
17. Keep site fencing, barriers and scaffolding clean using wet methods.	Desirable
18. Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	Desirable
19. Cover, seed or fence stockpiles to prevent wind whipping.	Desirable
Operating vehicle / machinery and sustainable travel	
21. Ensure all vehicles switch off engines when stationary - no idling vehicles.	Highly recommended
22. Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	Highly recommended
23. Impose and signpost a maximum-speed-limit of 15 mph on surfaced and 10 mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	Desirable
Operations	
26. Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	Highly recommended
27. Ensure an adequate water supply on the site for effective dust / particulate matter suppression / mitigation, using non-potable water where possible and appropriate.	Highly recommended
28. Use enclosed chutes and conveyors and covered skips.	Highly recommended
29. Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	Highly recommended
30. Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	Desirable
Waste management	
31. Avoid bonfires and burning of waste materials.	Highly recommended
Demolition	
33. Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	Highly recommended
34. Avoid explosive blasting, using appropriate manual or mechanical alternatives.	Highly recommended
Construction	
39. Avoid scabbling (roughening of concrete surfaces) if possible.	Desirable
40. Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Desirable
Trackout	
43. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	Desirable

Mitigation Measure	Highly recommended / Desirable
44. Avoid dry sweeping of large areas.	Desirable
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	Desirable
47. Record all inspections of haul routes and any subsequent action in a site log book.	Desirable
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	Desirable

The use of the dust control measures specified which are commensurate with the risk level defined in Step 2C is commonly found to be sufficient to control any dust generated during the demolition and construction programme to an acceptable level. As specified above, the measures to control dust emissions and monitor the effectiveness of the mitigation would be agreed formally with THC as part of a CEMP. It is anticipated that this would be achieved through the setting of an appropriate planning condition.

6.7.2 Emissions to Air from On-Site Combustion Plant and Odour (Operational Phase)

The assessment has shown that the current embedded mitigation (proposed stack heights and pollutant discharge parameters) reduce the effect from the Proposed Development to levels considered to be not significant. Therefore, no additional mitigation measures have been identified. However, for odour an Odour Management Plan might need to be developed to support the PPC application.

6.8 Residual Impacts

6.8.1 Emissions of Dust during Demolition and Construction (Construction Phase)

The aim of the construction risk assessment is to determine the risk of dust impacts and then to identify appropriate mitigation measures to prevent significant effects on receptors. A summary of the dust risk after the application of the suggested mitigation measures is displayed in **Table 6.12**.

Table 6.12 : Summary Dust Risk with Mitigation

Potential Impact	Summary of Dust Risk			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	Negligible	Low Risk	Low Risk	Low Risk
Human health	Negligible	Low Risk	Low Risk	Low Risk
Ecological	Negligible	Low Risk	Low Risk	Low Risk

Providing the mitigation measures are in place and appropriately managed during the construction phase, it is concluded that the development is not likely to generate unacceptable dust impacts to adjacent receptors during the demolition and construction stage. This is therefore considered to be “not significant”.

6.8.2 Emissions to Air from On-Site Combustion Plant and Odour (Operational Phase)

The change in air quality as a result of the development is not considered to be *slight* or *negligible.* Therefore, the impact is considered ‘negligible’ according to IAQM / EPUK assessment criteria.

6.9 Difficulties Encountered in Compiling Information

No significant difficulties were encounter in compiling the information required for this assessment.

6.10 Cumulative Impacts and Impact Interrelations

There are no potential cumulative impacts on air quality during the construction and operation of the Proposed Development.

6.11 References

Ref. 6-1: Email Communication with Stephen Cox. Environmental Health Officer, The Highland Council, 14th July 2016.

Ref. 6-2: Scottish Government, a: The National Planning Framework 3 (NPF3), 2014.

Ref. 6-3: Scottish Government, b: The Scottish Planning Policy 2014 (SPP), 2014.

Ref. 6-4: The Highland Council.gov.uk, http://www.highland.gov.uk/info/178/local_and_statutory_development_plans/582/west_highland_and_islands_local_development_plan, accessed July 2014.

Ref. 6-5: Department for Environment, Food and Rural Affairs and the Devolved Administrations, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, July 2007.

Ref. 6-6: Air Quality Standards (Scotland) Regulations 2010, Scottish Statutory Instrument 2010 No. 204, 11th June 2010.

Ref. 6-7: Air Quality Standards (Scotland) Amendment Regulations 2016, Draft Scottish Statutory Instrument, 1st April 2016.

Ref. 6-8: Scottish Environment Protection Agency, Environmental Assessment and Appraisal of BAT, Horizontal Guidance Note IPPC H1, July 2003.

Ref. 6-9: Scottish Environment Protection Agency, Odour Guidance 2010, January 2010.

Ref.6-10: Environmental Protection UK / Institute of Air Quality Management, land-use Planning and Development Control: Planning for Air Quality, May 2015 (v1.1).

Ref.6-11: Institute of Air Quality Management, Guidance on the assessment of dust from demolition and construction, February 2014.

Ref.6-12: Institute of Air Quality Management, Guidance on the assessment of odour for planning, May 2014.

Ref.6-13: Chartered Institution of Water and Environmental Management (CIWEM), Position Statement – Control of Odour, September 2012.

Ref.6-14: ADM Ltd, five years of hourly sequential meteorological data for the Skye Lusa weather station, July 2016.

Ref.6-15: Environment Agency and Department for Environment, Food and Rural Affairs, Air emissions risk assessment for your environmental permit, https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit/, accessed July 2016.

Ref.6-16: Scottish Government, Air Quality in Scotland website, http://www.scottishairquality.co.uk/, accessed July 2016.

Ref.6-17: UK Air Pollution Information System, http://www.apis.ac.uk/index.html, accessed July 2015.