Sheriffhall South East

Air Quality Impact Assessment

BUCCLEUCH PROPERTY

ITPENERGISED

Sheriffhall South

Air Quality Impact Assessment

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Contents

1. Introduction

ITPEnergised have been commissioned by Ironside Farrar on behalf of Buccleuch Property (hereafter referred to as "the Applicant") to carry out an air quality impact assessment (AQIA) to accompany the hybrid planning application for a mixed-use development consisting of business, storage & distribution and a drive-thru coffee shop, with associated car parking, access, infrastructure and landscaping ('the Proposed Development').

The hybrid application is therefore for the following use classes:

- Planning Permission in Principle for:
  - Class 6 Storage and Distribution – 76,500 sq. ft
- Detailed Planning Permission for:
  - Class 3 Food and Drink / Sui Generis - 1,800 sq. ft
  - Class 4 Business - 42,000 sq. ft

The Proposed Development is located at South Sheriffhall, within the Midlothian Council (MLC) administrative area.

The Proposed Development site is not located within an air quality management area (AQMA). The location and boundary of the Proposed Development is shown in **Figure 1**.

The Proposed Development will bring with it an increase in traffic on the local road network which has the potential to impact air quality within the area. This AQIA is therefore required to assess potential impacts associated with the Proposed Development upon existing receptors and determine the suitability of the site for future occupancy.

The energy strategy for the site is yet to be ascertained, however at this stage, the Proposed Development does not include a centralised energy centre with combustion sources or any other combustion processes. Should an energy centre with combustion sources or any other combustion processes be included, further air quality work will be undertaken as relevant.

This AQIA includes a site suitability assessment to determine the suitability of the Proposed Development site for future occupancy with regard to air quality.

A detailed air dispersion modelling study was carried out using the latest version of the modelling software ADMS-Roads 5 (Cambridge Environmental Research Consultants, 2020) to predict future pollutant concentrations from road traffic on the local road network at both existing and future sensitive receptors. The roads and sensitive receptors considered in this assessment are displayed in **Figure 2**.

The pollutants considered in this AQIA are oxides of nitrogen (NO_x), nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$).

A construction dust risk assessment is also included in this AQIA, to assess the potential risk of dust impacts on nearby sensitive receptors due to construction of the Proposed Development.

2. Legislation and Policy

The UK's legislation and regulatory regime, along with national, regional and local planning policy play a key role in the prevention, control and minimisation of atmospheric emissions that are potentially harmful to human health and the environment. Air Quality Standards (AQS)[1] are used as assessment criteria for

[1] Air Quality Standards are 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.

determining the significance of any potential changes in local air quality resulting from development proposals.

2.1 European Legislation

The EU has published a Directive on Ambient Air Quality Assessment and Management which came into force in September 1996 (Council of the European Union, 1996). This Directive was intended as a strategic framework for tackling air quality consistently, through setting European wide air quality limit values in a series of daughter directives, superseding and extending existing European legislation. The first four daughter directives were placed into national legislation. A new EU air quality directive (European Parliament and the Council of the European Union, 2008) came into force in June 2008 and was transposed into The Air Quality Standards Regulations in England, Wales, Scotland and Northern Ireland in June 2010 (HM Government, 2010). The directive merged the four daughter directives and one Council decision into a single directive on air quality.

2.2 National Legislation and Strategy

The Environment Act 1995 (HM Government, 1995) required the preparation of a national air quality strategy setting Air quality Objectives (AQOs) for specified pollutants and outlining measures to be taken by local authorities through the system of Local Air Quality Management (LAQM) and by others to work in pursuit of the achievement of these objectives. A National Air Quality Strategy (NAQS) was published in 1997 and subsequently reviewed and revised in 2000, and an addendum to the Strategy published in 2002. The current Strategy was published in July 2007 (Welsh Assembly Government, Scottish Executive, Department of the Environment, Department for Environment Food and Rural Affairs, 2007).

The AQOs which are relevant to LAQM have been set into Regulations namely Air Quality (Scotland) Regulations 2000, Air Quality (Scotland) Amendment Regulations 2002 and Air Quality (Scotland) Amendment Regulations 2016 (Scottish Executive, 2016), the latter of which introduces an additional statutory obligation for Scottish Local Authorities to comply with an annual mean standard for $PM_{2.5}$ to align with the World Health Organisation (WHO) guideline value (WHO, 2005).

The AQSs are set for the purpose of protecting human health, vegetation and ecosystems from certain harmful atmospheric pollutants. The Scottish standards take account of the EU objective values and are either effectively identical, or more stringent.

The standards applicable to this study are shown in **Table 1**.

Table 1 - AQS for Scotland Applicable to this Assessment

Pollutant	Concentration	Measured as
Human Receptors		
Nitrogen dioxide (NO_2)	200 µg/m³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m³	Annual mean
Particulate material (PM_{10})	50 µg/m³, not to be exceeded more than 7 times a year	24-hour mean
	18 µg/m³	Annual mean
Particulate material ($PM_{2.5}$)	10 µg/m³	Annual mean
Ecological Receptors		
Oxides of Nitrogen (NO_x)	30 µg/m³	Annual mean

The LAQM Technical Guidance, LAQM TG(16) (Department for Environment Food and Rural Affairs, 2021) provides advice on where the AQS for pollutants considered in this study apply. These are summarised in **Table 2**.

Table 2 - Examples of Where the AQS Apply

Averaging Period	Standards Should Apply to	Standards Should Not Apply to
Annual Mean	All locations where members of the public might be reasonably exposed such as: Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access such as: Hotels, unless people live there as a permanent residence; gardens of residential properties; Kerbside sites (as opposed to locations at the building façade), or any other location where the public exposure is expected to be short-term.
8-hour and 24-hour Means	All locations where the annual mean objective would apply, together with hotels. Gardens of residential properties.	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour Mean	All locations where the annual mean, 24-hour mean and 8-hour mean apply plus: Kerbside sites of busy shopping streets; Parts of car parks, bus and railway stations, etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more; Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

2.2.1 National Planning Framework 3

The National Planning Framework 3 (NPF3) was published in June 2014 (Scottish Government, 2014) and sets the context for development planning in Scotland and provides a framework for the spatial development of Scotland.

The NPF3 sets out the Scottish Government's development priorities and identifies national developments which support the development strategy.

The key planning outcomes for Scotland set out in the NPF3 are the following:

- "**A successful sustainable place** – supporting economic growth, regeneration and the creation of well-designed places;
- **A low carbon place** – reducing our carbon emissions and adapting to climate change;
- **A natural resilient place** – helping to protect and enhance our natural cultural assets and facilitating their sustainable use; and
- **A connected place** – supporting better transport and digital connectivity."

Preparation of The National Planning Framework 4 (NPF4) is currently underway and is planned to be finalised for review in Parliament in 2021.

2.2.2 PAN 51 – Planning, Environmental Protection and Regulation

Planning Advice Note (PAN) 51: Planning, Environmental Protection and Regulation (Scottish Executive, 2006) supports existing policy on the role of the planning system in relation to the environmental protection regimes and summarises the responsibilities of the environmental protection bodies.

With regard to air quality, PAN51 recognises that where proposals are within an Air Quality Management Area (AQMA) or adjacent to them, air quality is likely to be:

"a material consideration for large scale proposals or if they are to be occupied by sensitive groups such as the elderly or young children or are likely to have cumulative effects"

For proposals that are likely to yield a significant effect on local air quality, a detailed assessment of air quality impacts will be warranted. PAN 51 also states that:

"it may be necessary to consider the cumulative effect of developments on air quality leading to a gradual deterioration".

2.2.3 The Scottish Government Cleaner Air for Scotland Strategy

The Scottish Government Cleaner Air for Scotland (CAFS) strategy – The Road to a Healthier Future (Scottish Government, 2015), is a national strategy that sets out how the Scottish Government will deliver its commitment to further improving air quality to protect human health.

The CAFS strategy aims to help the Scottish Government achieve the ambitious goal "to have the best air quality in Europe". A National Modelling Framework (NMF) and National Low Emission Framework (NLEF) will be developed to provide the tools and mechanism to put in place measures to improve air quality.

The majority of the 40 actions included in the CAFS strategy have now been completed or are ongoing and will be taken forward in parallel with new actions outlined in the updated CAFS2 published in July 2021 (Scottish Government, 2021).

2.3 Local Planning Policy

The MLC Local Development Plan (LDP) sets out a number of policies to help plan for future development within its administrative area (Midlothian Council, 2017). Policy ENV 17 – Air Quality is included in the LDP and states the following:

"The Council may require further assessment (either as part of Environmental Impact Assessment or separately) to identify air quality impacts where the Council's Environmental Health service and the Scottish Environment Protection Agency (SEPA) considers it requisite. It will refuse planning permission, or seek effective mitigation, where development proposals cause unacceptable air quality or dust impacts, or would result in sensitive uses, which give rise to air pollution concerns, being located within or close to uses with potential to generate such pollution."

2.4 Local Air Quality Management

Under Section 82 of the Environment Act (1995) (Part IV) Local Authorities (LAs) are required to periodically review and assess air quality within their area of administration under the system LAQM. This review and assessment of air quality involves considering present and likely future air quality against the objectives and reporting to the Scottish Government by means of an Annual Progress Report (APR). If it is predicted that levels at sensitive locations where members of the public are regularly present for the relevant averaging period are likely to be exceeded, the LA is required to declare an AQMA. For each AQMA the LA is required to produce an Air Quality Action Plan (AQAP), the purpose of which is to implement measures to reduce pollutant concentrations below the objective values.

There are currently no declared AQMAs within the MLC administrative area.

The most recent air quality annual progress report (APR) for MLC publicly available at the time of writing was the 2019 APR (Midlothian Council, 2019) which reports on 2018 concentrations.

3. Scope and Methodology

3.1 Overview

This assessment has used the latest version of dispersion modelling software ADMS-Roads. This is a modern dispersion model that has an extensive published track record of use in the UK for the assessment of local air quality impacts, including model validation and verification studies (Cambridge Environmental Research Consultants, 2020).

There is currently no statutory guidance on the method by which an air quality impact assessment should be undertaken; therefore, this assessment has been carried out using the following guidance:

- The Technical Guidance LAQM.TG(16) for Local Air Quality Management (Department for Environment Food and Rural Affairs, 2021);
- The Environmental Protection UK (EPUK) and Institute of Air Quality Management (IAQM), Development Planning Control: Planning for Air Quality (EPUK & IAQM, 2017);
- IAQM, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020);
- IAQM, Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014); and
- The Environmental Protection Scotland (EPS) Cleaner Air for Scotland, Development Planning & Development Management, Guidance from Environmental Protection Scotland and the Royal Town Planning Institute Scotland (EPS, 2017).

3.2 Scope of Work

The scope of work for the AQIA included the following:

- Desktop review of baseline air quality in the locality from MLC monitoring data and publicly available background concentration maps;
- Consultation with MLC Environmental Health Services to confirm AQIA scope and methodology;
- Operational Phase Road Traffic modelling of the Proposed Development including:
    - Collection of road traffic data in the form of average hourly data with Heavy Duty Vehicle (HDV) and Light Duty Vehicle (LDV) splits via the appointed transport consultant (Transport Planning Ltd);
    - Prediction of baseline air quality using Advanced Dispersion Modelling software (ADMS-Roads) and Defra Emission Factor Toolkit (EfT) v10;
    - Comparison of model-predicted baseline concentrations with local monitoring data and model verification;
    - Prediction of future with and without Proposed Development pollutant concentrations and assessment of the changes in pollutant concentrations and resulting impacts;
    - Modelling of the following scenarios:
        - Baseline for model verification purposes;
        - Future without Proposed Development-including cumulative developments; and
        - Future with Proposed Development.
- Qualitative assessment of construction phase dust impacts;

- Identification of outline mitigation measures if necessary;
- Assessment of site suitability for proposed future use; and
- Production of this AQIA report.

3.3 Effects Scoped Out

3.3.1 Construction Phase

3.3.1.1 Road Traffic Emissions

The construction phase of the Proposed Development Site is likely to lead to an increase in the number of vehicles, including cars and Heavy-Duty Vehicles (HDVs), on the local highway network for the duration of the construction phase.

During construction, traffic would likely include HDVs delivering plant and supplies to the Proposed Development and removing surplus material, cars and light vehicles associated with staff arriving and departing from the Proposed Development, and vans delivering goods.

No details are yet available regarding the construction programme or material numbers and so no detailed calculation of construction-related traffic numbers has been made, however, the Proposed Development is not anticipated to generate construction traffic which would exceed 100 Annual Average Daily Traffic (AADT) equivalent on the local road network, which is the IAQM and EPUK (EPUK & IAQM, 2017) criteria triggering the need for a detailed air quality impact assessment outside an AQMA. The effect of construction road traffic emissions upon local air quality will be not significant and construction phase road traffic emissions are therefore not considered further in this assessment.

3.3.2 Operational Phase

3.3.2.1 Road Traffic Emissions

The incomplete combustion of fuel in vehicle engines results in the presence of hydrocarbons (HC) such as benzene and 1,3-butadiene, and sulphur dioxide (SO_2), carbon monoxide (CO), PM_{10} and $PM_{2.5}$ in exhaust emissions. In addition, at the high temperatures and pressures found within vehicle engines, some of the nitrogen in the air and the fuel is oxidised to form NO_X, mainly in the form of nitric oxide (NO), which is then converted to NO_2 in the atmosphere. NO_2 is associated with adverse effects on human health. Better emission control technology and fuel specifications are expected to reduce emissions per vehicle in the long term.

Although SO_2, CO, benzene and 1,3-butadiene are present in motor vehicle exhaust emissions, detailed consideration of the associated impacts on local air quality is not considered relevant in the context of this Proposed Development. Road traffic emissions of these substances linked to the Proposed Development will not be capable of compromising the achievement of the relevant AQS for the protection of human health. Emissions of SO_2, CO, benzene and 1,3-butadiene from road traffic are therefore not considered further within this assessment.

3.4 Emission Sources

3.4.1 Construction Phase

3.4.1.1 Fugitive Emissions of Particulate Matter

Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions. These include:

- Demolition;
- Earthworks, including the handling, working and storage of materials;
- Construction activities; and

- The transfer of dust-making materials from the site onto the local road network (track-out).

The size fraction called "PM_{10}" is composed of material with an aerodynamic diameter of less than 10µm in diameter and overlaps with the size fraction for dust. AQS for PM_{10} have been set for the protection of human health and the term PM_{10} is only used in this assessment when referring to the potential impact of emissions of particulate matter from demolition and construction activities on human health receptors. The short-term, 24-hour mean standard for airborne concentrations of PM_{10} is the appropriate AQS for assessing the potential impact on health of short-term fugitive emissions from demolition and construction sites.

This AQIA therefore considers the risk of dust impacts and resulting effect significance without mitigation in place and recommends any additional mitigation measures appropriate to the identified risk of dust impacts to receptors, to minimise the significance of any residual effects.

3.4.2 Operational Phase

3.4.2.1 Road Traffic Emissions

Following completion of the construction phase, there is the potential for changes to long-term and short-term mean concentrations of fine particulates (PM_{10}, $PM_{2.5}$), NO_2 and NO_x to occur because of predicted changes in road traffic movements on the local road network. This AQIA has therefore considered impacts and the resulting significance of effects associated with the Proposed Development generated traffic emissions and the suitability of the site for its proposed use.

Pollutant concentrations for each scenario have been predicted by modelling emissions from road traffic using predicted road traffic flows for each different scenario. The traffic flows used were provided by the appointed traffic consultants (Transport Planning Limited) and from Department for Transport (DfT) automatic count sites for the purposes of model verification.

Traffic data and all projections made are discussed in **Section 3.5.**

Details of general model conditions used in the dispersion model are provided in Table 3

Table 3 - General ADMS Model Conditions

Variables	ADMS Roads Model Input
Surface roughness at source/meteorological site	0.5 m
Minimum Monin-Obukhov length for stable conditions at source/meteorological site	Model-calculated per hourly meteorological condition
Terrain types	Flat Terrain
Receptor location	x, y coordinates determined by Geographic Information System (GIS) z = 1.5 m for human receptors x = 0 m for ecological receptors
Pollutants	NO_x, PM_{10}, $PM_{2.5}$
Traffic Emissions Factors	DEFRA EFT 10.1 (2 VC) emission factor dataset for 2018 (verification) and 2023 (completion year)

Variables	ADMS Roads Model Input
Meteorological data	2018 hourly World Meteorological Organisation (WMO) synoptic data from Edinburgh Gogarbank meteorological station
Emission profiles traffic	No diurnal profiles applied.
Receptors	Selected existing and proposed human receptors and selected ecological receptors from the Scottish Ancient Woodland Inventory (AWI).
Model output	Long-term annual mean NO_x concentrations Long-term annual mean PM_{10} concentrations Long-term annual mean $PM_{2.5}$ concentrations

3.5 Road Traffic Data

Road traffic data were provided by the appointed traffic consultants (Transport Planning Limited) for the following scenarios:

- Baseline 2018;
- Future 2023 without Proposed Development generated flows, including committed developments; and
- Future 2023 including committed developments and Proposed Development generated flows.

Additional data for the 2018 verification study were downloaded from DfT automatic count sites in Dalkeith and Lasswade to enable roads to be modelled adjacent to MLC monitoring sites.

Traffic data were provided in 24-hour AADT format with percentage of Heavy Duty Vehicles (HDVs) for each link.

Traffic data were further processed into hourly flows for use in the dispersion model.

Baseline 2018 traffic flows were modelled using 2018 emission factors, background concentrations and meteorological data for the purpose of model verification with MLC measured monitoring data diffusion tube sites within the study area.

Completion year (2023) traffic flows were modelled using 2023 emission factors, background concentrations from 2023 and meteorological data from 2018.

All raw and processed road traffic data, road speeds and geometry used in the dispersion model for this assessment are presented in **Appendix 2**.

3.6 Study Area and Air Quality Sensitive Receptors

3.6.1 Study Area

3.6.1.1 Construction Phase

The study area for the construction phase of this AQIA has been defined in accordance with the IAQM guidance (IAQM, 2014) which stipulates that *"an assessment will normally be required where there is:*

- *A 'human receptor' within:*
    - *350 m of the boundary of the site; and/or*
    - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).*
- *A* [designated] *ecological receptor within:*
    - *50 m of the boundary of the site;*
    - *50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s)."*

The study area considered as part of the construction phase assessment is shown in **Figure 4.**

3.6.1.2 Operational Phase

The road sources selected for the assessment of impacts associated with the operational phase of the Proposed Development have been defined by professional judgement and discussions with the appointed transport consultant (Transport Planning Ltd) to establish links likely to be impacted by the Proposed Development generated traffic.

For the purpose of model verification, additional links were considered as part of the baseline modelling study; this is explained further in **Section 3.9.1**.

The study area and road links considered in this assessment are shown on **Figure 2**.

3.6.2 Sensitive Receptors

3.6.2.1 Construction Phase – Fugitive Emissions of Particulate Matter

The sensitive receptors considered as part of the assessment of impacts associated with the construction phase of the Proposed Development include all human and ecological receptors within the buffers defined in **Section 3.6.1.1.**

3.6.2.2 Operational Phase – Traffic Emissions

The sensitive receptors selected for the assessment of impacts associated with the operational phase of the Proposed Development are human receptors, where people are likely to be present for a period of time consistent with the AQSs and are based on effects on human health. The AQSs have been set at concentrations that provide protection to all members of the public, including more vulnerable groups such as the very young, elderly or unwell. As such, the sensitivity of receptors was considered in the definition of the AQS values and therefore no additional subdivision of human health receptors on the basis of building or location type is necessary.

The human sensitive receptors used in this assessment are those which correspond to existing residential receptors where the short-term (hourly and daily means) and annual mean standards are relevant. Commercial/amenity receptors (as relevant) within the study area, where short-term standards apply, have also been assessed.

The Proposed Development will include commercial receptors where the short-term AQSs will apply. To account for this, the modelling includes the proposed outdoor seating area of the Drive-Thru closest to the modelled roads.

The IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020) states that designated ecological sites within 200 m of affected roads should be considered as part of the AQIA.

There are 12 designated ecological receptors (Ancient Woodland Inventory - AWI) located within 200 m of modelled roads that have been considered in this assessment.

In a conservative approach, ecological receptors have been placed at the boundary location of the designated AWI sites closest to the modelled roads. For some road links, the road is elevated above the ground level of the designated ecological site (e.g. the A7 passing sites E9 and E10 Refer to Figure 3 and Appendix 3). This AQIA has made the conservative assumption that all ecological receptors are at the same level as the adjacent modelled roads and therefore does not take into consideration the dispersion effect above and below the road and significant drop in concentration likely between the roadside and the AWI site level.

Predicted concentrations at ecological receptors E9 and E10 reported upon in this AQIA are therefore conservative worst-case concentrations.

A transept of receptors was added at distances of 10 m, 20 m, 50 m and 100 m from the roadside ecological receptors E9, E10, E11 and E12 as shown in **Figure 3.** The NO_x AQS for the protection of vegetation and ecosystems was predicted to be exceeded without the development at these locations and the extra receptors were added in order to determine the decrease in concentration with distance from the road and the area of the designated site affected.

The receptors used in this assessment are summarised in **Appendix 3** and illustrated in **Figure 2**.

Each of the receptors chosen represents the maximum level of exposure that could be experienced at other similar receptors in their vicinity (i.e. receptors closest to the modelled roads).

3.7 Meteorological Data

The closest meteorological station to the Proposed Development is Gogarbank, located approximately 15 km north-west of the Proposed Development site. Meteorological conditions recorded at Gogarbank are considered to be representative of conditions within the study area.

Hourly meteorological data recorded from Gogarbank meteorological station for the year 2018 were used for model verification and in the assessment of future 2023 concentrations at receptors.

A wind rose is presented in **Figure 5.**

3.8 Background Air Quality Data

There are no MLC background monitoring sites within the study area. Background concentrations within the study area have therefore been sourced from the updated 2018-based Scottish Air Quality (NO_x, NO_2 and PM_{10}) (Scottish Air Quality, 2021) and DEFRA ($PM_{2.5}$) background maps (DEFRA, 2021) for the relevant baseline (2018) and completion (2023) years.

The background maps include emissions from nearby sources such as local road networks and emissions from industrial and domestic sources. When the majority of a source type within a grid square is explicitly modelled in the assessment, the contributions from those sources are usually removed. This avoids “double-accounting” of road source contributions.

In this assessment, no sector removal has taken place as the majority of the roads in the study area are B-class roads and removal of them all as a source category would not be compensated by the small number that are modelled. This provides a conservative assessment of total predicted concentrations at receptors.

Background concentrations used in this assessment are provided in **Appendix 4.**

3.9 Methods of Analysis of Modelling Predictions

3.9.1 Model Verification

Model verification is used to check the performance of the model at a local level. The verification of the ADMS-Roads model is achieved by modelling concentrations at existing monitoring location(s) within the study area and comparing the modelled concentration(s) with the measured concentration(s).

There are four monitoring sites within the study area; roadside monitoring sites ED1 and ED2 located on Dalkeith High Street and roadside monitoring sites LW1 and LW2, located in Lasswade that were used in the model verification process. Model verification used traffic data, monitoring data and meteorological data from 2018 in order to provide an indication of model performance elsewhere in the study area.

The model verification process resulted in a model adjustment factor of 1.37 to be applied to modelled road source NO_x concentrations.

There were no sites available with which to verify predictions of PM_{10} or $PM_{2.5}$. A model adjustment factor of 1.37 was also applied to road source contributions of these pollutants.

The model verification process is outlined in **Appendix 5**.

3.9.2 NO_x to NO_2 Conversion

To accompany the publication of the guidance document LAQM.TG (09) (Department for Environment Food and Rural Affairs, 2009); a NO_x to NO_2 converter was made available as a tool to calculate the road source NO_2 contribution from modelled road source NO_x contributions. The tool was last updated in August 2020 (Department for Environment Food and Rural Affairs, 2020). The tool comes in the form of an MS Excel spreadsheet and uses local authority area-specific data to calculate annual mean concentrations of NO_2 from dispersion model output values of annual mean concentrations of NO_x. This tool was used to calculate the total NO_2 concentrations at receptors from the modelled road NO_x contribution and associated background concentration. Due to the location of the Proposed Development, the 'All other urban UK Traffic' setting was selected.

3.9.3 Predicting the Number of Times per Year the NO_2 Hourly Mean Standard is Exceeded

Research projects completed on behalf of DEFRA and the Devolved Administrations (Prof. Duncan Laxen and Dr Ben Marner, 2003) have concluded that the hourly mean NO_2 standard is unlikely to be exceeded if annual mean concentrations are predicted to be less the 60 µg/m^3.

In 2003, Laxen and Marner concluded:

"...local authorities could reliably base decisions on likely exceedances of the 1-hour standard for nitrogen dioxide alongside busy streets using an annual mean of 60 µg/m^3 and above."

The findings presented by Laxen and Marner are further supported by AEAT who revisited the investigation to complete an updated analysis including new monitoring results and additional monitoring sites. The recommendations of this report are:

"Local authorities should continue to use the threshold of 60 µg/m^3 NO_2 as the trigger for considering a likely exceedance of the hourly mean nitrogen dioxide objective."

Therefore, this assessment will evaluate the likelihood of exceeding the hourly mean NO_2 standard by comparing predicted annual mean NO_2 concentrations at all receptors to an annual mean equivalent threshold of 60 µg/m^3 NO_2. Where predicted concentrations are below this value, it can be concluded with confidence that the hourly mean NO_2 standard (200 µg/m^3 NO_2 not more than 18 times per year) will be achieved.

3.9.4 Predicting the Number of Times per Year the PM_{10} 24 - Hour Mean Standard is Exceeded

Prediction of the number of times per year the 24-hour mean for PM_{10} is exceeded can be difficult to determine directly using dispersion modelling. Therefore, in this assessment, the number of times this objective is exceeded per year has been predicted using the equation below, as suggested in Technical Guidance LAQM.TG(16) for Local Air Quality Management (Department for Environment Food and Rural Affairs, 2021):

$$No.\,24-hour\ mean\ exceedances = -18.5 + 0.00145 \times annual\ mean^3 + (\frac{206}{annual\ mean})$$

It should be noted that this equation is only valid for predicted annual mean concentrations above 14 µg/m^3.

3.9.5 Construction Phase Emissions

3.9.5.1 Fugitive Emissions of Particulate Matter

The IAQM guidance on the assessment of dust from demolition and construction (IAQM, 2014) was used in this assessment to determine the significance of effect due to dust arising from the construction phase of the Proposed Development upon human receptors.

The Proposed Development site was firstly allocated a risk category based on the following two factors:

- The scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large; and
- The sensitivity of the area to dust impacts, which is defined as low, medium or high sensitivity.

These two factors were then combined to determine the risk of dust impacts with no mitigation applied.

Experience in the UK is that good site practice is capable of mitigating the impact of fugitive emissions of particulate matter effectively. In all but the most exceptional circumstances, effects at receptors can be controlled to ensure residual risk of impacts are negligible to low at worse and are therefore not significant.

3.9.6 Operational Emissions

3.9.6.1 Road Traffic Emissions – Human Receptors

The change in pollutant concentrations with respect to future baseline concentrations has been described at receptors that are representative of exposure to impacts on local air quality within the study area. The absolute magnitude of pollutant concentrations in the "future without-Proposed Development" and "future with-Proposed Development" scenarios is also described, and this is used to consider the risk of the AQSs being exceeded in each scenario.

For a change of a given magnitude, the IAQM (EPUK & IAQM, 2017) have published recommendations for describing the magnitude of impacts and determining the significance of such impacts at individual receptors. The impact descriptors are summarised in **table 4.** A change of less than 0.5% of the Air Quality Assessment Level (AQAL) is described as Negligible.

Table 4 - Impact Descriptors for Individual Receptors

Long Term Average Concentration at Receptor in Assessment Year	% Change in concentration relative to Air Quality Assessment Level (AQAL)			
	1	2-5	6-10	>10
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

3.9.6.2 Traffic Emissions – Ecological Receptors

The IAQM Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2020) provides the following screening criteria to identify any potentially adverse impacts at designated ecological sites:

- Change in AADT flows on a given road of >1000 LDVs or >200 HDVs; and/or
- Process contribution resulting in a change in pollutant concentration >1% of the critical level / critical load for relevant habitats.

The guidance states that the above criteria must consider the Proposed Development solely and in-combination with other developments. The Proposed Development, solely, and in combination with committed developments will result in a change in LDV AADT flows >1000 on Gilmerton Road passing the site.

This AQIA reports on the following:

- Proposed Development contribution to NO_x concentrations at relevant ecological sites, including numerical magnitude and percentage changes for comparison with the 1% screening criterion;
- Total NO_x concentration (in-combination) at relevant ecological sites and comparison with the critical level of 30 $\mu g/m^3$.

Based on the above; recommendations are then made in the results section of this report (**Section** Error! Reference source not found.) as to whether further assessment work may be required at detailed design stage to ascertain the potential impacts and resulting significance of effects. This would typically include assessment against both critical levels and critical loads and require specialist inputs from an ecologist to confirm relevant habitat locations and sensitivities, to determine the effect of significance.

3.9.7 Overall Assessment of Significance at Sensitive Receptors

The significance of individual impacts has also been considered for the Proposed Development in overall terms. The potential for the Proposed Development to contribute to or hinder the successful implementation of policies and strategies for the management of local air quality at larger scale than at individual receptors, was considered if relevant and overall impact/risk descriptors derived.

Table summarises the descriptors used to characterise the overall significance of effects at sensitive receptors.

Table 5 - Descriptors used for the Overall Assessment of Significance at Sensitive Receptors

Overall Impact/Risk Descriptor	Significance
Substantial/High	A significant effect that is likely to be a material consideration in its own right.
Moderate/Medium	A significant effect that may be a material consideration in combination with other significant effects but is unlikely to be a material consideration in its own right.
Minor/Low	An effect that is not significant but that may be of local concern.
Negligible	An effect that is not significant change.

4. Baseline Environment

4.1 Dust Conditions

A background level of dust exists in all urban and rural locations in the UK. Dust can be generated on a local scale from vehicle movements and from the action of wind on exposed soils and surfaces. Dust levels can be affected by long-range transport of dust from distant sources into the local vicinity.

Residents currently experience dust deposition at a rate that is determined by the contributions of local and distant sources. This baseline rate of soiling is considered normal and varies dependent on prevailing climatic conditions. The tolerance of individuals to deposited dust is therefore shaped by their experience of baseline conditions.

Typical existing local sources of particulate matter includes wind-blown dust from agricultural land, exhaust emissions from energy plant, industry and road vehicles, brake and tyre wear from road vehicles and the long-range transport of material from outside the study area.

4.2 Baseline Pollutant Concentrations within the Study Area

There are no background MLC monitoring sites within the study area however there are roadside diffusion tube sites nearby in Dalkeith and Lasswade.

There are 4 roadside monitoring sites that have been used to help establish baseline concentrations for the area. Diffusion tube sites ED1, ED2, LW1 and LW2 all lie within 2 km of the Proposed development. The average annual mean NO_2 concentrations for these sites are shown in **table 6.**

Table 6– Average Annual Mean NO_2 Concentrations at Selected Diffusion Tube Monitoring Sites

Site ID	X & Y Coordinates	Average Annual Mean NO_2 Concentrations Between 2015 – 2018 ($\mu g/m^3$)
ED1	333205 , 667372	29.5
ED2	332996 , 667122	20
LW1*	330342 , 666138	22
LW2*	330568 , 666125	28

*Data only available from 2017 -2018

The diffusion tube sites recorded NO_2 annual mean concentrations which are significantly below the annual mean AQS for this pollutant (40 $\mu g/m^3$). The data reported is the most recent data available from these monitoring sites.

The monitored roadside concentrations on the main routes through Dalkeith and Lasswade are not directly representative of baseline concentrations across the Proposed Development area as they are expected to experience higher levels of traffic than at the Proposed Development. The 2021 background pollutant concentrations as reported in the 2018-updated Scottish Air Quality (Scottish Air Quality, 2021) and Department for Environment, Food & Rural Affairs (DEFRA) (DEFRA, 2021) background maps provide a good indication of the current pollutant concentrations across the Proposed Development site.

The 2021 background maps return the following pollutant concentrations for the 1km x 1km grid square containing the Proposed Development site:

- NO_2: 11.6 $\mu g/m^3$;
- PM_{10}: 12 $\mu g/m^3$; and

- $PM_{2.5}$: 6.3 µg/m^3.

The current pollutant concentrations across the Proposed Development site are therefore significantly below the AQSs.

5. Assessment Results

5.1 Future Baseline 2023 Concentrations Without Proposed Development

The future baseline without-Proposed Development scenario was modelled using future road traffic flows based on natural growth from the baseline survey counts and including contributions from committed developments as provided by Transport Planning Limited.

The traffic flows used for each road link are presented in **Appendix 2**.

5.1.1 Predicted Concentrations of NO_2

The predicted annual mean NO_2 concentrations at all the selected human receptors are displayed in **Appendix 6 – Table 6-A.**

Predicted future concentrations at all the existing human receptors are significantly below the annual mean AQS for NO_2 (40 µg/m^3).

The highest predicted concentration at all existing human receptors is 19.3 µg/m^3 at receptor R1 (residential property on Edinburgh Road, Dalkeith).

Predicted concentrations at all the existing human receptors in the study area are significantly below the annual mean equivalent (60 µg/m^3) for the hourly mean NO_2 standard. Consequently, it can be concluded that there are no predicted exceedances of the hourly standard for NO_2 (200 µg/m^3 not to be exceeded more than 18 times) at any receptors within the study.

5.1.2 Predicted Concentrations of PM_{10}

The predicted annual mean PM_{10} concentrations at all existing human receptors are displayed in **Appendix 6 – Table 6-B.**

Predicted future concentrations at all existing human receptors are significantly below the annual mean AQS for PM_{10} (18 µg/m^3).

The highest predicted concentration at all existing human receptors is 13.7 µg/m^3 at receptor H1 (hospitality venue, Gilmerton Road).

The annual mean PM_{10} concentrations at all existing human receptors are <14 µg/m^3; therefore, the TG16 formulae (Department for Environment Food and Rural Affairs, 2021) cannot be used to determine the number of exceedances of the PM_{10} daily mean AQS. The annual mean PM_{10} concentrations at all existing human receptors are however significantly below the annual mean AQS and therefore it is predicted that the 24-hour AQS (>50 µg/m^3 more than 7 times a year) will not be exceeded.

5.1.3 Predicted Concentrations of $PM_{2.5}$

The predicted annual mean $PM_{2.5}$ concentrations at all existing human receptors are displayed in **Appendix 6 – Table 6-C.**

Predicted future concentrations at all existing human receptors are significantly below the annual mean AQS for $PM_{2.5}$ (10 µg/m^3).

The highest predicted concentration at all existing human receptors is 7.3 µg/m^3 at receptor H1 (hospitality venue, Gilmerton Road).

5.1.4 Predicted Concentrations of NO_x – Ecological Receptors

The predicted annual mean NO_x concentrations at all selected ecological receptors are displayed in **Appendix 6 – Table 6-D.**

Predicted future concentrations are below the annual mean AQS for NO_x (30 µg/m^3) at all ecological receptors except for E9, E10, E11 and E12.

The maximum predicted concentration at a roadside receptor is 40.5 µg/m^3 at E9 which falls below the AQS within 20 m of the roadside (receptor E9-20m).

As explained in Section 3.6.2.2, the predictions at E9 and E10 are considered to be overestimates as they are predicted at the elevated road level and not at the actual ecological site ground level where the AQS should apply.

For receptors E11 and E12, the designated site is level with the roadside, therefore the predicted concentrations at these locations are considered to be representative of the exposure to NO_x of the AWI.

The predicted annual mean concentration of NO_x at E11 adjacent to the roadside is 34.3 µg/m^3, decreasing to 28.5 µg/m^3 within 10 m of the roadside.

The predicted annual mean concentration of NO_x at E12 adjacent to the roadside is 31.2 µg/m^3, decreasing to 28.6 µg/m^3 within 10 m of the roadside.

5.2 Future 2023 Concentrations With Proposed Development

5.2.1 Construction Dust Emissions

As with the majority of construction projects of this type, the early phases of the works are likely to involve excavations and earthworks and temporary stockpiling of potentially dusty materials. During the middle phases, when the buildings are erected, the principal sources of dust are likely to be from the cutting and grinding of materials and the movement of construction related road vehicles. The latter phases, when the majority of the buildings and infrastructure are complete, will involve the landscaping and finishing works. During these phases, the principal sources of dust will include the storage, handling and movement of materials generated during the associated earthworks.

The proposal has the potential to increase levels of airborne dust and PM_{10} during the construction phase. Specifically, there is potential for exposure to dust emissions at neighbouring residential, and public amenity properties.

A dust risk assessment has been carried out using the IAQM guidance criteria (IAQM, 2014) to determine the potential construction phase effects. The assessment process is presented in **Appendix 7** and summarised in **8.**

The dust risk assessment concluded the following:

- There are estimated to be 1 - 10 highly sensitive human receptors within 100 m of the proposed earthworks and construction activity areas;
- There are estimated to be 1 - 10 highly sensitive human receptors within 50 m of the proposed track-out route;
- There is a low risk of dust soiling impacts on nearby sensitive human receptors as a result of earthworks and low risk from construction activities without mitigation;
- There is a low risk of dust soiling impacts on nearby sensitive human receptors as a result of track-out without mitigation;

- There is a low risk of human health impacts on nearby sensitive human receptors as a result of earthworks and track-out without mitigation;
- There is a low risk of human health impacts on nearby sensitive human receptors as a result of construction without mitigation;
- There are estimated to be 1 - 10 low sensitivity ecological receptors within 50 m of the proposed earthworks and construction activity areas;
- There are estimated to be 1 - 10 low sensitivity ecological receptors within 20 m of the proposed track-out route; and
- There is a low risk of dust impacts on nearby ecological receptors as a result of earthworks, construction and track-out activities without mitigation.

Table 7 below summaries the potential risk of dust impacts on nearby sensitive receptors, without specific mitigation measures in place.

Table 7 - Summary of Construction Phase Risk of Dust Impacts

Potential Impact	Risk of Dust Impact			
	Demolition	Earthworks	Construction	Track-out
Dust Soiling	N/A	Low	Low	Low
Human Health	N/A	Low	Low	Low
Ecological Receptors	N/A	Low	Low	Low

5.2.2 Operational Phase Emissions

The future baseline with-Proposed Development scenario was modelled using future road traffic flows based on natural growth and included additional predicted traffic generated from the Proposed Development and from other committed developments nearby.

The traffic flows used for each road link are presented in **Appendix 2**.

5.2.2.1 Predicted Concentrations of NO_2

The predicted annual mean NO_2 concentrations at all existing human receptors are displayed in **Appendix 6 – Table 6-A.**

Predicted future concentrations at all existing human receptors are significantly below the annual mean AQS for NO_2 (40 µg/m^3).

The highest predicted concentration at all existing human receptors is 19.4 µg/m^3 at receptor R1 (residential property on Edinburgh Road, Dalkeith). The Proposed Development contribution to NO_2 concentrations at this receptor is 0.1 µg/m^3, which is less the 0.5% of the AQS and is therefore **Negligible**.

The impact descriptor for annual mean NO_2 concentrations at all other existing human receptors is also assessed as **Negligible**.

Predicted concentrations at all the existing human receptors in the study area are significantly below the annual mean equivalent (60 µg/m^3) for the hourly mean NO_2 standard (200 µg/m^3 not to be exceeded more than 18 times). Consequently, it can be concluded that there are no predicted exceedances of the hourly standard at any receptor within the study.

5.2.2.2 Predicted Concentrations of PM_{10}

The predicted annual mean PM_{10} concentrations at all existing human receptors are displayed in **Appendix 6 – Table 6-B.**

Predicted future concentrations at all existing human receptors are significantly below the annual mean AQS for PM_{10} (18 µg/m^3).

The highest predicted concentration at all existing human receptors is 13.9 µg/m^3 at receptor H1 (hospitality venue, Gilmerton Road). The Proposed Development contribution to PM_{10} concentration at this receptor is 0.05 µg/m^3 which is below 0.5% of the AQS and is therefore **Negligible**.

The annual mean PM_{10} concentrations at all selected human receptors are <14 µg/m^3; therefore, the TG16 formulae (Department for Environment Food and Rural Affairs, 2021) cannot be used to determine the number of exceedances of the PM_{10} daily mean AQS. The annual mean PM_{10} concentrations at all selected human receptors are however significantly below the annual mean AQS and therefore the 24-hour AQS (>50 µg/m^3 more than 7 times a year) will not be exceeded.

5.2.2.3 Predicted Concentrations of $PM_{2.5}$

The predicted annual mean $PM_{2.5}$ concentrations at all existing human receptors are displayed in **Appendix 6 – Table 6-C.**

Predicted future concentrations at all existing human receptors are significantly below the annual mean AQS for $PM_{2.5}$ (10µg/m^3).

The highest predicted concentration at all existing human receptors is 7.3 µg/m^3 at receptor H1 (hospitality venue, Gilmerton Road). The Proposed Development contribution to $PM_{2.5}$ concentration at this receptor is 0.02µg/m^3 which is below 0.5% of the AQS and is therefore **Negligible**.

5.2.2.4 Predicted Concentrations of NO_x – Ecological Receptors

The predicted annual mean NO_x concentrations at all selected ecological receptors are displayed in **Appendix 6 – Table 6-D.**

Predicted future concentrations are below the annual mean AQS for NO_x (30 µg/m^3) at all ecological receptors except for E9, E10, E11 and E12.

The maximum predicted concentration at a roadside receptor is 40.9 µg/m^3 at E9 which falls below the AQS within 30 m of the roadside (receptor E9-30m).

As explained in Section 3.6.2.2, the predictions at E9 and E10 are considered to be overestimates as they are predicted at the elevated road level and not at the actual ecological site ground level where the AQS should apply.

It is therefore anticipated that NO_x concentrations at the ground level of E9 and E10 will be significantly lower than those predicted at roadside level and approaching the background concentration of 14.9 µg/m^3 for the grid square and that the Proposed Development is unlikely to result in a change of >1% of the Critical Level at the AWI sites E9 and E10.

For receptors E11 and E12, the designated site is level with the roadside, therefore the predicted concentrations at these locations are considered to be representative of the exposure to NO_x of the AWI.

The predicted annual mean concentration of NO_x at E11 adjacent to the roadside is 34.7 µg/m^3, decreasing to 28.8 µg/m^3 within 10 m of the roadside.

The Proposed Development will result in a maximum change of up to 1.3% (0.4 µg/m^3) of the AQS (Critical Level) at this location. The predicted change in concentration associated with the Proposed Development reduces rapidly with distance and is predicted to fall below 1% of the Critical Level within the first 10 m of the AWI designation boundary adjacent to the A772.

The predicted annual mean concentration of NO_x at E12 adjacent to the roadside is 31.5 µg/m^3, decreasing to 28.9 µg/m^3 within 10 m of the roadside.

The Proposed Development will result in a maximum change of up to 1.1% (0.3 µg/m^3) of the AQS (Critical Level) at this location. The predicted change in concentration associated with the Proposed Development reduces rapidly with distance and is predicted to fall below 1% of the Critical Level within the first 20 m of the AWI designation boundary adjacent to the A7.

Based on the above it is clear that the Proposed Development is not the cause of exceedance of the Critical Level at any receptor, and the Proposed Development NO_x contributions are only predicted to exceed 1% of the Critical Level across an area up to 20 m from any designation boundary (depending on the location) (refer to **Appendix 5 –** Error! Reference source not found.).

5.3 Assessment of Significance

5.3.1 Construction Dust Emissions

The good-practice mitigation measures and site-specific mitigation measures outlined in **Appendix 7** will be adopted to minimise identified risks such that the residual impacts are negligible to low and therefore effects upon dust soiling and human health are ***not significant***. The good practice and site-specific mitigation measures will be included in a Construction Environmental Management Plan (CEMP) submitted by the contractor to the local authority for approval prior to the commencement of any works.

5.3.2 Operational Phase Emissions

The total predicted concentrations and impact descriptors at all sensitive human receptors have been considered. Predicted impact descriptors are all negligible and the overall effect of the Proposed Development on local air quality at human receptors is therefore assessed as ***Not Significant***.

Exceedances of the NO_x critical level have been predicted at four roadside ecological receptors however, these will not occur as a result of the Proposed Development traffic generation, and they are attributed to the conservative modelling methodology (E9 and E10 woodlands modelled at elevated road height) and existing high baseline NO_x levels predicted adjacent to busy roads.

The predicted change in concentration associated with the Proposed Development at the AWI designations adjacent to the A772 (E11) and the A7 (E12) will reduce rapidly with distance and will fall below the screening criteria of 1% of the critical level within the first 10 and 20 m of the AWI designation boundaries respectively.

The overall effect of the Proposed Development on ecological receptors is assessed as ***Not Significant.***

5.4 Site Suitability

Predicted concentrations at a selected proposed receptor (PR) within the Proposed Development are provided in **Appendix 6 – Tables 6-A to 6-B**.

The maximum predicted annual mean NO_2, PM_{10} and $PM_{2.5}$ concentration at the proposed receptor is 16.7 µg/m^3, 13.6 µg/m^3, and 7.2 µg/m^3 and are therefore significantly below the annual mean AQSs.

Predicted NO_2 concentrations at the proposed receptor is significantly below the annual mean equivalent (60 µg/m^3) for the hourly mean NO_2 standard (200 µg/m^3 not to be exceeded more than 18 times). It can therefore be concluded that there are no predicted exceedances of the hourly standard at the proposed receptor which is the only AQS relevant for the short-term public exposure that is likely to apply at the Proposed Development.

Overall, with respect to air quality, the Proposed Development site is assessed as suitable for its future intended use.

6. Mitigation

6.1 Proposed Mitigation for Construction Dust Management

The general mitigation measures that will be implemented during the construction phase to minimise risks of adverse air quality effects will be collated within a Construction Environmental Management Plan (CEMP) and will include actions such as those listed in **Appendix 7**.

6.2 Proposed Mitigation for Operational Traffic Emissions Management

This AQIA has been undertaken following a conservative methodology and therefore no mitigation measures are deemed to be required with regard to operational traffic emissions.

7. Conclusions

This report is the AQIA for the proposed mixed-use development at South Sheriffhall, Midlothian.

The assessment has been undertaken to demonstrate compliance with AQOs as set out in the NAQS and adopted into AQSs for Scotland. It has been undertaken in accordance with IAQM, EPUK and DEFRA technical guidance and MLC planning policy.

Detailed dispersion modelling using the ADMS-Roads modelling software was undertaken to predict the concentrations of NO_2, PM_{10} and $PM_{2.5}$ at existing sensitive human receptors and concentrations of NO_x at sensitive ecological receptor locations within the study area, due to emissions from road traffic, in conjunction with predicted future background concentrations.

No exceedances of the AQSs for NO_2, PM_{10} and $PM_{2.5}$ (human receptors) are predicted at any of the sensitive human receptors within the study area.

The predicted change in NO_2, PM_{10} and $PM_{2.5}$ (human receptors) annual mean concentrations between the future without Proposed Development and future with Proposed Development scenarios shows that the Proposed Development is predicted to have a **Negligible** impact at all human receptors within the study area.

The predicted short-term mean concentrations for NO_2 and PM_{10} (human receptors) which are relevant for the short-term exposure of members of public, comply with the relevant AQSs for NO_2 and PM_{10} at all human receptors.

Exceedances of the NO_x critical level have been predicted at four roadside ecological receptors however, these will not occur as a result of the Proposed Development traffic generation, and they are attributed to the conservative modelling methodology (E9 and E10 woodlands modelled at elevated road height) and existing high baseline NO_x levels predicted adjacent to busy roads.

The predicted change in concentration associated with the Proposed Development at the AWI designations adjacent to the A772 (E11) and the A7 (E12) will reduce rapidly with distance and will fall below the screening criteria of 1% of the critical level within the first 10 and 20 m of the AWI designation boundaries respectively.

In summary, the significance of effect associated with operational phase emissions upon local air quality of the Proposed Development is assessed as ***not significant***.

With regards to the risks of dust impacts predicted in the included construction dust risk assessment, the good-practice mitigation measures and site-specific mitigation measures outlined in **Appendix 7** will be adopted to minimise the risks identified, such that the residual impact of dust is negligible and therefore ***not significant***. These will be included in a Construction Environmental Management Plan (CEMP) submitted by the contractor to the local authority for approval prior to the commencement of any works.

The Proposed Development site is assessed as suitable for the intended future use with regard to air quality.

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Figures

N

Sheriffhall Farm

Dean Burn

A7

OLD DALKEITH ROAD

Unit 01

Unit 02

Unit 03

Unit 04

Unit 05

GILMERTON ROAD

MELVILLE GATE ROAD

Contains OS data © Crown Copyright and database right 2020

KEY

Site Boundary

Not to Same Scale

Contains OS data © Crown Copyright and database right 2020

0 50 100 m

Scale 1:2,000 @ A3

ITPENERGISED

Sheriffhall South
Air Quality Impact Assessment

Figure 1

Site Location and Layout

Date:	Drawn by:	Checked by:	Version:
03/11/2021	ER	AD	V1

Project Number: 4458

KEY

- Site Boundary
- MLC Diffusion Tube Monitoring Site
- Ecological Receptors
- Human Receptors
- Proposed Receptor
- Modelled Roads
- Modelled Roads for Verification

0 300 600 m

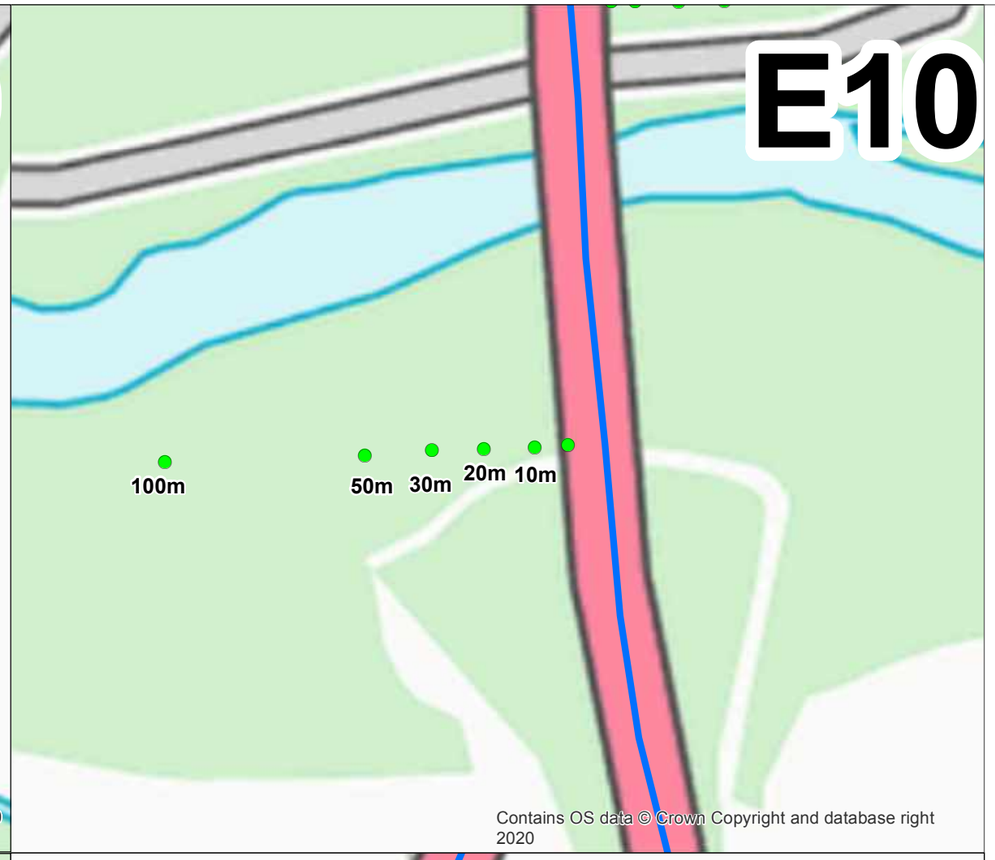
Scale 1:12,000 @ A3

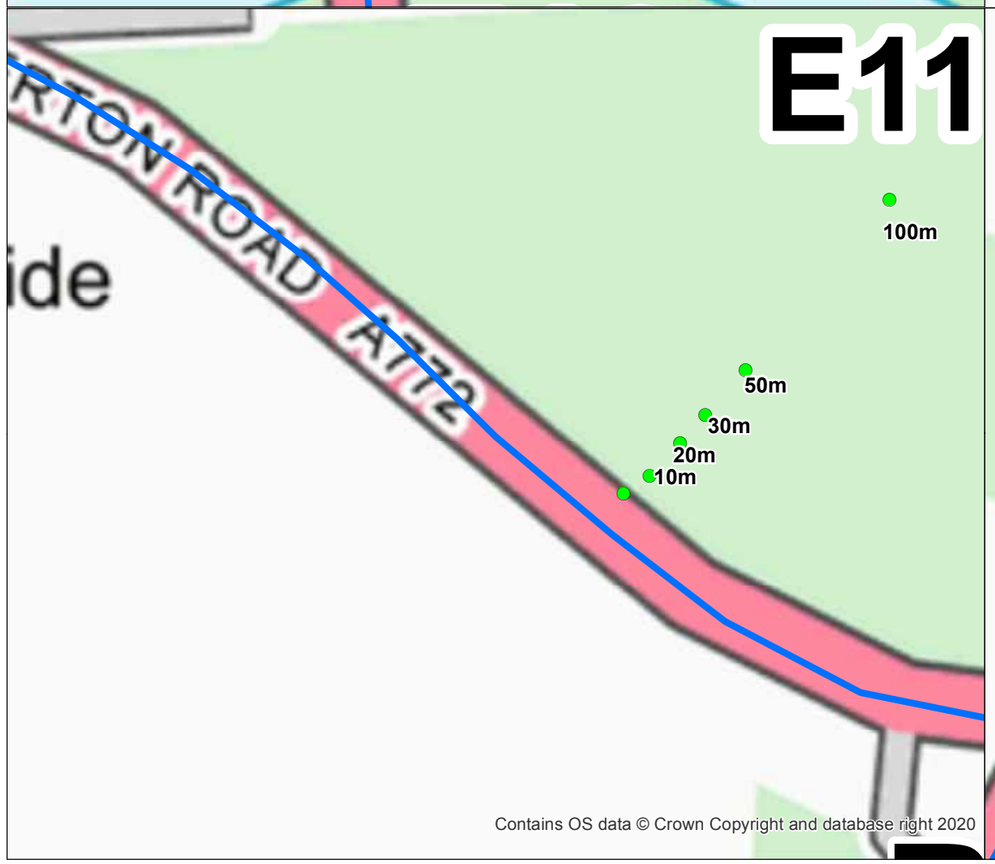
ITPENERGISED

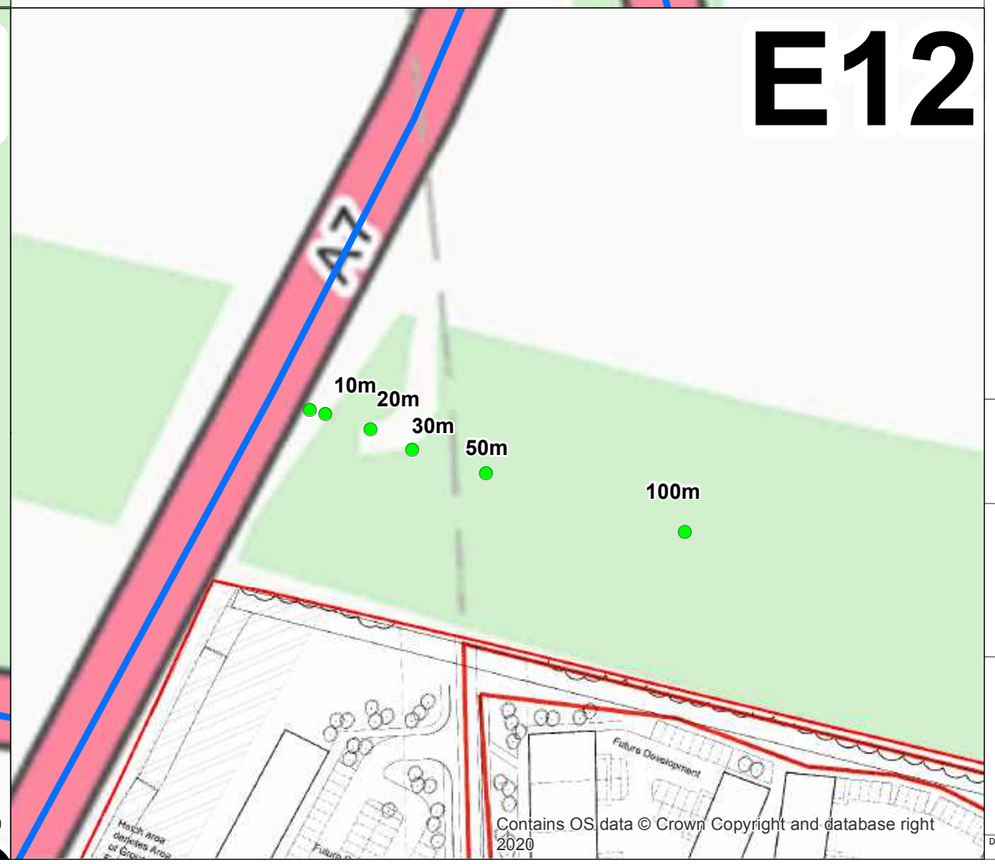
Sheriffhall South
Air Quality Impact Assessment
Figure 2
Modelled Roads and Receptors

Date:	Drawn by:	Checked by:	Version:
03/11/2021	ER	AD	V1

Project Number: 4458







KEY

- Site Boundary
- Ecological Receptors
- Modelled Roads

0 25 50 m

Scale 1:1,500 @ A3

ITPENERGISED

Sheriffhall South
Air Quality Impact Assessment
Figure 3
Additional Eco Receptors

Date:	Drawn by:	Checked by:	Version:
03/11/2021	ER	AD	V1

Project Number: 4458

N

Summerside

A720

H BYPASS A720

Sheriffhall Farm

350m

100m

50m

20m

50m

20m

Dean Burn

E12

E1

E4

E7

E8

Melville Cottages

A7106

GILMERTON ROAD

DALKEITH

High Wood

KEY

- Site Boundary
- Construction Dust Risk Buffer
- Track-out Route
- Track-out Dust Risk Buffer
- Ecological Receptors

0 100 200 m

Scale 1:4,500 @ A3

ITPENERGISED

South Sheriffhall
Air Quality Impact Assessment
Figure 4

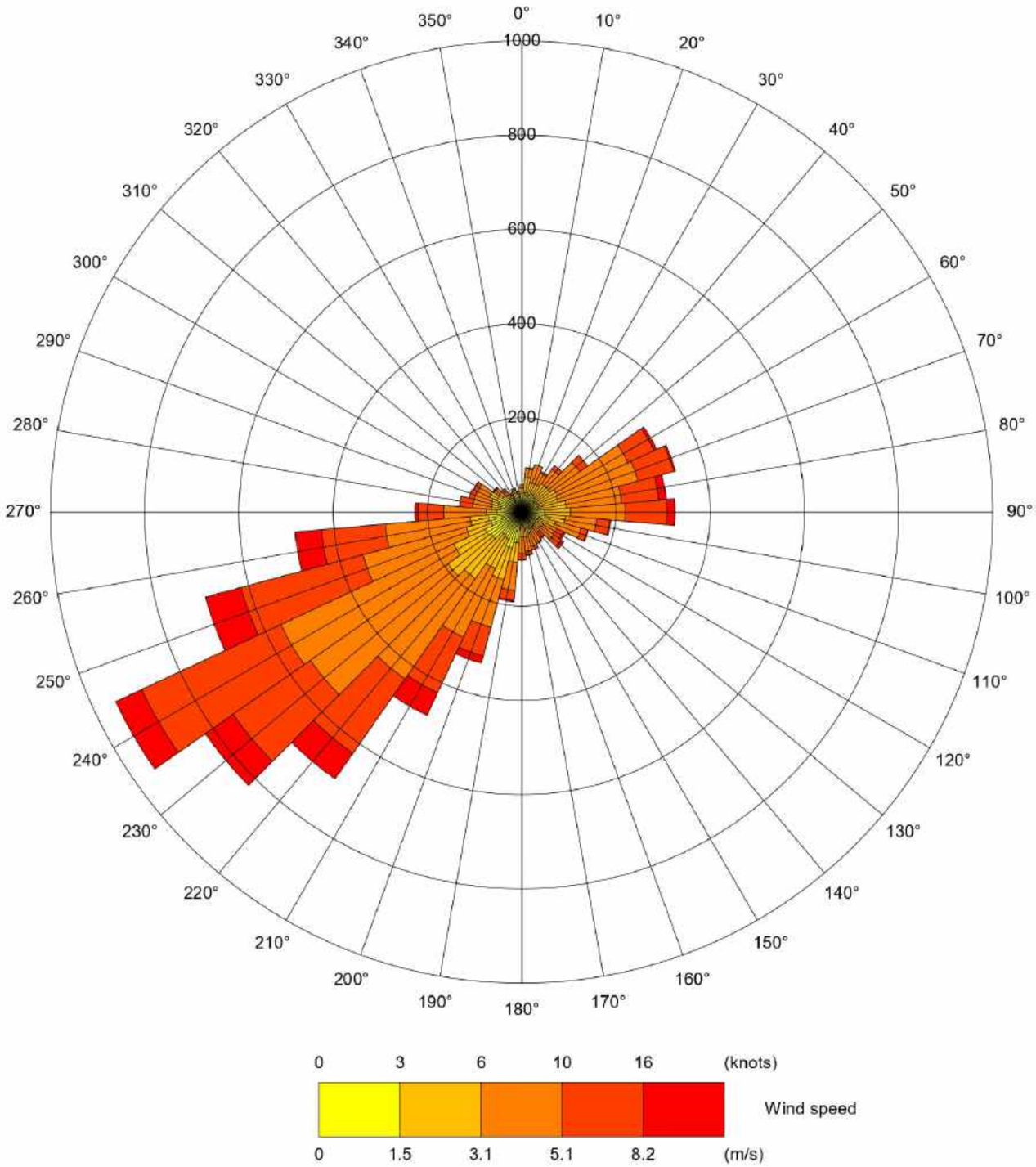
Construction Phase Dust Risk Assessment Study Area

Date:	Drawn by:	Checked by:	Version:
03/11/2021	ER	AD	V1

Project Number: 4458

N

Wind Rose for Gogarbank 2018



ITPENERGISED

Sheriffhall South
Air Quality Impact Assessment

Figure 5

Hourly Wind Rose Gogarbank 2018

Date:	Drawn by:	Checked by:	Version:
27/10/2021	ER	AD	V1

Project Number: 4458

Appendix 1 Consultation Correspondence

Annie Danskin

From: Jonas Beaugas <jonas.beaugas@itpenergised.com>
Sent: 13 September 2021 10:59
To: environmentalhealth@midlothian.gov.uk
Cc: Jonas Beaugas; Gregor Massie
Subject: Proposed Mixed Use Development at Land at Sheriffhall South, Gilmerton Road Dalkeith (Planning Reference: 21/00416/PAC) - Air Quality Consultation

Dear Sir/Madam,

We have been appointed to undertake the air quality impact assessment (AQIA) for a proposed mixed-use development the ('Proposed Development') at land at Sheriffhall South, Gilmerton Road in Dalkeith (HERE) within Midlothian Council (MLC) administrative area.

The planning application is a hybrid planning application for the following (major development):

1. *"Full Planning Permission for the erection of Business (Class 4), Storage & Distribution (Class 6) development and Class 3 / Sui Generis Drive Thru Coffee Shop, with associated car parking, access, infrastructure and landscaping proposals; and*
2. *Planning Permission in Principle for Business (Class 4) and Storage & Distribution (Class 6) development with ancillary offices and associated access infrastructure works (detailed matters of appearance, landscaping, layout and scale are reserved for subsequent approval)."*

Please note that the use class mix is currently being confirmed against the layout.

At this stage the Proposed Development does not include any large combustion sources forming part of an energy centre or industrial/commercial process– however this will be confirmed.

Could you please review the proposed scope and methodology detailed below at your earliest convenience and confirm that these are acceptable.

Please do not hesitate to give me a call should you have any questions (07982 606925).

Thank you and Kind Regards,

Jonas Beaugas

Proposed Scope

The AQIA will be undertaken in accordance with relevant statutory and non-statutory guidance on air quality assessment and will give reference to local policy and Local Air Quality Management (LAQM) reports, including:

1. Defra and Devolved Administrations, LAQM Technical Guidance (TG16) – 2021;
2. Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) Land-Use Planning & Development Control: Planning for Air Quality – 2017;
3. IAQM, Guidance on the assessment of dust from demolition and construction – 2014;
4. IAQM, A Guide to the assessment of air quality impacts on designated nature conservation sites (2020);
5. MLC latest Air Quality Annual Progress Report (APR); and
6. MLC Local development plan (2017).

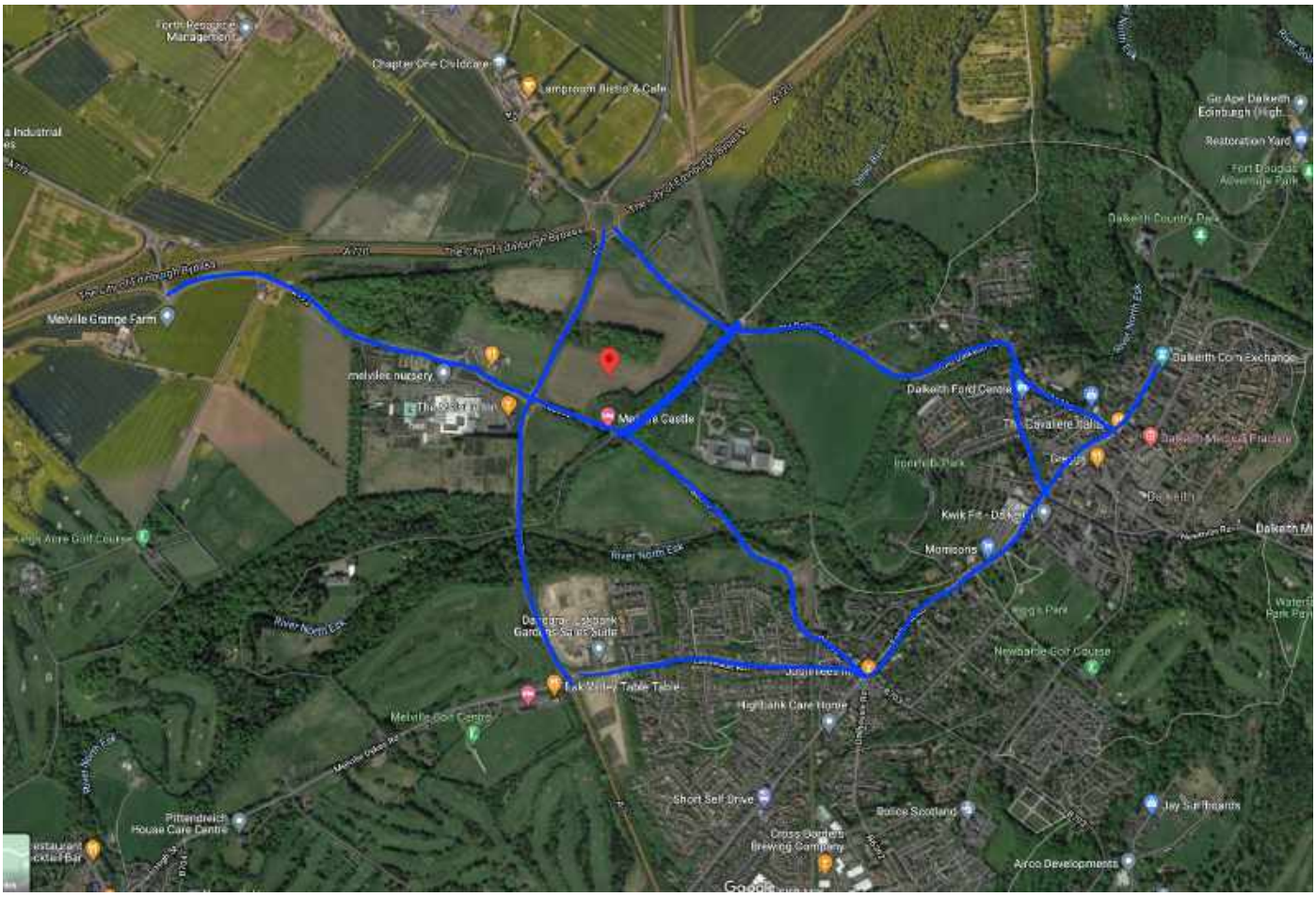
The scope of the AQIA will include the followings:

- Consultation with MLC Environmental Health Officer;
- Desktop review of baseline air quality in the locality;

- Collection of road traffic data in the form of 24-hour Annual Average Daily Traffic, including average speed and percentage of heavy duty vehicles (HDV) via the appointed transport consultant;
- Prediction of baseline air quality using Advanced Dispersion Modelling software (ADMS-Roads V5);
- Comparison of model-predicted baseline concentrations with local monitoring data and completion of a model verification exercise (where possible);
- Prediction of the change in nitrogen dioxide (NO_2) and fine particulates (PM_{10} and $PM_{2.5}$) between the future without and future with Proposed Development Scenario and assessment of impacts;
- Qualitative assessment of construction phase dust impacts;
- Screening assessment of construction phase traffic;
- Assessment of site suitability for proposed use; and
- Identification of mitigation measures if required.

Operational Phase

Traffic data available for the study are yet to be confirmed, however we intend to consider the links in blue on the below. The study area will however be finalised and may increase or reduce following discussions with the appointed traffic consultant based on data availability and predicted changes in traffic on the local road network.



The following traffic scenarios will be considered:

- Baseline for model verification purpose (representative of 2019 flows for model verification);
- Future baseline without Proposed Development but including growth and committed developments; and
- Future baseline (as above) + Proposed Development generated traffic.

The completion year is yet to be confirmed.

The assessment will consider emissions of NO_2 and particulates PM_{10} and $PM_{2.5}$.

Model verification will be undertaken using suitable MLC monitoring sites located along modelled roads. No air quality monitoring is proposed.

We would propose to carry out the assessment using a single year of world meteorological organisation (WMO) synoptic data from Edinburgh Gogarbank for the baseline year.

NO_2, PM_{10} and $PM_{2.5}$ pollutant concentrations due to road traffic emissions will be predicted at existing and proposed human sensitive receptors and designated ecological receptors (where relevant) and then compared against the relevant Air Quality Standards (AQS). Receptors will be selected such that they represent locations with the maximum exposure.

The changes in pollutant concentrations at existing receptors between the future without and future with scenarios will be assessed in accordance with relevant guidance documents [2] & [4].

NO_x, NO_2, PM_{10} and $PM_{2.5}$ background concentrations within the study area will be derived from the DEFRA background map (2018 updated) for the relevant years (baseline and completion years). To avoid double accounting background concentration will be sector removed where required.

Construction Phase

Traffic associated with the construction phase of the Proposed Development will be of relatively short duration and of smaller magnitude compared to the operational phase traffic. It is anticipated that construction traffic will not exceed the EPUK&IAQM criteria [2]:

- *"A change of Light Duty Vehicle (LDV) flows of:*
    - *More than 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA);*
    - *More than 500 AADT elsewhere;*
- *A change of Heavy Duty Vehicle (HDV) flows of:*
    - *More than 25 AADT within or adjacent to an AQMA;*
    - *More than 100 AADT elsewhere."*

It is therefore proposed to scope out the need for a detailed assessment of construction phase traffic.

Construction phase dust impacts associated with the construction of the Proposed Development will be assessed in accordance with the IAQM Assessment of dust from demolition and construction guidance [3] and any required mitigation specified. Construction phase dust impacts will consider impacts upon human and ecological receptors (where relevant).

Data/Information Request

- Can you please let us know if there are any specific receptors we should include as part of the AQIA?
- Can you please let us know if there are any cumulative developments which should be considered as part of the AQIA?
- Can you please provide us with your latest published Annual Progress Report?

Kind Regards,

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Appendix 2 Modelled Traffic Data

SUMMARY OF TRAFFIC DATA

Scenario: **Baseline 2018 Verification**

Link	Street Name	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
1	Old DK 1	11903	11702	488	64	201	8	64	NO	9.4	
2	Old DK2	11419	11187	466	64	232	10	64	NO	7.9	
3	Edinburgh Road	11419	11187	466	32	232	10	32	NO	12	
4	Melvill Gate Road	4321	4271	178	64	50	2	64	YES	9.5	10
5	Gilmerton Road	6550	6500	271	64	50	2	64	NO	11.7	
6	Melville Road	6550	6500	271	64	50	2	64	NO	7.6	
7	Gilmerton Road 2	6862	6793	283	64	69	3	64	NO	7.7	
8	A7	22462	21217	884	96	1245	52	96	NO	11.5	
9	Gilmerton Road 3	12060	11488	479	64	572	24	64	NO	7.7	
10	A7 2	12755	11963	498	96	792	33	96	NO	7.8	
11	Eskbank Road	12361	12104	504	32	257	11	32	YES	20	8
12	Lasswade Road	4595	4487	187	48	108	5	48	NO	7	
13	Melville Dykes Road	8591	8315	346	48	276	12	48	NO	7	
14	Elm row	22234	21636	902	32	598	25	32	YES	16.8	8

SUMMARY OF TRAFFIC DATA

Scenario: **2023 Plus Committed**

Link	Street Name	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
1	Old DK 1	17140	16850	702	64	290	12	64	NO	9.4	
2	Old DK2	11679	11444	477	64	235	10	64	NO	7.9	
3	Edinburgh Road	11679	11444	477	32	235	10	32	NO	12	
4	Melvill Gate Road	4503	4453	186	64	50	2	64	YES	9.5	10
5	Gilmerton Road	6912	6861	286	64	51	2	64	NO	11.7	
6	Melville Road	6912	6861	286	64	51	2	64	NO	7.6	
7	Gilmerton Road 2	7799	7730	322	64	69	3	64	NO	7.7	
8	A7	23548	22260	927	96	1288	54	96	NO	11.5	
9	Gilmerton Road 3	17803	16979	707	64	824	34	64	NO	7.7	
10	A7 2	13329	12509	521	96	820	34	96	NO	7.8	

SUMMARY OF TRAFFIC DATA

Scenario: **2023 Plus Proposed Plus Committed**

Link	Street Name	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
1	Old DK 1	17172	16882	703	64	290	12	64	NO	9.4	
2	Old DK2	11794	11557	482	64	237	10	64	NO	7.9	
3	Edinburgh Road	11794	11557	482	32	237	10	32	NO	12	
4	Melvill Gate Road	4653	4601	192	64	52	2	64	YES	9.5	10
5	Gilmerton Road	7173	7120	297	64	53	2	64	NO	11.7	
6	Melville Road	7173	7120	297	64	53	2	64	NO	7.6	
7	Gilmerton Road 2	8918	8839	368	64	79	3	64	NO	7.7	
8	A7	24004	22691	945	96	1313	55	96	NO	11.5	
9	Gilmerton Road 3	18193	17351	723	64	842	35	64	NO	7.7	
10	A7 2	13597	12761	532	96	836	35	96	NO	7.8	

Appendix 3 Sensitive Receptors

Table 3-A – Sensitive Receptor Locations

ID	Description	Coordinates		
		X	Y	Z
Existing Human Receptors				
C1	Edinburgh Road - Church	333169	667391	1.5
R1	Edinburgh Road - Residential	333201	667382	1.5
R2	Edinburgh Road - Residential	333011	667470	1.5
R3	Edinburgh Road - Residential	332948	667610	1.5
R4	Melville Road - Residential	332432	666754	1.5
R5	Gilmerton road - Residential	331155	667629	1.5
H1	Gilmerton road - Carvery	331466	667560	1.5
H2	A7 – Melville Inn	331543	667446	1.5
Proposed Receptors				
PR	Drive Thru	331651	667488	1.5
Ecological Receptors – Ancient Woodland Inventory				
E1	AWI - Wood ID:35566	332119	667674	0
E2	AWI - Wood ID:35562	332429	667664	0
E3	AWI - Wood ID:35569	332668	667512	0
E4	AWI - Wood ID:35566	332099	667583	0
E5	AWI - Wood ID:35566	331933	667323	0
E6	AWI - Wood ID:35573	332154	667085	0
E7	AWI - Wood ID:35566	331807	667385	0
E8	AWI - Wood ID:35567	331755	667370	0
E9	AWI - Wood ID:35567	331556	667142	0
E10	AWI - Wood ID:35573	331546	667033	0
E11	AWI - Wood ID:35563	331049	667700	0
E12	AWI - Wood ID:35563	331702	667674	0
Diffusion Tube Site for Verification (2018 data)				
ED1	Edinburgh Road, Dalkeith	333203	667372	2
ED2	Eskbank Road, Dalkeith	332996	667122	2
LW1	High Street, Lasswade	330343	666138	2
LW2	Elm Row, Lasswade	330470	666125	2

Appendix 4 Sensitive Receptor Background Concentrations

Table 4-A – 2018 Annual Mean Background Concentrations at Diffusion Tube Monitoring Sites

ID	Annual Mean Background Concentrations 2018 (µg/m^3)	
	NO_2	NOx
Diffusion Tube Monitoring Sites		
ED1	11.2	16.1
ED2	11.0	16.0
LW1	9.8	14.0
LW2	9.8	14.0

Table 4-B – Annual Mean Background Concentration for 2023 at Sensitive Receptor Locations

ID	Annual Mean Background 2023 Concentrations (µg/m^3)*			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
Existing Human Receptors				
C1	13.3	9.3	10.2	5.6
R1	13.3	9.3	10.2	5.6
R2	13.3	9.3	10.2	5.6
R3	12.6	8.8	10.3	5.6
R4	12.5	8.8	10.6	5.8
R5	14.9	10.4	11.8	6.2
H1	14.9	10.4	11.8	6.2
H2	14.9	10.4	11.8	6.2
Proposed Receptor				
PR	14.9	10.4	11.8	6.2
Ecological Receptors				
E1	12.6	8.8	10.3	5.6
E2	12.6	8.8	10.3	5.6
E3	12.6	8.8	10.3	5.6
E4	12.6	8.8	10.3	5.6
E5	14.9	10.4	11.8	6.2
E6	12.6	8.8	10.3	5.6
E7	14.9	10.4	11.8	6.2
E8	14.9	10.4	11.8	6.2
E9	14.9	10.4	11.8	6.2
E10	14.9	10.4	11.8	6.2
E11	14.9	10.4	11.8	6.2
E12	14.9	10.4	11.8	6.2

Appendix 5 Model Verification

Table 5A - Comparison of Monitored vs Modelled Road NO_x

Receptor	Monitored NO2 (µg/m3)	Background NOx Concentration (µg/m3) (after sector removal)	Monitored Road NOx (µg/m3)	Modelled Road NOx (µg/m3)	% Difference NOx (Modelled-Monitored)/Monitored x100
ED1	32.4	16.1	41.6	25.4	-39%
ED2	22.2	16.0	21.0	24.4	16%
LW1	23.6	14.0	26.2	19.6	-25%
LW2	30.6	14.0	40.6	24.9	-39%

Table 5B - Comparison of Monitored vs Adjusted Road NOx

Receptor	Monitored Road NO_x (µg/m^3)	Modelled Road NO_x (µg/m^3)	Ratio of Monitored / Modelled Road NO_x	Adjustment factor for modelled road contribution	Adjusted Modelled Road NO_x (µg/m^3)	Adjusted Modelled Total NO_x (µg/m^3)
ED1	41.6	25.4	1.64	1.37	34.7	50.9
ED2	21.0	24.4	0.86	1.37	33.5	49.5
LW1	26.2	19.6	1.34	1.37	26.8	40.8
LW2	40.6	24.9	1.63	1.37	34.1	48.1

Table 5C - Comparison of Monitored vs Modelled Total NO_2

Receptor	Modelled total NO_2 (µg/m^3)	Monitored NO_2 (µg/m^3)	% Difference
ED1	29.14	32.4	-10%
ED2	28.36	22.2	28%
LW1	23.93	23.6	1%
LW2	27.52	30.6	-10%

Chart 5A - Comparison of Monitored vs Modelled Road NO_x

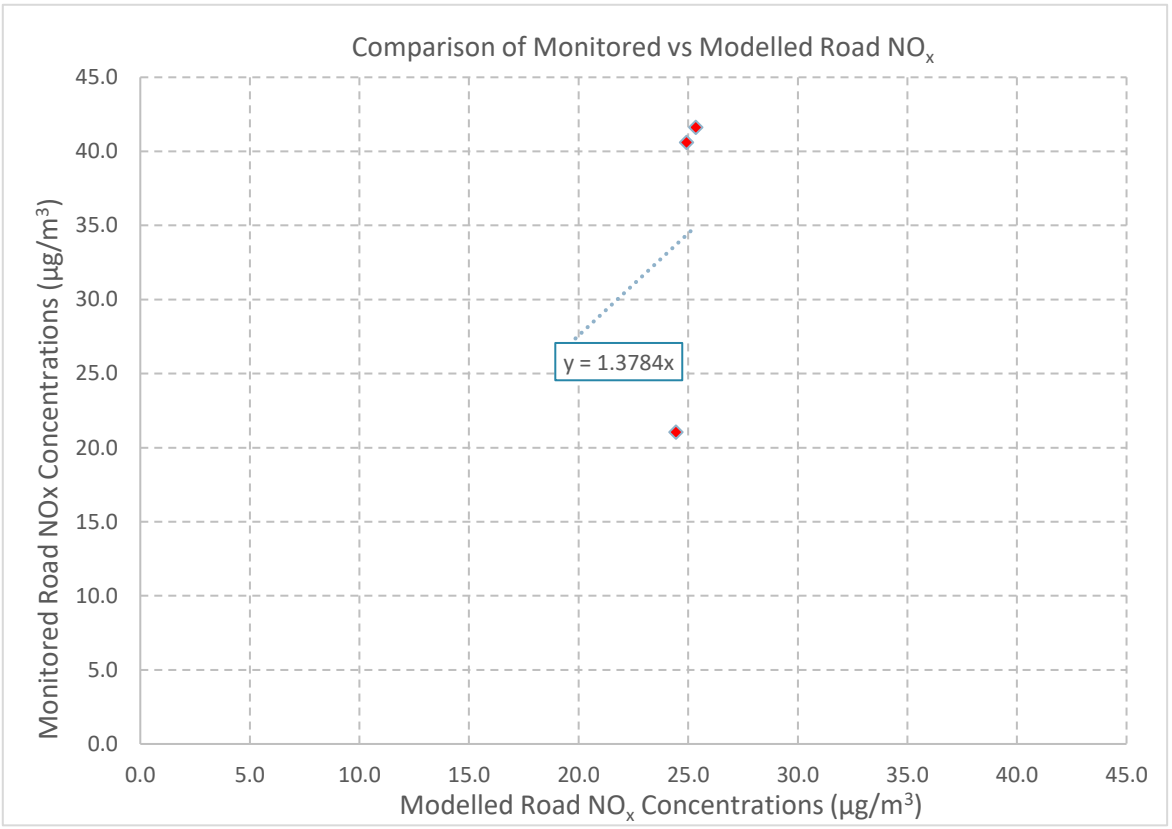


Chart 5B - Comparison of Monitored vs Adjusted Modelled Road NO_x

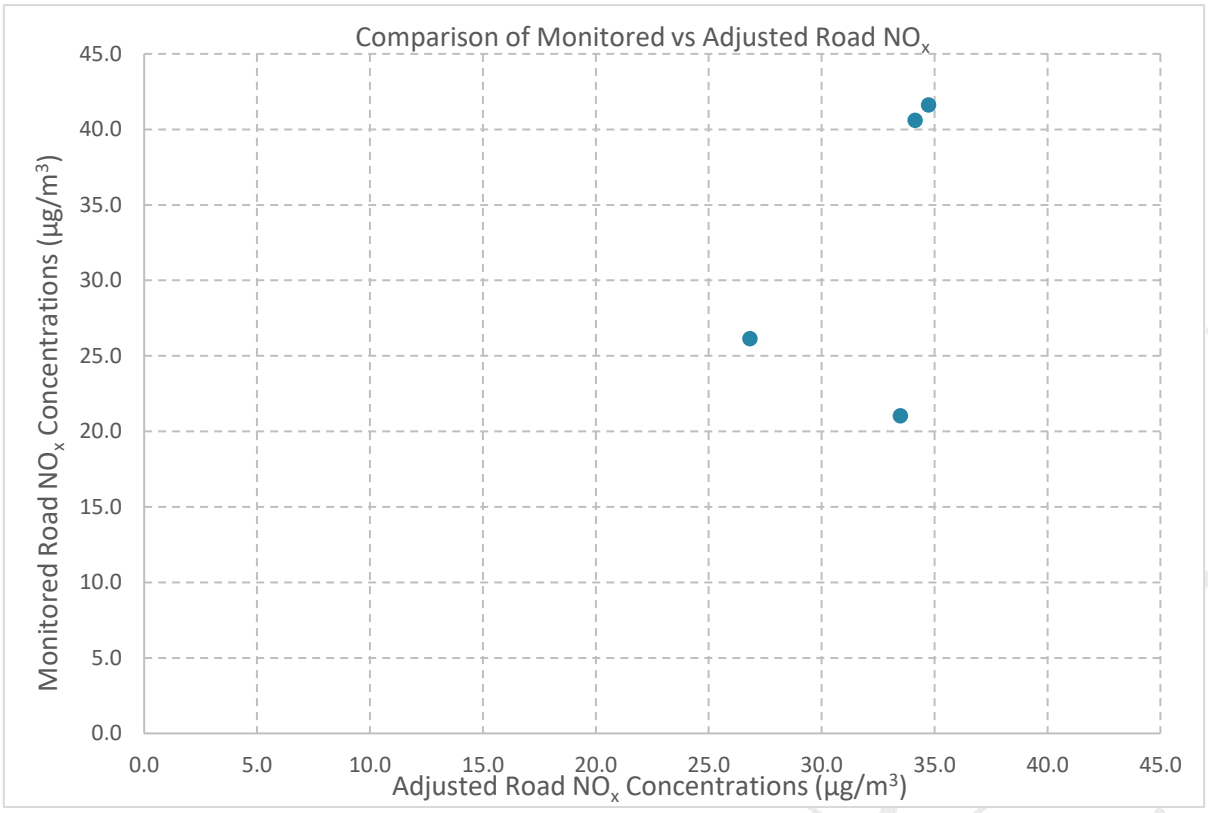
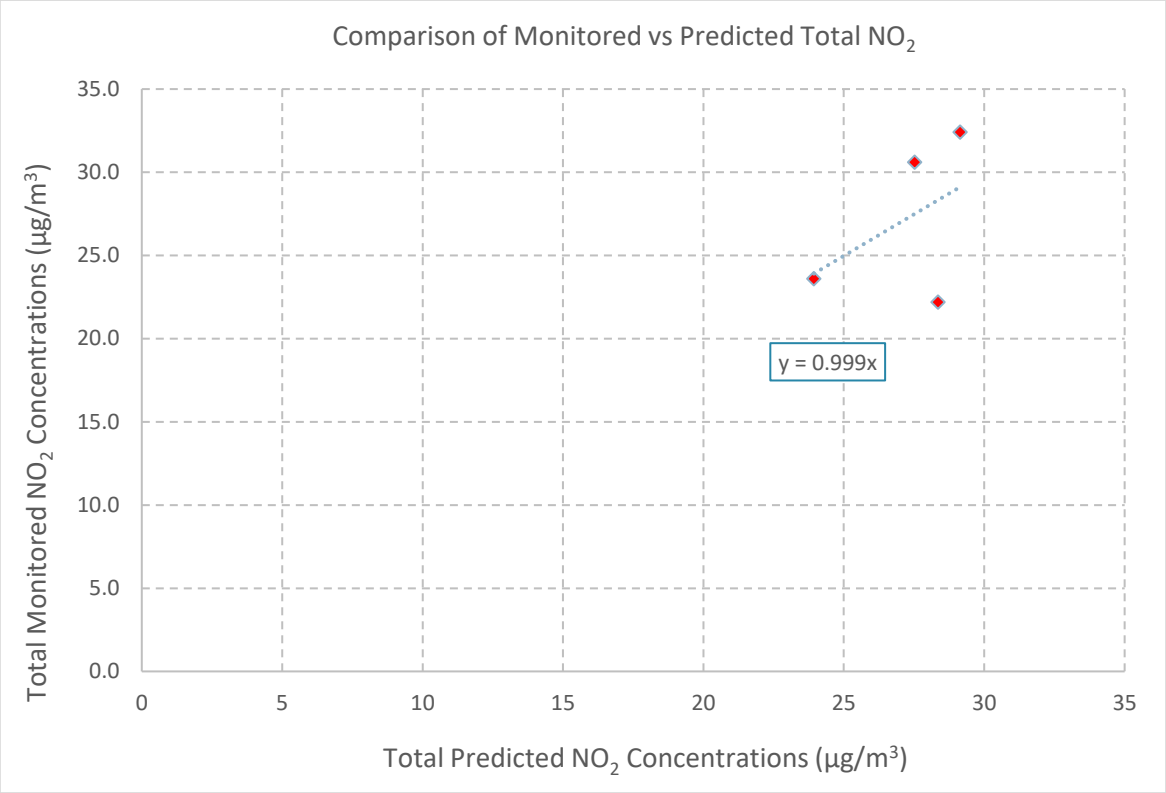


Chart 5C - Comparison of Monitored vs Modelled Total NO_2



Model Uncertainty

$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Obs_i - Pred_i)^2}$$ = 3.8

$$FB = \frac{(Avg.Obs - Avg.Pred)}{0.5(Avg.Obs + Avg.Pred)}$$ = 0.0

N= 4

As per the DEFRA LAQM Technical Guidance TG16 (Department for Environment Food and Rural Affairs, 2021), if the following statement apply then the model is deemed robust:

- The majority of the predicted concentrations should be within 25% of the monitored concentrations as a minimum, preferably within 10%, after adjustment;
- RMSE is less than 10% of the AQS (i.e., <4 ug/m^3 for annual mean NO_2); and
- Model Fractional Bias is close to 0.

While the adjusted modelled NO2 is greater than 25% of the monitored value at ED2 due to the specification of a street canyon along the entire length of Eskbank Road, all of the above apply to the NO_2 model verification. Therefore the model adjustment is found to be robust and suitable to be used for future scenario predictions on other links.

Appendix 6 Model Results

Table 6-A – Predicted 2023 NO_2 Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Scheme Concentration (µg/m³)	With Scheme Concentration (µg/m³)	Numerical Magnitude of change (µg/m³)	% of change relative to AQS	Concentration as % of AQS	Impact Descriptor	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial
1	C1	15.03	15.09	0.06	N/A	N/A	N/A	-
2	R1	19.32	19.41	0.09	0.2%	48.5%	Negligible	-
3	R2	12.10	12.13	0.03	0.1%	30.3%	Negligible	-
4	R3	14.55	14.60	0.05	0.1%	36.5%	Negligible	-
5	R4	10.95	11.02	0.07	0.2%	27.6%	Negligible	-
6	H1	16.71	16.85	0.14	N/A	N/A	N/A	-
7	H2	15.43	15.56	0.13	N/A	N/A	N/A	-
8	R5	14.98	15.08	0.10	0.2%	37.7%	Negligible	-
9	PR	N/A	16.74	N/A	N/A	N/A	N/A	-

Table 6-B – Predicted 2023 PM_{10} Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Scheme Concentration (µg/m³)	With Scheme Concentration (µg/m³)	Numerical Magnitude of change (µg/m³)	% of change relative to AQS	Concentration as % of AQS	Impact Descriptor		Number of Exceedances of Daily PM_{10}	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial	Without Proposed Development	With Proposed Development
1	C1	11.38	11.39	0.01	N/A	N/A	N/A	-	0	0
2	R1	12.23	12.25	0.02	0.1%	68.1%	Negligible	-	0	0
3	R2	10.96	10.97	0.01	0.0%	60.9%	Negligible	-	0	0
4	R3	11.92	11.94	0.02	0.1%	66.3%	Negligible	-	0	0
5	R4	11.17	11.19	0.02	0.1%	62.2%	Negligible	-	0	0
6	H1	13.70	13.75	0.04	N/A	N/A	N/A	-	0	0
7	H2	13.24	13.28	0.04	N/A	N/A	N/A	-	0	0
8	R5	13.19	13.22	0.03	0.2%	73.5%	Negligible	-	0	0
9	PR	N/A	13.63	N/A	N/A	N/A	N/A	-	0	0

Table 6-C – Predicted 2023 $PM_{2.5}$ Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Scheme Concentration (µg/m³)	With Scheme Concentration (µg/m³)	Numerical Magnitude of change (µg/m³)	% of change relative to AQS	Concentration as % of AQS	Impact Descriptor	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial
1	C1	6.34	6.34	0.01	N/A	N/A	N/A	-
2	R1	6.83	6.84	0.01	0.1%	68.4%	Negligible	-
3	R2	6.09	6.09	0.00	<0.1%	60.9%	Negligible	-
4	R3	6.54	6.55	0.01	0.1%	65.5%	Negligible	-
5	R4	6.17	6.18	0.01	0.1%	61.8%	Negligible	-
6	H1	7.27	7.29	0.02	N/A	N/A	N/A	-
7	H2	7.02	7.04	0.02	N/A	N/A	N/A	-
8	R5	6.99	7.00	0.02	0.2%	70.0%	Negligible	-
9	PR	N/A	7.23	N/A	N/A	N/A	N/A	-

Table 6-D – Predicted 2023 NO_x Concentrations at Selected Ecological Receptors for the With and Without Proposed Development

Receptor ID	Receptor Name	Without Proposed Development Concentration (µg/m³)	With Proposed Development Concentration (µg/m³)	Numerical Magnitude of change (µg/m³)	% of change relative to AQS	Concentration as % of AQS
E1	AWI – Woodland ID: 35566	24.2	24.3	0.1	0.4%	0.8
E2	AWI – Woodland ID: 35562	25.5	25.7	0.1	0.5%	0.9
E3	AWI – Woodland ID: 35569	19.5	19.6	0.1	0.3%	0.7
E4	AWI – Woodland ID: 35566	20.7	20.9	0.2	0.7%	0.7
E5	AWI – Woodland ID: 35566	26.0	26.4	0.4	1.3%	0.9
E6	AWI – Woodland ID: 35573	18.5	18.7	0.2	0.6%	0.6
E7	AWI – Woodland ID: 35566	24.9	25.7	0.8	2.7%	0.9
E8	AWI – Woodland ID: 35567	20.4	20.7	0.3	0.9%	0.7
E9	AWI – Woodland ID: 35567	40.5	40.9	0.4	1.4%	1.4
E9 - 10m	AWI – Woodland ID: 35567	33.6	33.9	0.3	1.1%	1.1
E9 - 20m	AWI – Woodland ID: 35567	28.1	28.3	0.2	0.8%	0.9
E9 - 30m	AWI – Woodland ID: 35567	25.3	25.5	0.2	0.6%	0.9
E9 - 50m	AWI – Woodland ID: 35567	23.2	23.3	0.2	0.5%	0.8
E9 - 100m	AWI – Woodland ID: 35567	20.3	20.4	0.1	0.4%	0.7
E10	AWI – Woodland ID: 35573	34.2	34.6	0.3	1.1%	1.2
E10 - 10m	AWI – Woodland ID: 35573	27.0	27.2	0.2	0.7%	0.9
E10 - 20m	AWI – Woodland ID: 35573	22.8	22.9	0.1	0.5%	0.8
E10 - 30m	AWI – Woodland ID: 35573	20.9	21.0	0.1	0.4%	0.7
E10 - 50m	AWI – Woodland ID: 35573	19.7	19.8	0.1	0.3%	0.7
E10 - 100m	AWI – Woodland ID: 35573	18.0	18.0	0.1	0.2%	0.6
E11	AWI – Woodland ID: 35563	34.3	34.7	0.4	1.3%	1.2
E11 - 10m	AWI – Woodland ID: 35563	28.5	28.8	0.3	0.9%	1.0
E11 - 20m	AWI – Woodland ID: 35563	24.8	25.0	0.2	0.7%	0.8
E11 - 30m	AWI – Woodland ID: 35563	23.2	23.4	0.2	0.6%	0.8
E11 - 50m	AWI – Woodland ID: 35563	21.7	21.8	0.2	0.5%	0.7
E11 - 100m	AWI – Woodland ID: 35563	19.2	19.3	0.1	0.3%	0.6
E12	AWI – Woodland ID: 35563	31.2	31.5	0.3	1.1%	1.1
E12 -10m	AWI – Woodland ID: 35563	28.6	28.9	0.3	1.0%	1.0
E12 -20m	AWI – Woodland ID: 35563	25.1	25.3	0.2	0.8%	0.8
E12 -30m	AWI – Woodland ID: 35563	23.4	23.6	0.2	0.7%	0.8
E12 -50m	AWI – Woodland ID: 35563	21.9	22.1	0.2	0.6%	0.7
E12 -100m	AWI – Woodland ID: 35563	20.1	20.3	0.1	0.5%	0.7

Appendix 7 Construction Dust Risk Assessment

The construction dust risk assessment below has been carried out using the criteria in IAQM guidance (IAQM, 2014) to determine the impact magnitude and sensitivity of the area around the site. This assessment should be followed with reference to **Figure 4**.

There are designated sensitive ecological receptors within 50 m of the construction activity areas. This assessment has therefore considered potential ecological impacts associated with construction dust emissions.

Demolition – There are no existing structures within Proposed Development site which are required to be demolished. Therefore, any risk of dust impacts from demolition activities is not considered further in this assessment.

Earthworks – Site clearance works, the digging of trenches for foundations and utilities and temporary stockpiling of material represent the principal activities that may generate emissions of particulate material. The potential for stockpiles of materials to generate dust depends on the nature of the material. The current grounds of the site are soft, friable earth compared to hardcore concrete.

Dust Emission Magnitude

- The total area of earthworks is estimated to be >10,000 m^2 (approximately 28,500 m^2). In accordance with the IAQM guidance, the potential dust emission magnitude for earthworks is assessed as **Large**.

Sensitivity and Risk of Impacts

- There are estimated to be 1-10 high sensitivity human receptors within 100 m of the proposed earthworks areas. Sensitivity of the area to dust soiling due to earthworks is therefore assessed as **Low**.

- The large magnitude with high sensitivity results in the risk of dust soiling impacts due to earthworks being assessed as **Low**.

- The average annual mean 2021 PM_{10} background concentrations[2] at all highly sensitive human receptors within 350 m of the site boundary is 12 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There are estimated to be 1-10 high sensitivity human receptors within 100 m of the proposed earthworks areas. Sensitivity of the area to human health impacts due to earthworks is therefore assessed as **Low**.

- The large magnitude with low sensitivity results in the risk of dust impacts on human health due to earthworks as being assessed as **Low**.

- There are estimated to be 1-10 low sensitivity ecological receptors within 50m of the proposed earthworks area. Sensitivity of the ecological receptors to dust soiling due to earthworks therefore assessed as **Low**.

[2] http://www.scottishairquality.scot/data/mapping?view=data

- The large magnitude with low sensitivity results in the risk of dust soiling impacts due to earthworks being assessed as **Low**.

Construction Phase – Dust emissions during construction can give rise to elevated dust deposition and PM_{10} concentrations. These are generally short-lived changes over a few hours or days, which occur over a limited time period of several weeks or months and are usually in defined phases.

Dust Emission Magnitude

- The total building volume is estimated to be between 25,000 m^3 – 100,000 m^3. The potential dust emission magnitude for construction is therefore assessed as **Medium**.

Sensitivity and Risk of Impacts

- There are estimated to be 1-10 high sensitivity human receptors within 100 m of the proposed construction areas. Sensitivity of the area to dust soiling due to construction is therefore assessed as **Low**.

- The medium magnitude with low sensitivity results in the risk of dust soiling impacts due to construction being assessed as **Low**.

- The average annual mean 2021 PM_{10} background concentrations[2] at all highly sensitive human receptors within 350 m of the site boundary is 12 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There are estimated to be 1-10 high sensitivity human receptors within 100 m of the proposed construction areas. Sensitivity of the area to human health impacts due to construction is therefore assessed as **Low**.

- The medium magnitude with the low sensitivity results in the risk of dust impacts on human health due to construction being assessed as **Low**.

- There are estimated to be 1-10 low sensitivity ecological receptors within 50m of the proposed construction area. Sensitivity of the ecological receptors to dust soiling due to construction therefore assessed as **Low**.

- The large magnitude with low sensitivity results in the risk of dust soiling impacts due to construction being assessed as **Low**.

Track-out Material – Without site-specific mitigation, the IAQM guidance states that track-out can occur from roads up to 500 m from the site exit of a large construction site. The impact declines with distance from the roads and therefore, it is only necessary to consider track-out up to 50 m from the edge of the road.

The proposed track-out route has been identified in order to give access to A720 without passing any highly sensitive receptors. The track-out route will run west from the exit at the south of the site before joining onto the A7 and heading north towards the A720. The proposed route is displayed in **Figure 4**:

Dust Emission Magnitude

- It has been estimated that this development will introduce 10 - 50 HDV movements per day during peak construction. The potential dust emission magnitude for track-out for 10 - 50 HDVs is assessed as **Medium**.

Sensitivity and Risk of Impacts

- There are estimated to be 1-10 high sensitivity human receptors within 50 m of the proposed track-out route. Sensitivity of the area to dust soiling due to track-out is therefore assessed as **Low**.

- The medium magnitude with low sensitivity results in the risk of dust soiling impacts due to track-out being assessed as **Low**.

- The average annual mean 2021 PM_{10} background concentrations[2] at all highly sensitive human receptors within 350 m of the site boundary is 12 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There are estimated to be 1-10 high sensitivity human receptors within 50 m of the proposed track-out route. Sensitivity of the area to human health impacts due to track-out is therefore assessed as **Low**.

- The medium magnitude with the low sensitivity results in the risk of dust impacts on human health due to track-out being assessed as **Low**.

- There are estimated to be 1-10 low sensitivity ecological receptors within 20m of the proposed track-out route. Sensitivity of the ecological receptors to dust soiling due to track-out therefore assessed as **Low**.

- The large magnitude with low sensitivity results in the risk of dust soiling impacts due to track-out being assessed as **Low**.

Dust Emission Magnitude

The overall dust emission magnitude is summarised in **Table 7-A.**

Table 7-A – Overall Dust Emission Magnitude

Activities	Dust Emission Magnitude
Demolition	N/A
Earthworks	Large
Construction	Medium
Track-out	Medium

Overall Sensitivity of the Surrounding Area

Table 7-B below summarises the sensitivity of the surrounding area.

Table 7-B – Overall Sensitivity of the Surrounding Area

Potential Impact	Sensitivity of the Surrounding Area			
	Demolition	Earthworks	Construction	Track-out
Dust Soiling	N/A	Low	Low	Low
Human Health	N/A	Low	Low	Low

Ecological receptors	N/A	Low	Low	Low

Overall Risk of Dust Impacts

Table 7-C below summarises the dust risk to define site-specific mitigation.

Table 7-C – Summary of Dust Risk to Define Site-Specific Mitigation

Potential Impact	Risk of Dust Impact			
	Demolition	Earthworks	Construction	Track-out
Dust Soiling	N/A	Low	Low	Low
Human Health	N/A	Low	Low	Low
Ecological receptors	N/A	Low	Low	Low

Proposed Dust Mitigation Measures for Inclusion in a CEMP

Outlined below are recommendations for mitigation measures to be included in a CEMP, based on the overall risk of dust impacts as assessed above. These are measures that are listed as Desirable or Highly Recommended in the IAQM guidance.

Proposed mitigation for communications:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary; and
- Display the head or regional office contact information.

Proposed mitigation for dust management:

- Develop and implement a Dust Management Plan (DMP). This may include measures to control other emissions, approved by the Local Authority.

Proposed mitigation for site management:

- 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;
- Make the complaints log available to the local authority when asked; and
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

Proposed mitigation for monitoring:

- 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;
- Increase 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; and
- Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences.

Proposed mitigation for preparing and maintaining the site:

- Plan site layout so that machinery and dust causing activities are located away from receptors, as far as possible;
- Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site; and
- Cover, seed or fence stockpiles to prevent wind whipping.

Proposed mitigation for site operations:

- 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;
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- Use enclosed chutes and conveyors and covered skips;
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate; and
- 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.

Proposed mitigation for waste management:

- Avoid bonfires and burning of waste materials.

Operating vehicle/machinery and sustainable travel:

- Ensure all vehicles switch off engines when stationary;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable;
- Impose and signpost a maximum speed limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas; and
- Issue all suppliers and contractors with delivery routes and access times/restrictions.

Proposed mitigation specific to earthworks:

- Re-vegetate earthworks and exposed areas/soils stockpiles to stabilise surfaces as soon as practicable;
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable; and
- Only remove the cover in small areas during work and not all at once.

Proposed mitigation specific to construction:

Avoid scabbling (roughening of concrete surfaces) if possible;

- 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 control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery; and
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

Proposed mitigation specific to track-out:

- 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 a sweeper being continuously in use;
- Avoid dry sweeping of large areas;
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; and
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
- Record all inspections of haul routes and any subsequent action in a site log book; and

- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

Conclusions

The dust risk assessment concluded the following:

- There are estimated to be 1 - 10 highly sensitive human receptors within 100 m of the proposed earthworks and construction activity areas;
- There are estimated to be 1 - 10 highly sensitive human receptors within 50 m of the proposed track-out route;
- There is a low risk of dust soiling impacts on nearby sensitive human receptors as a result of earthworks and track-out activities without mitigation;
- There is a low risk of dust soiling impacts on nearby sensitive human receptors as a result of construction without mitigation;
- There is a low risk of human health impacts on nearby sensitive human receptors as a result of earthworks, and track-out without mitigation;
- There is a low risk of human health impacts on nearby human receptors as a result of earthworks without mitigation;
- There are estimated to be 1 – 10 low sensitivity ecological receptors within 50 m of the proposed earthworks, construction areas;
- There are estimated to be 1 – 10 low sensitivity ecological receptors within 20 m of the proposed track-out route; and
- There is a low risk of dust soiling impacts on nearby ecological receptors as a result of earthworks, construction and track-out activities without mitigation.

The good-practice mitigation measures and site-specific mitigation measures outlined above will be adopted to minimise these identified risks such that the residual impact of dust is negligible and therefore ***not significant***. These will be included in a Construction Environmental Management Plan (CEMP) submitted by the contractor to the local authority for approval prior to the commencement of any works.

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