Proposed Lidl Store, Crieff Road, Perth

Air Quality Impact Assessment

Client:	Lidl (Great Britain) Ltd
Project No:	5064
Version:	1.0
Date:	2022-07-26

Document Information

Project Name:	Proposed Lidl Store, Crieff Road, Perth
Document Title:	Air Quality Impact Assessment
Client Name:	Lidl (Great Britain) Ltd
Client Contact:	Emma Black
Client Address:	1 Coddington Crescent, Eurocentral, Motherwell, ML1 4YF
Document Status:	Final for Issue
Author:	Scott Munro
Reviewed:	Jonas Beaugas
Approved:	Annie Danskin
Date:	2022-07-26
Version:	1.0
Project/Proposal Number:	5064
ITPEnergised Office:	4th Floor, Centrum House, 108-114 Dundas Street, Edinburgh, EH3 5DQ

Revision History

Version	Date	Authored	Reviewed	Approved	Notes
1.0	2022-07-26	S. Munro	J. Beaugas	A. Danskin	Final for Issue

Contents

1. Introduction

ITPEnergised has been commissioned by Lidl (hereafter referred to as "the client") to carry out an air quality impact assessment (AQIA) to accompany a planning application (planning reference 22/00816/FLL) for a proposed Lidl store ('the Proposed Development'), at Crieff Road, Perth. The Proposed Development is located within the Perth and Kinross (PKC) administrative area.

The layout and location of the Proposed Development are displayed on Drawing 1. The Proposed Development is located within an air quality management area (AQMA). Sensitive receptors within this AQMA have been considered as part of this AQIA.

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 commercial use.

No energy centre or large combustion sources are included as part of the Proposed Development.

A detailed air dispersion modelling study was carried out using the latest version of the modelling software ADMS-Roads 5 (Cambridge Environmental Research Consultants, 2021) 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 on Drawing 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 activities.

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 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.

[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.

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)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40µg/m^3	Annual mean
Particulate material (PM_{10})	50µg/m^3, not to be exceeded more than 7 times a year	24-hour mean
	18µg/m^3	Annual mean
Particulate material ($PM_{2.5}$)	10µg/m^3	Annual mean
Ecological Receptors		
Oxides of Nitrogen (NO_x)	30µg/m^3	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

2.3.1 Local Plan Policy Documents

PKC recently adopted a Local Development Plan (LDP) which provides guidance for the use and development of land within its administrative area (Perth and Kinross Council, 2019). The Air Quality and Planning Supplementary Guidance (Perth and Kinross Council, 2020) provides further information on the criteria detailing the need for an AQIA.

The LDP includes one policy which relates to air quality (policy 57: Air Quality) which states:

"Within or adjacent to designated Air Quality Management Areas, where pollutant concentrations are in excess of the national air quality objectives and may pose a risk to human health, development proposals that would adversely affect air quality may not be permitted. There is a presumption against locating development catering for sensitive receptors in areas where they may be exposed to elevated pollution levels.

Any proposed development that could have a detrimental effect on air quality, through exacerbation of existing air quality issues or introduction of new sources of pollution (including dust and/or odour), must provide appropriate mitigation measures. The LDP expects that some type of mitigation of air quality impacts will be required for all but the smallest developments. Best practice design measures should therefore be considered early in the design and placemaking process. ("...")

Proposals and mitigation measures must not conflict with the actions proposed in Air Quality Action Plans.

An air quality impact assessment will usually be required where the Council considers that there may be a risk of an air quality impact upon human health. The main ways in which development may potentially impact upon air quality are as follows:

(a) introducing new human exposure at a location with poor air quality (e.g., within an existing Air Quality Management Area or close to a busy road or junction);

(b) the development may itself lead to a deterioration in local air quality (e.g., from increased vehicle emissions or flue emissions from heating or energy production plant); and

(c) if the demolition/construction phase will have an impact upon the local environment (e.g., through fugitive dust and/or exhaust emissions from machinery and vehicles).

The cumulative impact of other consented development and of these three criteria will be taken into account. In line with best practice, screening criteria will be used to identify where impacts are insignificant. Supplementary guidance will set out how air quality will be considered when determining planning applications

The Council keeps an evidence base of air quality and has developed a high-resolution dispersion model for the LDP area."

2.4 Local Air Quality Management

The aforementioned AQOs have been set down in regulation solely for the purposes of LAQM. The Environment Act 1995 requires that Local Authorities undertake a tiered appraisal of air quality within their area to establish compliance or non-compliance with the targets established in the UK National Air Quality Strategy, and, if it is unlikely that the objective values will be met in the given timescale, they must designate an AQMA and prepare an Air Quality Action Plan (AQAP) with the aim of achieving the objective values. The boundary of an AQMA is set by the governing local authority to define the geographical area that is to be subject to the management measures to be set out in a subsequent AQAP. Consequently, it is not unusual for the boundary of an AQMA to include within it, relevant locations where air quality is not at risk of exceeding an air quality objective.

The most recent air quality annual progress report (APR) for PKC publicly available at the time of writing was the 2021 APR (Perth and Kinross Council, 2021) which reports on 2016-2020 concentrations.

There are two AQMA's within the PKC administrative area:

Perth AQMA declared in 2006 due to the exceedance of NO_2 and PM_{10} annual mean AQO; and

Crieff AQMA declared in 2014 due to the exceedance of NO_2 and PM_{10} annual mean AQO.

The Perth AQMA covers the entire city which is where the Proposed Development is located and is outlined in the Perth & Kinross Council Air Quality Action Plan (AQAP) (Council, 2009).

The Proposed Development is located within the Perth AQMA as shown on Drawing 1.

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, 2021).

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);

The IAQM, A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites (IAQM, 2019);

The 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).

Air Quality and Planning Supplementary Guidance (Perth & Kinross Council, 2020)

3.2 Scope of Work

The scope of work for the AQIA included the following:

Consultation with PKC environmental health services to confirm scope and methodology for the AQIA;

Desktop review of baseline air quality in the locality from PKC monitoring data and publicly available background concentration maps;

Processing of baseline and development-generated road traffic data in the form of average hourly data with Heavy Duty Vehicle (HDV) and Light Duty Vehicle (LDV) splits from the appointed transport consultant and/or Department for Transport traffic count data (if available);

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 (where available) and model verification;

Prediction of future with and without Proposed Development pollutant concentrations and assessment of the changes in pollutant concentrations and resulting significance of impacts;

Identification of mitigation measures if necessary;

Assessment of site suitability;

Qualitative assessment of construction phase dust impacts (construction and demolition as relevant); and

Production of a stand-alone AQIA report and supporting technical drawings suitable for submission to PKC.

3.3 Consultation

ITPEnergised consulted with the PKC EHO on the 1st of February 2022 and received a response on the 9th of February 2022. A summary of the consultation between ITPEnergised and PKC is provided in Table 3.

Table 3 Summary of consultation Response

Date	PKC Comment	ITPEnergised's Response
1st of February 2022	PKC EHO agreed with the suggested scope and methodology from ITPEnergised's consultation and asked for the Almond Valley Huntingtower (19/01433/AMM) mixed development to be considered in the cumulative development scenario. PKC also provided ITPEnergised with PKCs adopted Air Quality and Planning Supplementary Guidance 2020 report.	ITPEnergised passed on this request to the transport consultant and agreed to reflect the comments from PKC into the AQIA.

3.4 Effects Scoped Out

3.4.1 Construction Phase

3.4.1.1 Road Traffic Emissions

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

During construction, traffic would be generated by vehicles, such as HDVs delivering plant and supplies to the Proposed Development and removing surplus material. Car and light vehicle trips would be generated by staff arriving and departing from the Proposed Development and vans delivering goods.

No details are yet available about construction programme or material numbers and so therefore no detailed calculation of construction-related traffic numbers has been made.

It is highly unlikely that construction traffic (HDV) will 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. Construction traffic (HDV) may exceed 25 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 AQIA within an AQMA. It is however anticipated that the Proposed Development construction phase road traffic will travel to the Proposed Development via the A9 and only enter the AQMA as it accesses the Proposed Development, avoiding more sensitive areas with a higher density of receptors and higher baseline pollutant concentrations within Perth city centre.

On that basis, the effect of construction road traffic emissions upon local air quality is predicted to be not significant and construction phase road traffic emissions are therefore not considered further in this assessment.

3.4.2 Operational Phase

3.4.2.1 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.

3.5 Emission Sources

3.5.1 Construction Phase

3.5.1.1 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.

3.5.2 Operational Phase

3.5.2.1 Road Traffic Emissions

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

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. Therefore, pollutant concentrations have been predicted for the following scenarios:

2019 baseline for model verification;

Future 2024 without Proposed Development; and

Future 2024 with Proposed Development.

Pollutant concentrations for each scenario have been predicted by modelling emissions from road traffic using road traffic flows provided for each of the above scenarios. The traffic flows used were provided by the appointed traffic consultant ECS Transport Planning Ltd.

Baseline traffic data were sourced from local Department for Transport (DfT) data points. Traffic data and all projections made are discussed in Section 3.6. Baseline 2019 traffic flows have been modelled using 2019 emission factors from EfT 10.1 (2VC) for the purpose of model verification with local monitoring from 2019.

Completion year (2024) traffic flows have been modelled using 2024 emission factors from the EfT 10.1 (2VC) projections.

Details of general model conditions used in the dispersion model are provided in Table 4.

Table 4 - General ADMS Model Conditions

Variables	ADMS Roads Model Input
Surface roughness at source/meteorological site	0.5 m / 0.2 m
Minimum Monin-Obukhov length for stable conditions at source/meteorological site	Model-calculated per hourly meteorological condition for both sites
Terrain types	Flat Terrain
Receptor location	x, y coordinates determined by Geographic Information System (GIS) z = 1.5 m for ground floor at human receptors and 0 m for ecological receptors
Pollutants	NO_x, PM_{10}, $PM_{2.5}$
Traffic Emissions Factors	DEFRA EFT 10.1 (2VC) for 2019 (Baseline) and 2024 (completion year).
Meteorological data	One year (2019) hourly World Meteorological Organisation (WMO) from Strathallen Airfield meteorological station.
Emission profiles traffic	No Diurnal profiles applied
Receptors	Selected existing and proposed human and ecological receptors closest to modelled road. In a conservative approach specified points have been placed at the nearest location within the designated ecological sites to the modelled roads.
Model output	Long-term annual mean NO_x concentrations Long-term annual mean PM_{10} concentrations Long-term annual mean $PM_{2.5}$ concentrations

3.6 Road Traffic Data

Traffic data were provided in 24-hour AADT format. Traffic data were further processed into hourly flows for use in the dispersion model.

No baseline flows were provided for comparison with local monitoring data in the verification process. Verification was therefore undertaken using local DfT counts.

Traffic data were provided for the future with and without Proposed Development scenarios for the year 2024.

No HDV flows were provided for the future scenarios. The percentage HDV assumed was estimated to be the same as the DfT count data for similar road links.

No future projections were provided for the proposed modelled links along the A9 along with adjoining slip roads. The 2019 traffic flows for the A9 were taken from DfT counts. Future projected traffic for the A9 were projected using the ratio between DfT counts for 2019 and future 2024 traffic flows provided by the traffic consultant for roads in which both datasets were available for comparison.

Committed developments are included in the future without scenario.

All processed road traffic data, road speeds and geometry used in the dispersion model for this assessment are presented in Appendix 1.

3.7 Study Area and Air Quality Sensitive Receptors

3.7.1 Study Area

3.7.1.1 Demolition and 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 on Drawing 3.

3.7.1.2 Operational Phase

The study area for the operational phase of this AQIA has been defined by professional judgement and discussions with the appointed transport consultant to establish links likely to be impacted by the Proposed Development generated traffic.

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

3.7.2 Sensitive Receptors

All human and ecological receptors considered in this assessment are summarised in Appendix 2 and displayed on Drawing 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).

3.7.2.1 Human Receptors

The sensitive human receptors selected for this assessment are locations where people are likely to be present for a period of time consistent with the AQS and are based on effects on human health. The AQSs relevant to human exposure 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 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 and proposed residential receptors, hospitals, care homes and schools where the short-term (hourly and daily means) and annual mean standards are relevant.

3.7.2.2 Ecological Receptors

A review of the study area indicated that there are four ecological sites situated nearby the roads modelled in this assessment. Three Ancient Woodland Inventory (AWI) sites situated near the A9 and New link roads. Potential effects at the SAC designated River Almond have also been considered.

3.8 Meteorological Data

The closest meteorological station to the Proposed Development is Strathallen Airfield, located approximately 22 km south-west of the Proposed Development. Meteorological conditions recorded at Strathallen Airfield are considered to be representative of conditions within the study area.

Hourly meteorological data recorded from Strathallen meteorological station for the year 2019 have therefore been used in this assessment.

A single year of meteorological data has been used in this assessment.

A wind rose for the meteorological data recorded in 2019 at Strathallen meteorological station is presented in Drawing 4.

3.9 Background Air Quality Data

There are no PKC background monitoring sites within the study area. Background concentrations for NO_x, NO_2, PM_{10} and $PM_{2.5}$ for the 2019 baseline and 2024 completion year have been sourced from the updated 2018-based Scottish Air Quality (NO_x, NO_2 and PM_{10}) (Scottish Air Quality, 2024) and DEFRA ($PM_{2.5}$) background maps (DEFRA, 2022).

The background maps include emissions from nearby sources such as local road networks and emissions from industrial and domestic sources. When explicitly modelled in the assessment, the contributions from motorway, trunk and primary roads within relevant squares are usually removed. This avoids "double-accounting" of road source contributions.

In this assessment, contributions from primary roads, trunk roads and motorways within relevant 1 km x 1 km grid squares have been removed if they are explicitly modelled.

Background concentrations used as part of this assessment are provided in Appendix 3.

3.10 Methods of Analysis of Modelling Predictions

3.10.1 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 two monitoring sites along the modelled roads measuring NO_2 concentrations.

Table 5 – Monitoring Site Information

Site ID	Site Location	Site Type	Monitoring Type
P47	5 East Huntingtower	Roadside	Passive diffusion tube
P46	204 Crieff Road	Roadside	Passive diffusion tube

A baseline year of 2019 was selected to estimate the conditions in pre-covid-19 times. Baseline flows for 2019 were unable to be provided by the traffic consultant and therefore the traffic flows for the baseline modelled roads were sources from DfT counts. (Department for Transport, 2021). DfT counts were used for the A9, New Link Road and the A85 for the baseline model.

The monitoring data was sourced from the latest APR from 2021 which reports on 2016 – 2020 concentrations (Perth and Kinross Council, 2021).

The model verification process is outlined in Appendix 4.

3.10.1.1 Oxides of Nitrogen (NO_x) Model Verification.

The model verification process resulted in a correction factor of 1.12 to be applied to modelled road NO_x concentrations.

3.10.1.2 Particulate Matter (PM_{10} & $PM_{2.5}$) Model Verification.

There are no PM_{10} or $PM_{2.5}$ monitoring sites within the study area which could be used for model verification. Therefore, to adopt a conservative approach a correction factor of 1.12 was also applied to modelled road PM_{10} and $PM_{2.5}$ concentrations.

3.10.2 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 is 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.

3.10.3 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.

3.10.4 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):

$$N\ \mu 24-hp\ uns\ f\ \ of\ x\ o\ d\ f\ f\ e = a - 18.5 + f0.00145 \times a\ o\ o\ m\ \mu o m^3 + (\frac{206}{a\ o\ o\ m\ \ of\ o\ m})$$

It should be noted that this equation is only valid for predicted annual mean concentrations above 14 µg/m^3, however annual mean concentrations of PM_{10} lower than 14 µg/m^3 are highly unlikely to result in exceedance of the 24-hour mean AQS.

3.10.5 Demolition and Construction Phase Emissions

3.10.5.1 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.

3.10.6 Operational Emissions

3.10.6.1 Traffic Emissions – Human Receptors

The IAQM/EPUK Guidance on Land-use Planning and Development Control: Planning for Air Quality (EPUK & IAQM, 2017) provides a suggested framework of impact descriptors with respect to assessment of long-term (annual mean) air quality objectives. The guidance presents a practical way of assigning a meaningful description to the degree of an impact, by expressing the magnitude of incremental change as a proportion of a relevant assessment level which is summarised below.

The change in pollutant concentrations with respect to baseline concentrations has been assessed at selected representative receptors within the study area. The absolute magnitude of pollutant concentrations with the Proposed Development is also described, and this is used to consider the risk of the AQSs being exceeded in each scenario.

The impact descriptors are summarised in Table 6. A change of less than 0.5% of the Air Quality Assessment Level (AQAL) is described as Negligible.

Table 6 - 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

3.10.6.2 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 for the Proposed Development solely and in-combination with other developments. The Proposed Development will not solely result in a change in AADT flows on the local road network of >1000 LDVs or >200 HDVs.

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; and
>
> Total NO_x concentration at relevant ecological sites and compliance 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 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.

3.10.7 Overall Assessment of Significance at Sensitive Receptors

The derived IAQM risk categories (construction dust) and impact descriptors (operational traffic) at individual receptors have 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 over a larger domain than at individual receptors, was considered if relevant and overall risk categories/impact descriptors derived.

Table 7 summarises the descriptors used to characterise the overall significance of effects at sensitive receptors.

Table 7 - IAQM Risk Categories / Impact Descriptors and Resulting Significance

IAQM Risk Category/Impact Descriptor	Significance
High/Substantial	A significant effect that is likely to be a material consideration in its own right.
Medium/Moderate	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.
Low/Slight	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. Road vehicles are considered to be the main sources of dust in the vicinity of the proposed development. The contribution of dust from roads is captured in the background maps.

There are no significant sources of dust close to the Proposed Development site.

4.2 Baseline Pollutant Concentrations within the Study Area

The Proposed Development is located within the Perth city AQMA which was declared in 2006 due to the exceedance of the annual mean AQOs for particulate matter (PM_{10}) and Nitrogen Dioxide (NO_2).

The existing air quality monitoring network operated by PKC consists of four automatic monitoring sites located in Perth and Crieff, and 79 passive diffusion tubes (PDT) located throughout the PKC administrative area; 59 of the which are located in or near Perth (Perth and Kinross Council, 2021).

There are two PKC monitoring sites located along the modelled roads – roadside diffusion tubes P46 and P47 located along the A85/ Crieff Road. The 2019 measured annual mean NO_2 concentrations are 19.0 and 19.0 respectively, which is well below the annual mean AQS (40 µg/m^3).

The conditions at the P46 roadside diffusion tube are considered to be directly representative of expected concentrations at the Proposed Development with the site also being situated along the A85.

The latest year for which non-covid-19 impacted data are available is 2019 and as such is presented to show the current baseline pollutant concentrations.

The 2019 background pollutant concentrations as reported in the 2018-updated Scottish Air Quality (Scottish Air Quality, 2019) and (DEFRA) background maps (DEFRA, 2022) provide a good indication of the future predicted pollutant concentrations around the Proposed Development site.

The 2019 background maps return the following average pollutant concentrations for the 1 km x 1 km grid squares containing the Proposed Development site ad surrounding sensitive receptors:

- NO_x: 9.7 µg/m^3;
- NO_2: 6.8 µg/m^3;
- PM_{10}: 9.9 µg/m^3; and
- $PM_{2.5}$: 5.8 µg/m^3.

The pollutant concentrations across the Proposed Development site are therefore significantly below all the relevant annual mean AQSs.

5. Assessment Results

5.1 Future Baseline 2024 Concentrations Without Proposed Development

The future baseline without-Proposed Development scenario includes relevant additional traffic contributions from other committed developments.

The traffic flows used for each road link are presented in Appendix 1.

5.1.1 Predicted Concentrations of NO_2

The predicted annual mean NO_2 concentrations at all the selected human receptors are provided in Appendix 5 – Table 5-A.

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

The highest predicted concentration at all selected human receptors is 13.6 µg/m^3 at receptor R11 (Residential Property on Newhouse Road).

Predicted concentrations at all the selected 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 of the selected receptors.

5.1.2 Predicted Concentrations of PM_{10}

The predicted annual mean PM_{10} concentrations at all selected human receptors are provided in Appendix 5 – Table 5-B.

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

The highest predicted concentration at all selected human receptors is 12.4 µg/m^3 at receptor R11 (Residential Property on Newhouse Road).

The PM_{10} 24-hour AQS (>50 µg/m^3 more than 7 times a year) is not predicted to be exceeded at any of the selected human receptors.

5.1.3 Predicted Concentrations of $PM_{2.5}$

The predicted annual mean $PM_{2.5}$ concentrations at all selected human receptors are provided in Appendix 5 – Table 5-C.

Predicted future concentrations at all selected 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 6.9 µg/m^3 at receptor R11 (Residential Property on Newhouse Road).

5.1.4 Predicted Concentrations of NO_X – Ecological Receptors

The predicted annual mean NO_x concentrations at the selected ecological receptor are displayed in Appendix 5 Table 5-E.

The predicted future annual mean concentrations are above the critical level for NO_x (30 µg/m^3) at receptor E3 (AWI-3) situated 5.5 m from the A9 Slip Road/ New Link Road where the annual mean NO_x concentration is 36.6 µg/m^3 (121.9% of the critical level).

The high concentration of NO_x predicted at the AWI area at the north of New Link Road/ A9 Slip Road can be explained by the proximity of the designation to these roads (within 6 m of the road). The road traffic contribution accounts for approximately 58.5% of the total predicted concentration at the boundary of the E3 AWI and is anticipated to quickly reduce with distance from the roadside.

5.2 Future 2024 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 demolition, 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 demolition and 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 6 and summarised in Table 8.

The dust risk assessment concluded the following:

No demolition is anticipated to take place.

There are >100 highly sensitive receptors within 350 m of earthworks and construction areas;

There are 1-10 highly sensitive receptors within 50 m of the track-out route;

There is a low risk of dust soiling impacts on nearby sensitive receptors as a result of earthworks and track-out and a negligible risk as a result of construction activities;

There is a low risk of human health impact on nearby sensitive receptors as a result of earthworks and track-out and negligible risk as a result of construction activities.

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.

Table 8 below summaries the potential risk of dust impacts on nearby sensitive receptors, without specific mitigation measures in place.

Table 8 - Summary of Construction Phase Risk of Dust Impacts

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

5.2.2 Operational Phase Emissions

The future baseline with-Proposed Development scenario was modelled using future road traffic flows based on low growth factor and included additional predicted traffic generated from the Proposed Development.

The traffic flows used for each road link are presented in Appendix 1.

5.2.2.1 Predicted Concentrations of NO_2

The predicted annual mean NO_2 concentrations at all selected human receptors are provided in Appendix 5 – Table 5-A.

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

The highest predicted concentration at all selected human receptors is 13.8 µg/m^3 at receptor R11 (Residential Property on Newhouse Road). The Proposed Development contribution to NO_2 concentrations at this receptor is 0.2 µg/m^3, which is 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 selected 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 selected human receptors are provided in Appendix 5 – Table 5-B.

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

The highest predicted concentration at all selected human receptors is 12.5 µg/m^3 at receptor R11 (Residential Property on Newhouse Road). The Proposed Development contribution to PM_{10} concentration at this receptor is <0.1 µg/m^3 which is below 0.5% of the AQS and is therefore Negligible.

The PM_{10} 24-hour AQS (>50 µg/m^3 more than 7 times a year) is not predicted to be exceeded at any of the selected human receptors.

The impact descriptor for annual mean PM_{10} concentrations at all other selected human receptors is also assessed as Negligible.

5.2.2.3 Predicted Concentrations of $PM_{2.5}$

The predicted annual mean $PM_{2.5}$ concentrations at all selected human receptors are provided in Appendix 5 – Table 5-C.

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

The highest predicted concentration at all selected human receptors is 6.9 µg/m^3 at receptor R11 (Residential Property on Newhouse Road). The Proposed Development contribution to $PM_{2.5}$ concentration at this receptor is <0.1 µg/m^3 which is 0.5% of the AQS and is therefore Negligible.

The impact descriptor for annual mean $PM_{2.5}$ concentrations at all other selected human receptors is also assessed as Negligible.

5.2.2.4 Predicted Concentrations of NO_X – Ecological Receptors

The predicted annual mean NO_x concentrations at the selected ecological receptor are displayed in Appendix 5 Table 5-E.

The predicted future annual mean concentrations are above the critical level for NO_x (30 µg/m^3) at receptor E3 (AWI-3) situated 5.5 m from the A9 Slip Road/ New Link Road where the annual mean NO_x concentration is 36.9 µg/m^3 (122.9% of the critical level)

The Proposed Development will result in a maximum change of up to 1.0% of the (0.3 µg/m^3) of the Critical Level at these locations which is at the 1% screening criterion for ecological receptors. Based on the above and with no exceedances of the 1% criterion; no significant adverse effect upon ecological receptors within the study area are associated with the Proposed Development. Exceedances of the critical level are predicted; however, these will not occur as a result of the Proposed Development traffic generation.

5.3 Assessment of Significance

5.3.1 Construction Dust Emissions

The good-practice mitigation measures and site-specific mitigation measures outlined in Appendix 6 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 selected existing sensitive receptors have been considered. Predicted impact descriptors are all negligible and the overall effect on local air quality of the Proposed Development is therefore assessed as Not Significant.

5.4 Site Suitability

Predicted concentrations at selected proposed receptors within the Proposed Development are provided in Appendix 5 – Table 5-D.

The maximum predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations across all proposed receptors are 12.3 µg/m^3, 11.1 µg/m^3, and 6.4 µg/m^3 respectively and are therefore significantly below the annual mean AQSs.

Predicted NO_2 concentrations at all proposed receptors 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). It can therefore be concluded that there are no predicted exceedances of the hourly standard which is the applicable standard at the proposed receptors.

The annual mean PM_{10} concentrations 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 proposed 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.

Overall, with respect to air quality, the Proposed Development site is assessed as suitable for its proposed commercial and residential uses.

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 6.

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.

The Proposed Development site is located near frequent bus routes which will encourage workers, residents and visitors to travel by public transport to and from the site.

7. Conclusions

This report is the AQIA for the proposed Lidl store at Crieff Road, Perth.

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.

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

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

Exceedances of the NO_x critical level have been predicted; however, these will not occur due to the Proposed Development traffic generation. It has been concluded that no significant adverse effect upon ecological receptors within the study area associated solely with the Proposed Development are anticipated.

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

With regard 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 6 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 its proposed commercial with regard to air quality.

8. References

2021.Scottish.Air.Quality.
Available at: http://www.scottishairquality.scot/data/mapping?view=data

Cambridge Environmental Research Consultants, 2021. Model validation. Available at: http://www.cerc.co.uk/environmental-software/model-validation.html

Council of the European Union, 1996. Council Directive 96/62/EC on ambient air quality assessment and management, s.l.: s.n.

Council, P. &. K., 2009. Air Quality Action Plan

DEFRA, 2021. Local Air Quality Management - Technical Guidance (TG16)

DEFRA, 2022. DEFRA Background Maps - 2018 base

DEFRA, 2022. Defra Backround Maps - 2018 Based

Department for Environment and Rural Affairs, 2019. NOx to NO2 Calculator V7.1

Department for Environment Food and Rural Affairs, 2009. Local Air Quality Management - Technical Guidance (TG09)

Department for Environment Food and Rural Affairs, 2018. Local Air Quality Management - Technical Guidance (TG16)

Department for Environment Food and Rural Affairs, 2020. NOx to NO2 Calculator V8.1

Department for Environment Food and Rural Affairs, 2021. Local Air Quality Management - Technical Guidance (TG16)

Department for Transport, 2021. Department for Transport. [Online] Available at: https://roadtraffic.dft.gov.uk/#16/56.4047/-3.4651/basemap-countpoints

Department of the Environment Transport and the Regions, 1997. National Road Traffic Forecasts (Great Britain)

EPS, 2017. Delivering Cleaner Air for Scotland - Development Planning & Development Mangement

EPUK & IAQM, 2017. Land-Use Planning & Development Control: Planning for Air Quality

EPUK & IAQM, 2017. Land-Use Planning & Development Control: Planning for Air Quality

European Parliament and the Council of the European Union, 2008. Directive 2008/50/EC on ambient air quality and cleaner air for Europe

HM Government, 1995. Environment Act

HM Government, 2010. The Air Quality Standards Regulations

IAQM, 2014. Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

IAQM, 2014. Guidance on the Assessment of Dust from Demolition and Construction Version 1.1

IAQM, 2019. A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

IAQM, 2020. a Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites

Perth and Kinross Council, 2019. Local Development Plan 2

Perth and Kinross Council, 2021. Air Quality Annual Progress Report (APR) for Perth and Kinross Council

PKC, 2020. Air Quality and Planning Supplementary Planning Guidance

Prof. Duncan Laxen and Dr Ben Marner, 2003. Analysis of the Relationship Between 1-Hour and Annual Mean Nitrogen Dioxide at UK Roadside and Kerbisde Monitoring Sites

Scottish Air Quality, 2019. Scottish Air Quality Background Maps - 2018 base

Scottish Air Quality, 2024. Scottish Air Quality Background Maps - 2018 base

Scottish Executive, 2006. Planning Advice Note 51: Planning, Environmental Protection and Regulation

Scottish Executive, 2016. The Air Quality (Scotland) Amendment Regulations

Scottish Government, 2014. National Planning Framework 3

Scottish Government, 2015. Cleaner Air for Scotland - The Road to a Healthier Future

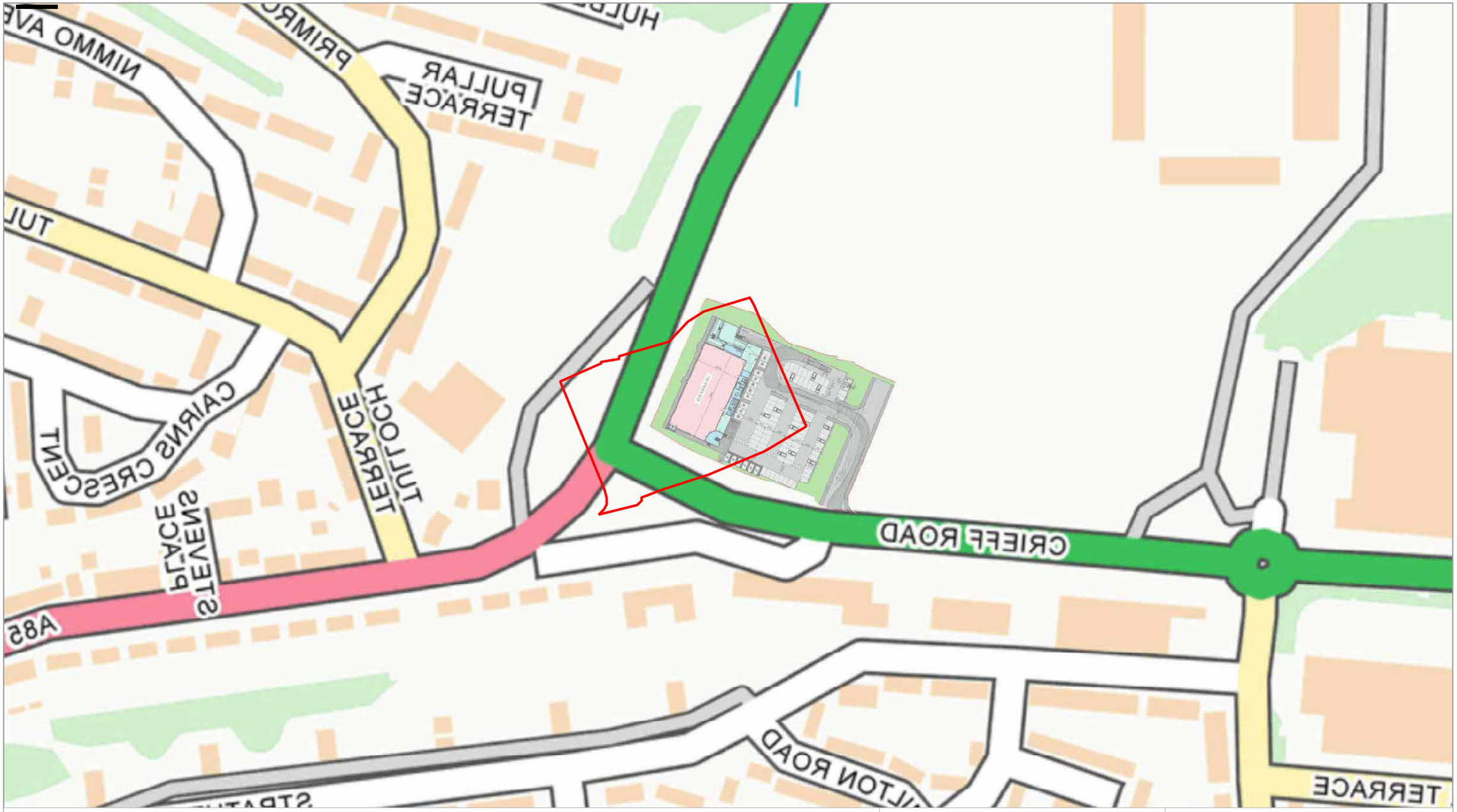
Scottish Government, 2020. Cleaner Air for Scotland 2 - Draft Air Quality Strategy Consultation

Scottish Government, 2021. Cleaner Air for Scotland 2 Towards a Better Place for Everyone

Welsh Assembly Government, Scottish Executive, Department of the Environment, Department for Environment Food and Rural Affairs, 2007. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland

WHO, 2005. Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide

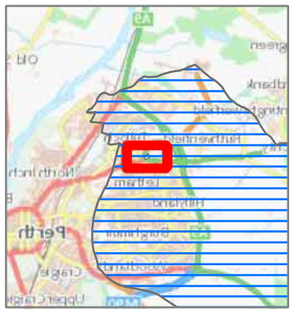
Drawings



KEY

Red Line Boundary

Perth City AQMA



Coordinate System: British National Grid
Projection: Transverse Mercator

0 0.010.02 0.04 0.06 0.08 0.1 Kilometers

1:2,000

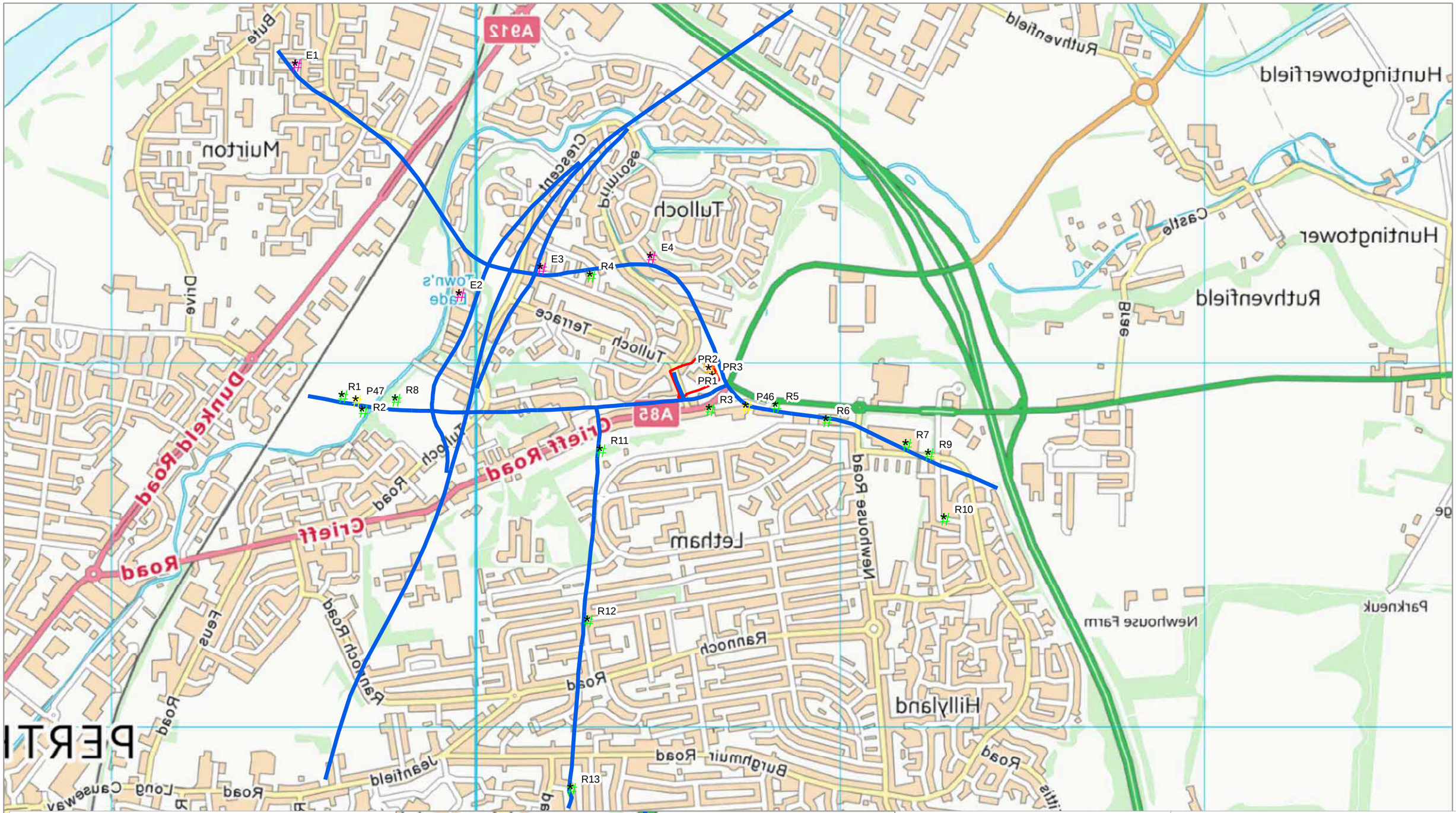
ITPENERGISED

Proposed Lidl Store,
Crieff Road, Perth
Air Quality Impact Assessment

Drawing 1
Site Location and Layout

Date:	Lead:	Review:	Version:
25/07/2022	SM	JB	V1

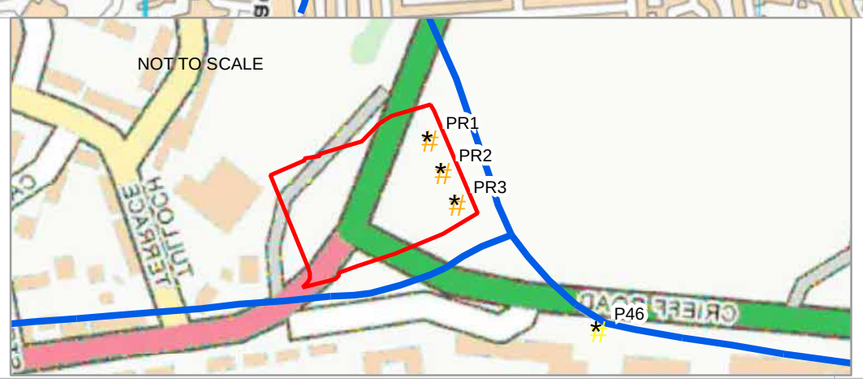
Project Number: 5064



KEY

- Red Line Boundary
- Modelled Road
- Human Receptors
- Proposed Receptor
- Ecological Receptor
- Diffusion Tube

NOT TO SCALE



Coordinate System: British National Grid
Projection: Transverse Mercator

0 0.05 0.1 0.2 0.3 0.4 0.5 Kilometers

1:10,000

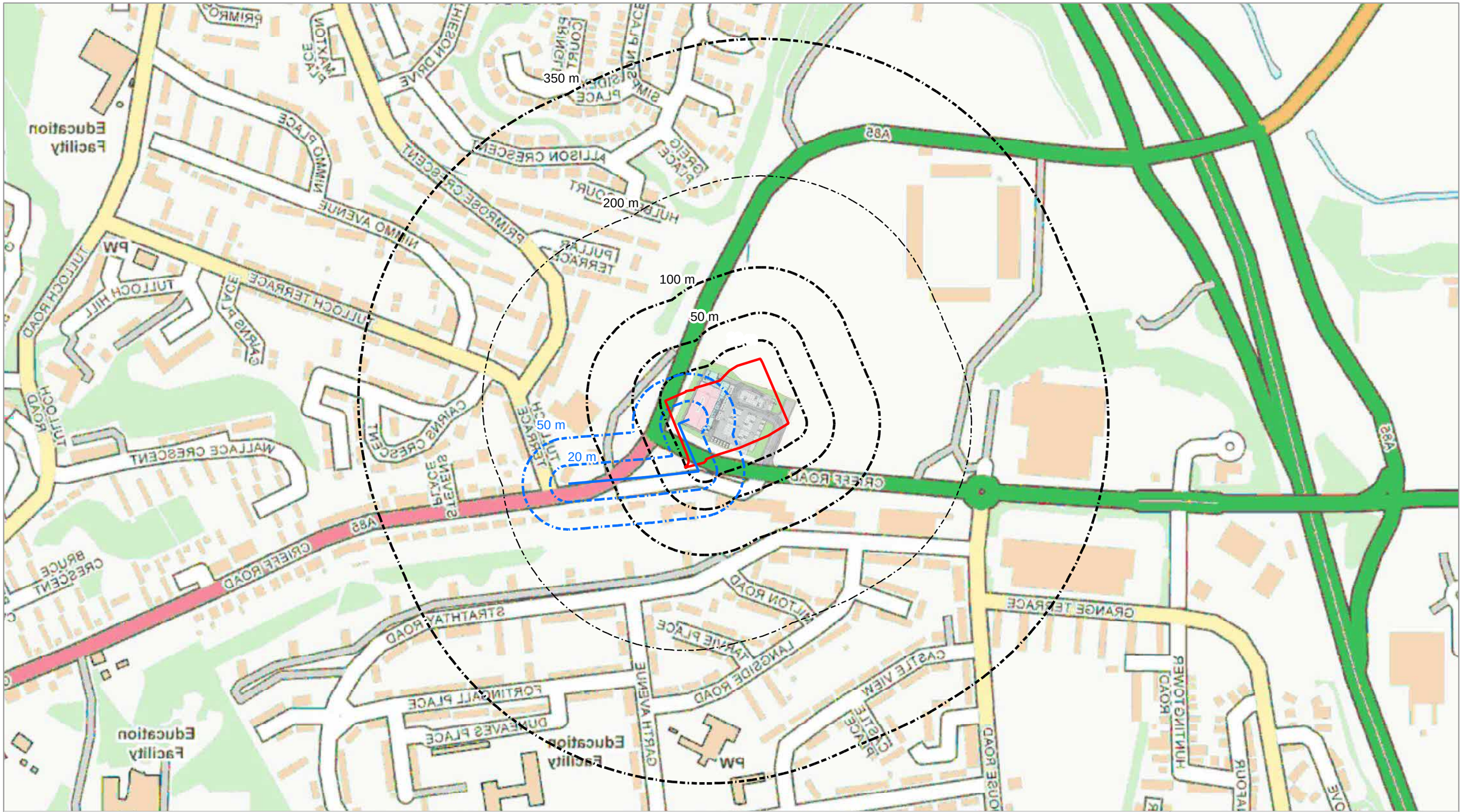
ITPENERGISED

Proposed Lidl Store,
Crieff Road, Perth
Air Quality Impact Assessment

Drawing 2
Modelled Roads and Recptors

Date:	Lead:	Review:	Version:
26/07/2022	SM	JB	V1

Project Number: 5064



KEY

- Red Line Boundary
- Construction Phase Dust Risk Assessment Buffer
- Track-out Route
- Track-out Route Buffer

Coordinate System: British National Grid
Projection: Transverse Mercator

0 0.0225 045 0.09 0.135 0.18 0.225
Kilometers

1:4,000

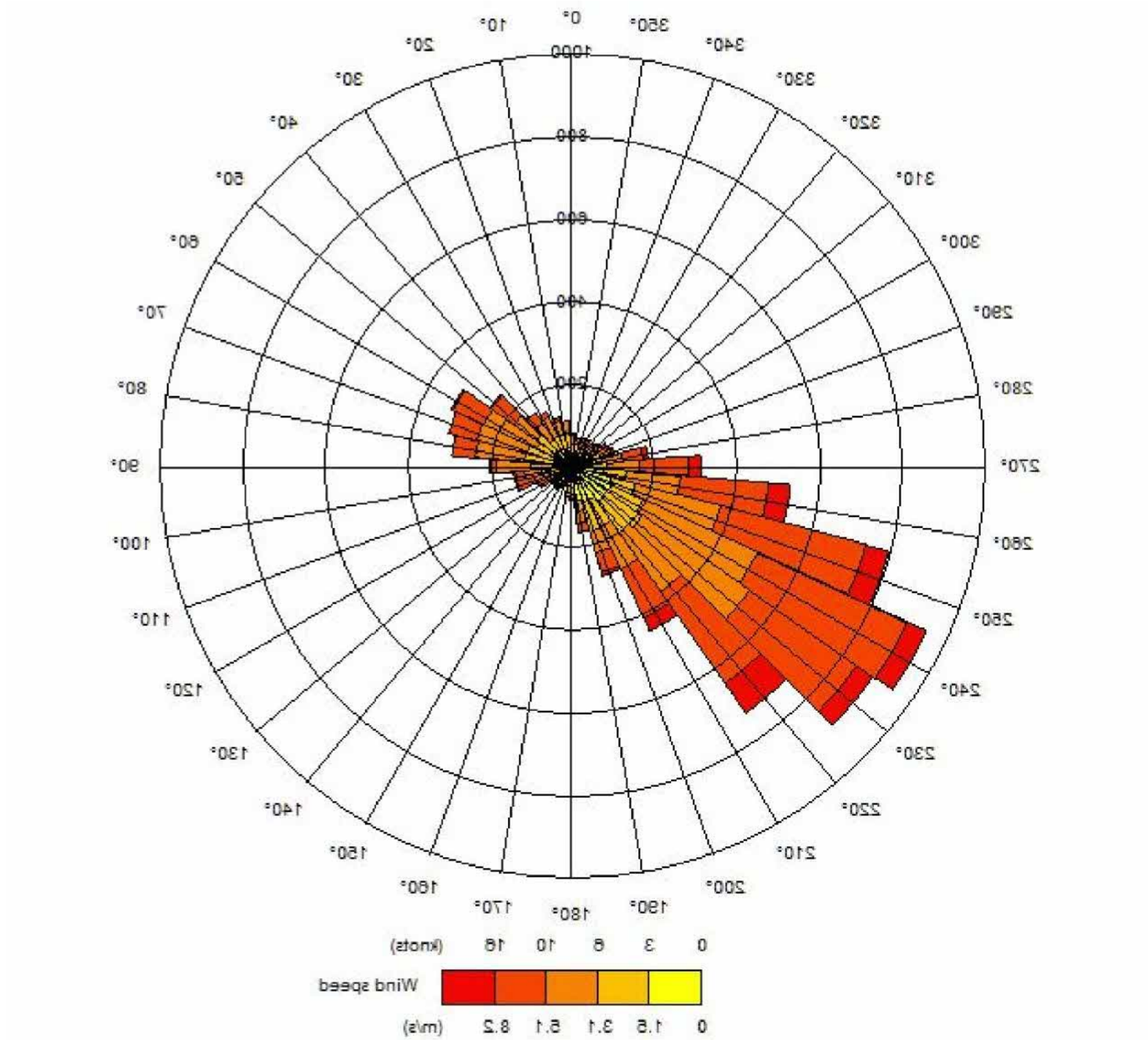
ITPENERGISED

Proposed Lidl Store,
Crieff Road, Perth
Air Quality Impact Assessment

Drawing 3
Construction Dust Risk
Assessment Study Area

Date:	Lead:	Review:	Version:
25/07/2022	SM	JB	V1

2019 Hourly Meteorological Data for Strathallen Airfield



ITPENERGISED

Proposed Lidl Store,
Crieff Road, Perth
Air Quality Impact Assessment
Drawing 4
2019 Wind Rose for
Strathallen Airfield

Date:	Drawn by:	Checked by:	Version:
25/07/2022	SM	JB	V1

Appendix 1 Traffic Data as Modelled

SUMMARY OF TRAFFIC DATA

Scenario: Baseline 2019

Link	Street Name	Manual Count Point	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	LDV Speed (mph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	HDV Speed (mph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
A9 and additional sliproads														
Road041	North section of modelled A9	91042	32287.0	30101.0	1254.2	112.7	70.0	2186.0	91.1	112.7	70.0	NO	19.0	N/A
Road042	A9 section between New link road sliproads and North section of A9	91043	31186.0	28142.0	1172.6	112.7	70.0	3044.0	126.8	112.7	70.0	NO	19.0	N/A
Road043	A9 section between New link road sliproads	91043	31186.0	28142.0	1172.6	112.7	70.0	3044.0	126.8	112.7	70.0	NO	19.0	N/A
Road044	A9 section between New link road sliproads and south section of A9	91043	31186.0	28142.0	1172.6	112.7	70.0	3044.0	126.8	112.7	70.0	NO	19.0	N/A
Road045	South section of modelled A9	91045	31186.0	28142.0	1172.6	112.7	70.0	3044.0	126.8	112.7	70.0	NO	19.0	N/A
Road058	Sliproad A9 Northbound intwersecting with A85 road	91044	4561.0	4278.0	178.3	64.4	40.0	283.0	11.8	64.4	40.0	NO	6.5	N/A
Road059	RSA Sliproad A9 Northbound intwersecting with A85 road	91048	8155.0	7853.0	327.2	20.0	12.4	302.0	12.6	20.0	12.4	NO	6.5	N/A
Road060	Connection between A85 and New link road	91048	8155.0	7853.0	327.2	64.4	40.0	302.0	12.6	64.4	40.0	NO	12.0	N/A
Road061	RSA Connection between A85 and New link road	91048	8155.0	7853.0	327.2	20.0	12.4	302.0	12.6	20.0	12.4	NO	12.0	N/A
Road062	Sliproad from New link road joining A9 northbound	91050	1614.0	1505.0	62.7	96.6	60.0	109.0	4.5	96.6	60.0	NO	7.0	N/A
Road063	Sliproad A9 southbound intersecting with New link road	91049	1614.0	1505.0	62.7	96.6	60.0	109.0	4.5	96.6	60.0	NO	6.5	N/A
Road064	RSA Sliproad A9 southbound intersecting with New link road	91051	3769.0	3529.0	147.0	20.0	12.4	240.0	10.0	20.0	12.4	NO	12.0	N/A
Road065	Sliproad from New link road joining A9 southbound	91051	3769.0	3529.0	147.0	96.6	60.0	240.0	10.0	96.6	60.0	NO	6.5	N/A
New Link Road														
Road005	RSA traffic lights at A9 crossing	91046	918.0	900.0	37.5	20.0	12.4	18.0	0.8	20.0	12.4	NO	9.0	N/A
Road006	RSA traffic lights at A9 sliproads east	91046	918.0	900.0	37.5	20.0	12.4	18.0	0.8	20.0	12.4	NO	14.0	N/A
Road007	RSA traffic lights at McDermaid Park entrance	91046	918.0	900.0	37.5	20.0	12.4	18.0	0.8	20.0	12.4	NO	14.0	N/A
Road008	Section of road between RSA traffic lights at McDermaid Park entrance and Perth crematorium entrance	91046	918.0	900.0	37.5	64.4	40.0	18.0	0.8	64.4	40.0	NO	9.0	N/A
Road009	Perth crematorium entrance to RSA junction with A85	91046	918.0	900.0	37.5	64.4	40.0	18.0	0.8	64.4	40.0	NO	9.0	N/A
Road010	RSA junction with A85	91046	918.0	900.0	37.5	20.0	12.4	18.0	0.8	20.0	12.4	NO	9.0	N/A
A85/ Crieff Road														
Road046	RSA traffic lights at junction with Tulloch Terrace	91041	9180.0	9002.0	375.1	20.0	12.4	178.0	7.4	20.0	12.4	NO	12.0	N/A
Road038	Stretch of road east from RSA traffic lights at junction with Tulloch Terrace.	91041	9180.0	9002.0	375.1	48.3	30.0	178.0	7.4	48.3	30.0	NO	8.0	N/A
Road039	RSA at Castle Brae Junction	Estimated	9908	9601.0	400.0	20.0	12.4	307	12.8	20.0	12.4	NO	10.0	N/A
Road013	Section of road passing Huntingtower Estate	Estimated	9908	9601.0	400.0	20.0	12.4	307	12.8	20.0	12.4	NO	10.0	N/A
Road014	Section of road between Huntingtower Estate and A9 crossing	Estimated	9908	9601.0	400.0	64.4	40.0	307	12.8	64.4	40.0	NO	10.0	N/A
Road015	RSA traffic lights at A9 crossing west	Estimated	9908	9601.0	400.0	20.0	12.4	307	12.8	20.0	12.4	NO	13.0	N/A
Road016	RSA traffic lights at A9 crossing middle	Estimated	9908	9601.0	400.0	20.0	12.4	307	12.8	20.0	12.4	NO	13.0	N/A
Road017	RSA traffic lights at A9 crossing east	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	10.0	N/A
Road018	Road widening at A9 crossing east	91040	15428	15008.0	625.3	48.3	30.0	420	17.5	48.3	30.0	NO	14.0	N/A
Road019	RSA traffic lights at Huntingtower Road west	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	14.0	N/A
Road020	RSA traffic lights at Huntingtower Road east	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	14.0	N/A
Road021	Section of road between RSA traffic lights at Huntingtower Road east and RSA roundabout at Newhouse Road West	91040	15428	15008.0	625.3	48.3	30.0	420	17.5	48.3	30.0	NO	14.0	N/A
Road022	RSA roundabout at Newhouse Road West	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	11.0	N/A
Road023	RSA roundabout at Newhouse Road East	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	11.0	N/A
Road024	Section of road between RSA roundabout at Newhouse Road East and site entrance	91040	15428	15008.0	625.3	48.3	30.0	420	17.5	48.3	30.0	NO	11.0	N/A
Road025	Road widening at site entrance	91040	15428	15008.0	625.3	48.3	30.0	420	17.5	48.3	30.0	NO	14.0	N/A
Road026	RSA junction with New Link Road west	91040	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	14.0	N/A
Road027	RSA junction with New Link Road east	91041	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	14.0	N/A
Road028	RSA traffic lights at Tulloch Terrace	91041	15428	15008.0	625.3	20.0	12.4	420	17.5	20.0	12.4	NO	14.0	N/A

ITPENERGISED

SUMMARY OF TRAFFIC DATA

Scenario: Future Without 2024

Link	Street Name	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	LDV Speed (mph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	HDV Speed (mph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
A9 and additional sliproads													
Road041	North section of modelled A9	33074.9	30835.5	1284.8	112.7	70.0	2239.3	93.3	112.7	70.0	NO	19.0	N/A
Road042	A9 section between New link road sliproads and North section of A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road043	A9 section between New link road sliproads	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road044	A9 section between New link road sliproads and south section of A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road045	South section of modelled A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road058	Sliproad A9 Northbound intwersecting with A85 road	3842.0	3552.1	148.0	64.4	40.0	289.9	12.1	64.4	40.0	NO	6.5	N/A
Road059	RSA Sliproad A9 Northbound intwersecting with A85 road	8354.0	8044.6	335.2	20.0	12.4	309.4	12.9	20.0	12.4	NO	6.5	N/A
Road060	Connection between A85 and New link road	8354.0	8044.6	335.2	64.4	40.0	309.4	12.9	64.4	40.0	NO	12.0	N/A
Road061	RSA Connection between A85 and New link road	8354.0	8044.6	335.2	20.0	12.4	309.4	12.9	20.0	12.4	NO	12.0	N/A
Road062	Sliproad from New link road joining A9 northbound	1653.4	1541.7	64.2	96.6	60.0	111.7	4.7	96.6	60.0	NO	7.0	N/A
Road063	Sliproad A9 southbound intersecting with New link road	1653.4	1541.7	64.2	96.6	60.0	111.7	4.7	96.6	60.0	NO	6.5	N/A
Road064	RSA Sliproad A9 southbound intersecting with New link road	3861.0	3615.1	150.6	20.0	12.4	245.9	10.2	20.0	12.4	NO	12.0	N/A
Road065	Sliproad from New link road joining A9 southbound	3861.0	3615.1	150.6	96.6	60.0	245.9	10.2	96.6	60.0	NO	6.5	N/A
New Link Road													
Road001	RSA roundabout with Ruthvenfield Road	4362.0	4276.5	178.2	20.0	12.4	85.5	3.6	20.0	12.4	NO	9.0	N/A
Road002	section of road between B9993 and RSA traffic lights at A9 sliproads	4362.0	4276.5	178.2	64.4	40.0	85.5	3.6	64.4	40.0	NO	9.0	N/A
Road003	RSA traffic lights at A9 sliproads west	4362.0	4276.5	178.2	20.0	12.4	85.5	3.6	20.0	12.4	NO	9.0	N/A
Road004	RSA traffic lights at A9 crossing	4362.0	4276.5	178.2	20.0	12.4	85.5	3.6	20.0	12.4	NO	9.0	N/A
Road005	RSA traffic lights at A9 crossing	9276.0	9094.1	378.9	20.0	12.4	181.9	7.6	20.0	12.4	NO	9.0	N/A
Road006	RSA traffic lights at A9 sliproads east	9276.0	9094.1	378.9	20.0	12.4	181.9	7.6	20.0	12.4	NO	14.0	N/A
Road007	RSA traffic lights at McDermaid Park entrance	9276.0	9094.1	378.9	20.0	12.4	181.9	7.6	20.0	12.4	NO	14.0	N/A
Road008	Section of road between RSA traffic lights at McDermaid Park entrance and Perth crematorium entrance	9276.0	9094.1	378.9	64.4	40.0	181.9	7.6	64.4	40.0	NO	9.0	N/A
Road009	Perth crematorium entrance to RSA junction with A85	9276.0	9094.1	378.9	64.4	40.0	181.9	7.6	64.4	40.0	NO	9.0	N/A
Road010	RSA junction with A85	9276.0	9094.1	378.9	20.0	12.4	181.9	7.6	20.0	12.4	NO	9.0	N/A
A85/ Crieff Road													
Road046	RSA traffic lights at junction with Tulloch Terrace	9276.0	9096.1	379.0	20.0	12.4	179.9	7.5	20.0	12.4	NO	12.0	N/A
Road047	Stretch of road between RSA traffic lights at junction with Tulloch Terrace and RSA traffic lights at Tulloch Road	9276.0	9096.1	379.0	48.3	30.0	179.9	7.5	48.3	30.0	NO	8.0	N/A
Road048	RSA traffic lights at Tulloch Road	9276.0	9023.5	376.0	20.0	12.4	252.5	10.5	20.0	12.4	NO	8.0	N/A
Road012	RSA at Castle Brae Junction	10823.0	10528.4	438.7	64.4	40.0	294.6	12.3	64.4	40.0	NO	10.0	N/A
Road013	Section of road passing Huntingtower Estate	10823.0	10528.4	438.7	64.4	40.0	294.6	12.3	64.4	40.0	NO	10.0	N/A
Road014	Section of road between Huntingtower Estate and A9 crossing	10823.0	10528.4	438.7	64.4	40.0	294.6	12.3	64.4	40.0	NO	10.0	N/A
Road015	RSA traffic lights at A9 crossing west	10823.0	10528.4	438.7	20.0	12.4	294.6	12.3	20.0	12.4	NO	13.0	N/A
Road016	RSA traffic lights at A9 crossing middle	11836	11513.8	479.7	20.0	12.4	322.2	13.4	20.0	12.4	NO	13.0	N/A
Road017	RSA traffic lights at A9 crossing east	11836	11513.8	479.7	20.0	12.4	322.2	13.4	20.0	12.4	NO	10.0	N/A
Road018	Road widening at A9 crossing east	11836	11513.8	479.7	48.3	30.0	322.2	13.4	48.3	30.0	NO	14.0	N/A
Road019	RSA traffic lights at Huntingtower Road west	11836	11513.8	479.7	20.0	12.4	322.2	13.4	20.0	12.4	NO	14.0	N/A
Road020	RSA traffic lights at Huntingtower Road east	13191.0	12831.9	534.7	20.0	12.4	359.1	15.0	20.0	12.4	NO	14.0	N/A
Road021	Section of road between RSA traffic lights at Huntingtower Road east and RSA roundabout at Newhouse Road West	13191.0	12831.9	534.7	48.3	30.0	359.1	15.0	48.3	30.0	NO	14.0	N/A
Road022	RSA roundabout at Newhouse Road West	13191.0	12831.9	534.7	20.0	12.4	359.1	15.0	20.0	12.4	NO	11.0	N/A
Road023	RSA roundabout at Newhouse Road East	8341.0	8113.9	338.1	20.0	12.4	227.1	9.5	20.0	12.4	NO	11.0	N/A
Road024	Section of road between RSA roundabout at Newhouse Road East and site entrance	8222	7998.2	333.3	48.3	30.0	223.8	9.3	48.3	30.0	NO	11.0	N/A
Road025	Road widening at site entrance	8190	7967.0	332.0	48.3	30.0	223.0	9.3	48.3	30.0	NO	14.0	N/A
Road026	RSA junction with New Link Road west	8172.0	7949.5	331.2	20.0	12.4	222.5	9.3	20.0	12.4	NO	14.0	N/A
Road027	RSA junction with New Link Road east	9276.0	9096.1	379.0	20.0	12.4	179.9	7.5	20.0	12.4	NO	14.0	N/A
Road028	RSA traffic lights at Tulloch Terrace	9276.0	9096.1	379.0	20.0	12.4	179.9	7.5	20.0	12.4	NO	14.0	N/A
Newhouse Road													
Road049	RSA at Newhouse roundabout	11713.0	11394.1	474.8	20.0	12.4	318.9	13.3	20.0	12.4	NO	8.0	N/A
Road050	Stretch of road between RSA at newhouse roundabout and opening into Grange Terrace	11713.0	11394.1	474.8	48.3	30.0	318.9	13.3	30.0	18.6	NO	8.0	N/A
Road051	RSA opening into Grange Terrace	11713.0	11394.1	474.8	20.0	12.4	318.9	13.3	20.0	12.4	NO	8.0	N/A
Road052	Stretch of road between RSA at Grange Terrace and RSA at Struan Road	11713.0	11394.1	474.8	48.3	30.0	318.9	13.3	30.0	18.6	NO	8.0	N/A
Road053	RSA at Struan Road	11713.0	11394.1	474.8	20.0	12.4	318.9	13.3	20.0	12.4	NO	8.0	N/A
Road054	Stretch of road between Struan Road and RSA at Rannoch Road roundabout	11713.0	11394.1	474.8	48.3	30.0	318.9	13.3	30.0	18.6	NO	8.0	N/A
Road055	RSA at Rannoch Road roundabout	11713.0	11394.1	474.8	20.0	12.4	318.9	13.3	20.0	12.4	NO	8.0	N/A
Road056	Stretch of road between RSA at Rannoch Road and RSA at Burghmuir junction	11713.0	11394.1	474.8	48.3	30.0	318.9	13.3	30.0	18.6	NO	8.0	N/A
Road057	RSA at Burghmuir Junction	11713.0	11394.1	474.8	20.0	12.4	318.9	13.3	20.0	12.4	NO	8.0	N/A
Site Access													
Road069	RSA primary site entrance/ exit	151.0	146.9	6.1	20.0	12.4	4.1	0.2	20.0	12.4	NO	8.0	N/A

ITPENERGISED

SUMMARY OF TRAFFIC DATA

Scenario: Future With 2024

Link	Street Name	TOTAL AADT	AADT LDV Flow	Hourly LDV Flow	LDV Speed (kph)	LDV Speed (mph)	AADT HGV Flow	Hourly HDV Flow	HDV Speed (kph)	HDV Speed (mph)	Canyon	Road / Canyon Width (m)	Canyon height (m)
A9 and additional sliproads													
Road041	North section of modelled A9	33074.9	30835.5	1284.8	112.7	70.0	2239.3	93.3	112.7	70.0	NO	19.0	N/A
Road042	A9 section between New link road sliproads and North section of A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road043	A9 section between New link road sliproads	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road044	A9 section between New link road sliproads and south section of A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road045	South section of modelled A9	31947.0	28828.7	1201.2	112.7	70.0	3118.3	129.9	112.7	70.0	NO	19.0	N/A
Road058	Sliproad A9 Northbound intwersecting with A85 road	3891.0	3601.1	150.0	64.4	40.0	289.9	12.1	64.4	40.0	NO	6.5	N/A
Road059	RSA Sliproad A9 Northbound intwersecting with A85 road	8354.0	8044.6	335.2	20.0	12.4	309.4	12.9	20.0	12.4	NO	6.5	N/A
Road060	Connection between A85 and New link road	8354.0	8044.6	335.2	64.4	40.0	309.4	12.9	64.4	40.0	NO	12.0	N/A
Road061	RSA Connection between A85 and New link road	8354.0	8044.6	335.2	20.0	12.4	309.4	12.9	20.0	12.4	NO	12.0	N/A
Road062	Sliproad from New link road joining A9 northbound	1653.4	1541.7	64.2	96.6	60.0	111.7	4.7	96.6	60.0	NO	7.0	N/A
Road063	Sliproad A9 southbound intersecting with New link road	1653.4	1541.7	64.2	96.6	60.0	111.7	4.7	96.6	60.0	NO	6.5	N/A
Road064	RSA Sliproad A9 southbound intersecting with New link road	3861.0	3615.1	150.6	20.0	12.4	245.9	10.2	20.0	12.4	NO	12.0	N/A
Road065	Sliproad from New link road joining A9 southbound	3861.0	3615.1	150.6	96.6	60.0	245.9	10.2	96.6	60.0	NO	6.5	N/A
New Link Road													
Road001	RSA roundabout with Ruthvenfield Road	4484.0	4396.1	183.2	20.0	12.4	87.9	3.7	20.0	12.4	NO	9.0	N/A
Road002	section of road between B9993 and RSA traffic lights at A9 sliproads	4484.0	4396.1	183.2	64.4	40.0	87.9	3.7	64.4	40.0	NO	9.0	N/A
Road003	RSA traffic lights at A9 sliproads west	4484.0	4396.1	183.2	20.0	12.4	87.9	3.7	20.0	12.4	NO	9.0	N/A
Road004	RSA traffic lights at A9 crossing	4484.0	4396.1	183.2	20.0	12.4	87.9	3.7	20.0	12.4	NO	9.0	N/A
Road005	RSA traffic lights at A9 crossing	9526.0	9339.2	389.1	20.0	12.4	186.8	7.8	20.0	12.4	NO	9.0	N/A
Road006	RSA traffic lights at A9 sliproads east	9526.0	9339.2	389.1	20.0	12.4	186.8	7.8	20.0	12.4	NO	14.0	N/A
Road007	RSA traffic lights at McDermaid Park entrance	9526.0	9339.2	389.1	20.0	12.4	186.8	7.8	20.0	12.4	NO	14.0	N/A
Road008	Section of road between RSA traffic lights at McDermaid Park entrance and Perth crematorium entrance	9526.0	9339.2	389.1	64.4	40.0	186.8	7.8	64.4	40.0	NO	9.0	N/A
Road009	Perth crematorium entrance to RSA junction with A85	9526.0	9339.2	389.1	64.4	40.0	186.8	7.8	64.4	40.0	NO	9.0	N/A
Road010	RSA junction with A85	9526.0	9339.2	389.1	20.0	12.4	186.8	7.8	20.0	12.4	NO	9.0	N/A
A85/ Crieff Road													
Road046	RSA traffic lights at junction with Tulloch Terrace	9526.0	9341.3	389.2	20.0	12.4	184.7	7.7	20.0	12.4	NO	12.0	N/A
Road047	Stretch of road between RSA traffic lights at junction with Tulloch Terrace and RSA traffic lights at Tulloch Road	9526.0	9341.3	389.2	48.3	30.0	184.7	7.7	48.3	30.0	NO	8.0	N/A
Road048	RSA traffic lights at Tulloch Road	9526.0	9266.7	386.1	20.0	12.4	259.3	10.8	20.0	12.4	NO	8.0	N/A
Road012	RSA at Castle Brae Junction	10875.0	10578.9	440.8	64.4	40.0	296.1	12.3	64.4	40.0	NO	10.0	N/A
Road013	Section of road passing Huntingtower Estate	10875.0	10578.9	440.8	64.4	40.0	296.1	12.3	64.4	40.0	NO	10.0	N/A
Road014	Section of road between Huntingtower Estate and A9 crossing	10875.0	10578.9	440.8	64.4	40.0	296.1	12.3	64.4	40.0	NO	10.0	N/A
Road015	RSA traffic lights at A9 crossing west	10875.0	10578.9	440.8	20.0	12.4	296.1	12.3	20.0	12.4	NO	13.0	N/A
Road016	RSA traffic lights at A9 crossing middle	11986	11659.7	485.8	20.0	12.4	326.3	13.6	20.0	12.4	NO	13.0	N/A
Road017	RSA traffic lights at A9 crossing east	11986	11659.7	485.8	20.0	12.4	326.3	13.6	20.0	12.4	NO	10.0	N/A
Road018	Road widening at A9 crossing east	11986	11659.7	485.8	48.3	30.0	326.3	13.6	48.3	30.0	NO	14.0	N/A
Road019	RSA traffic lights at Huntingtower Road west	11986	11659.7	485.8	20.0	12.4	326.3	13.6	20.0	12.4	NO	14.0	N/A
Road020	RSA traffic lights at Huntingtower Road east	13341.0	12977.8	540.7	20.0	12.4	363.2	15.1	20.0	12.4	NO	14.0	N/A
Road021	Section of road between RSA traffic lights at Huntingtower Road east and RSA roundabout at Newhouse Road West	13341.0	12977.8	540.7	48.3	30.0	363.2	15.1	48.3	30.0	NO	14.0	N/A
Road022	RSA roundabout at Newhouse Road West	13341.0	12977.8	540.7	20.0	12.4	363.2	15.1	20.0	12.4	NO	11.0	N/A
Road023	RSA roundabout at Newhouse Road East	8733.0	8495.3	354.0	20.0	12.4	237.7	9.9	20.0	12.4	NO	11.0	N/A
Road024	Section of road between RSA roundabout at Newhouse Road East and site entrance	8620	8385.3	349.4	48.3	30.0	234.7	9.8	48.3	30.0	NO	11.0	N/A
Road025	Road widening at site entrance	8504	8272.5	344.7	48.3	30.0	231.5	9.6	48.3	30.0	NO	14.0	N/A
Road026	RSA junction with New Link Road west	8544.0	8311.4	346.3	20.0	12.4	232.6	9.7	20.0	12.4	NO	14.0	N/A
Road027	RSA junction with New Link Road east	9526.0	9341.3	389.2	20.0	12.4	184.7	7.7	20.0	12.4	NO	14.0	N/A
Road028	RSA traffic lights at Tulloch Terrace	9526.0	9341.3	389.2	20.0	12.4	184.7	7.7	20.0	12.4	NO	14.0	N/A
Newhouse Road													
Road049	RSA at Newhouse roundabout	11955.0	11629.5	484.6	20.0	12.4	325.5	13.6	20.0	12.4	NO	8.0	N/A
Road050	Stretch of road between RSA at newhouse roundabout and opening into Grange Terrace	11955.0	11629.5	484.6	48.3	30.0	325.5	13.6	30.0	18.6	NO	8.0	N/A
Road051	RSA opening into Grange Terrace	11955.0	11629.5	484.6	20.0	12.4	325.5	13.6	20.0	12.4	NO	8.0	N/A
Road052	Stretch of road between RSA at Grange Terrace and RSA at Struan Road	11955.0	11629.5	484.6	48.3	30.0	325.5	13.6	30.0	18.6	NO	8.0	N/A
Road053	RSA at Struan Road	11955.0	11629.5	484.6	20.0	12.4	325.5	13.6	20.0	12.4	NO	8.0	N/A
Road054	Stretch of road between Struan Road and RSA at Rannoch Road roundabout	11955.0	11629.5	484.6	48.3	30.0	325.5	13.6	30.0	18.6	NO	8.0	N/A
Road055	RSA at Rannoch Road roundabout	11955.0	11629.5	484.6	20.0	12.4	325.5	13.6	20.0	12.4	NO	8.0	N/A
Road056	Stretch of road between RSA at Rannoch Road and RSA at Burghmuir junction	11955.0	11629.5	484.6	48.3	30.0	325.5	13.6	30.0	18.6	NO	8.0	N/A
Road057	RSA at Burghmuir Junction	11955.0	11629.5	484.6	20.0	12.4	325.5	13.6	20.0	12.4	NO	8.0	N/A
Site Access													
Road069	RSA primary site entrance/ exit	2189.0	2129.4	88.7	20.0	12.4	59.6	2.5	20.0	12.4	NO	8.0	N/A

Appendix 2 - Modelled Receptors

Table 2-A – Modelled Receptor Locations

ID	Description	Coordinates		
		X	Y	Z
Existing Human Receptors				
R1	Residential Property on Crieff Road/ Castle Brae	308255	724904	1.5
R2	Residential Property A85	308311	724864	1.5
R3	Residential Property A85	309264	724868	1.5
R4	McDermaid Park	308937	725234	1.5
R5	Residential Property Crieff Road	309445	724877	1.5
R6	Residential Property Crieff Road	309585	724837	1.5
R7	Residential Property Crieff Road	309803	724772	1.5
R8	Residential Property A85	308401	724894	1.5
R9	Residential Property Crieff Road	309865	724745	1.5
R10	Perth College UHI	309952	724501	1.5
R11	Residential Property Newhouse Road	308964	724756	1.5
R12	Residential Property Newhouse Road	308929	724287	1.5
R13	Residential Property Newhouse Road	308884	723826	1.5
Proposed Human Receptors				
PR1	Proposed Lidl Store	309254	724999	1.5
PR2	Proposed Lidl Store	309263	724978	1.5
PR3	Proposed Lidl Store	309272	724958	1.5
Ecological Receptors				
E1	SAC River Almond	308127	725814	0
E2	AWI-1	308577	725183	0
E3	AWI-2	308800	725255	0
E4	AWI-3	309102	725286	0
Perth and Kinross Council Monitoring Sites				
P47	5 East Huntingtower	308293	724892	2.84
P46	204 Crieff Road	309364	724875	2.14

Appendix 3 Background Concentrations

Table 3-A – Annual Mean NO_x Background Concentration for 2019 at Air Quality Monitoring Sites

Monitoring Site ID	Sector Removed Annual Mean Background NO_x Concentration (µg/m^3)
P47	9.3
P46	9.0

Table 3-B – Annual Mean Background Concentration for 2024 at Sensitive Receptor Locations

ID	Sector Removed Annual Mean Background 2024 Concentrations (µg/m^3)*			
	NO_x	NO_2	PM_{10}	$PM_{2.5}$
Existing Human Receptors				
R1	7.3	4.8	10.3	5.7
R2	7.3	4.8	10.3	5.7
R3	7.2	4.7	9.4	5.4
R4	6.4	4.3	10.0	5.3
R5	7.2	4.7	9.4	5.4
R6	7.2	4.7	9.4	5.4
R7	7.2	4.7	9.4	5.4
R8	7.3	4.8	10.3	5.7
R9	7.2	4.7	9.4	5.4
R10	7.2	4.7	9.4	5.4
R11	7.3	4.8	10.3	5.7
R12	7.3	4.8	10.3	5.7
R13	7.6	5.4	9.8	5.5
Ecological Receptor				
E1	8.6	N/A	N/A	N/A
E2	8.6	N/A	N/A	N/A
E3	8.6	N/A	N/A	N/A
E4	15.8	N/A	N/A	N/A
Proposed Receptors				
PR1	9.6	6.8	9.9	5.8
PR2	9.6	6.8	9.9	5.8
PR3	9.6	6.8	9.9	5.8

Appendix 4 Model Verification

The model verification for the 2019 baseline year was undertaken using publicly available DfT traffic count data. A summary of the verification results is presented in section 3.11

Nitrogen Dioxide (NO_2) Model Verification

Table 4-A - Comparison of Monitored vs Modelled Road NO_x

Monitoring Site ID	Monitored NO_2 ($\mu g/m^3$)	Background NO_x Concentration ($\mu g/m^3$) (after sector removal)	Monitored Road NO_x ($\mu g/m^3$)	Modelled Road NO_x ($\mu g/m^3$)	% Difference NO_x (Modelled-Monitored)/Monitored x100
P47	19.0	8.9	24.4	17.7	-27%
P46	19.0	8.8	24.4	24.8	2%

Chart 4-A - Comparison of Monitored vs Modelled Road NO_x

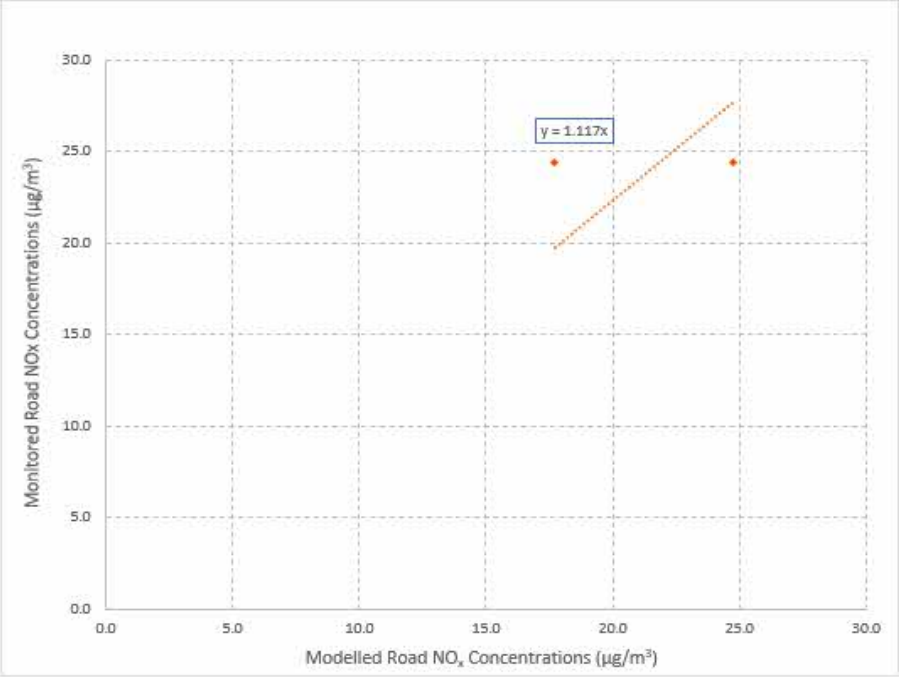


Table 4-B - Comparison of Monitored vs Adjusted Road NO_x

Monitoring Site ID	Monitored Road NO_x ($\mu g/m^3$)	Modelled Road NO_x ($\mu g/m^3$)	Ratio of Monitored / Modelled Road NO_x	Adjustment factor for modelled road contribution	Adjusted Modelled Road NO_x ($\mu g/m^3$)	Adjusted Modelled Total NO_x ($\mu g/m^3$)
P47	24.4	17.7	1.4	1.12	19.8	28.6
P46	24.4	24.8	1.0	1.12	27.7	36.5

Chart 4-B - Comparison of Monitored vs Adjusted Road NO_x

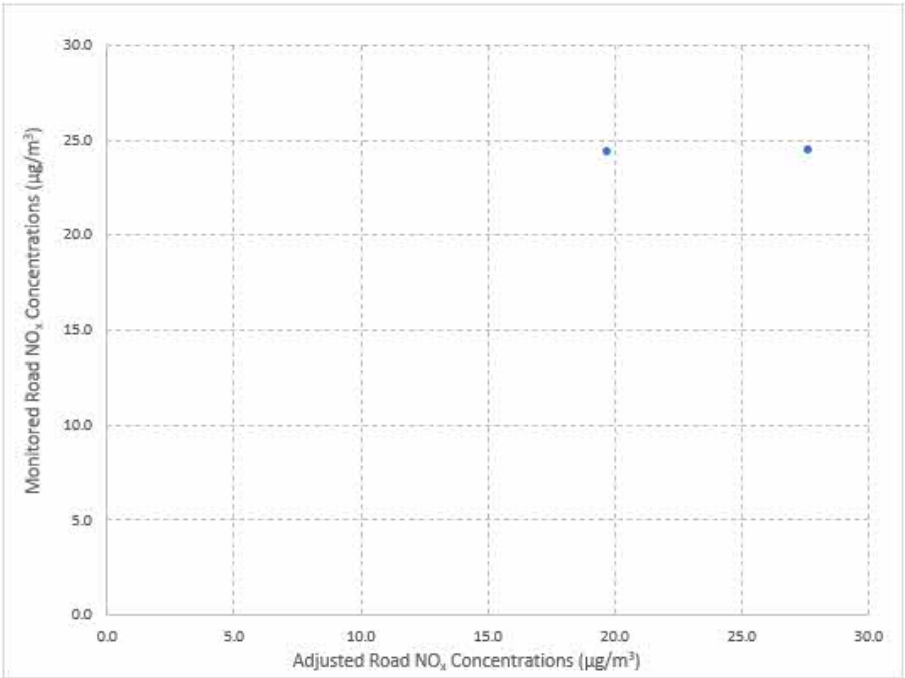
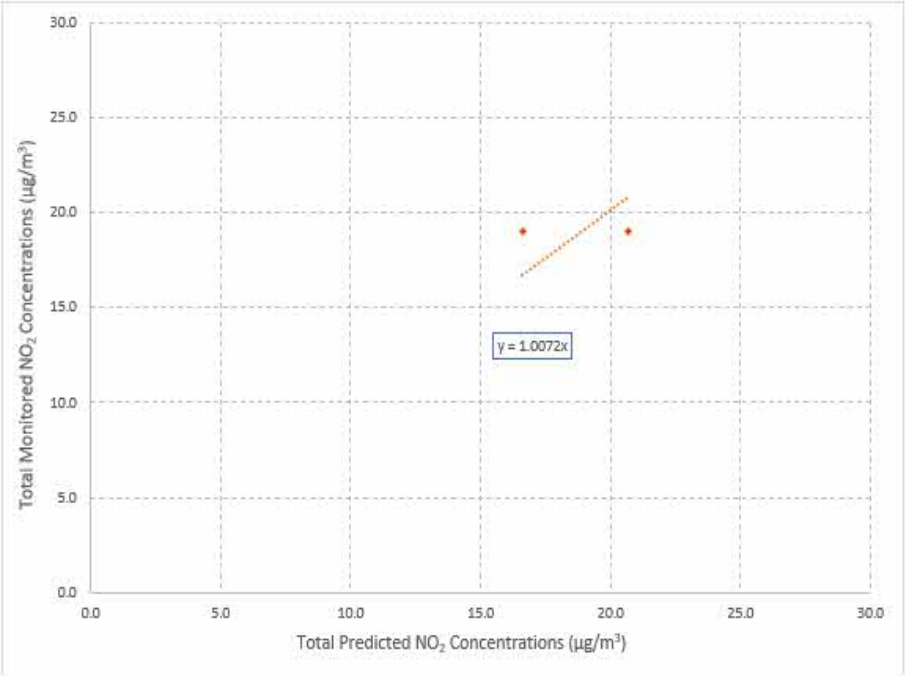


Table 4-C - Comparison of Monitored vs Modelled Total NO_2

Monitoring Site ID	Modelled total NO_2 (µg/m^3)	Monitored NO_2 (µg/m^3)	% Difference
P47	16.6	19.0	-13%
P46	20.7	19.0	9%

Chart 4-C - Comparison of Monitored vs Modelled Total NO_2



$$RMSE = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(Obs_i - Pred_i)^2} = 2.1 \qquad FB = \frac{(Avg.Obs - Avg.Pred)}{0.5(Avg.Obs + Avg.Pred)} = 0.0$$

As per the DEFRA LAQM Technical Guidance TG16 (Department for Environment Food and Rural Affairs, 2018), 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.

Nitrogen Dioxide Model Verification

All of the above apply to the NO_2 model verification and therefore the model is found to be robust and suitable to be used for future scenario predictions.

Particulate Matter (PM_{10} & $PM_{2.5}$) Model Verification

There are no PKC operated monitoring site for particulate within the study area. In a conservative approach the correction factor of 1.12 derived for the modelled road traffic emissions of NO_x has been applied to the modelled road traffic emissions of Particulate Matter (both PM_{10} and $PM_{2.5}$).

Appendix 5 Model Results

Table 5-A – Predicted 2024 NO_2 Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Proposed Development Concentration (µg/m^3)	With Proposed Development Concentration (µg/m^3)	Numerical Magnitude of change (µg/m^3)	% change relative to AQS	Concentration as % of AQS	Impact Descriptor	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial
R1	Residential Property on Crieff Road/ Castle Brae	9.3	9.3	<0.1	0.1%	23.3%	Negligible	-
R2	Residential Property A85	8.4	8.4	<0.1	<0.1%	21.1%	Negligible	-
R3	Residential Property A85	8.5	8.7	0.1	0.3%	21.6%	Negligible	-
R4	McDermaid Park	10.4	10.4	N/A	N/A	N/A		-
R5	Residential Property Crieff Road	13.6	13.8	0.2	0.5%	34.5%	Negligible	-
R6	Residential Property Crieff Road	9.9	10.0	0.1	0.3%	25.1%	Negligible	-
R7	Residential Property Crieff Road	10.0	10.1	0.1	0.2%	25.3%	Negligible	-
R8	Residential Property A85	9.3	9.4	<0.1	0.1%	23.4%	Negligible	-
R9	Residential Property Crieff Road	9.5	9.6	0.1	0.3%	24.1%	Negligible	-
R10	Perth College UHI	5.8	5.8	<0.1	<0.1%	14.5%	Negligible	-
R11	Residential Property Newhouse Road	13.6	13.8	0.2	0.5%	34.6%	Negligible	-
R12	Residential Property Newhouse Road	11.5	11.6	0.2	0.4%	29.1%	Negligible	-
R13	Residential Property Newhouse Road	13.3	13.5	0.2	0.5%	33.7%	Negligible	-

Table 5-B – Predicted 2024 PM_{10} Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Proposed Development Concentration (µg/m^3)	With Proposed Development Concentration (µg/m^3)	Numerical Magnitude of change (µg/m^3)	% change relative to AQS	Concentration as % of AQS	Impact Descriptor	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial
R1	Residential Property on Crieff Road/ Castle Brae	11.7	11.8	<0.1	<0.1%	65.3%	Negligible	-
R2	Residential Property A85	11.4	11.4	<0.1	<0.1%	63.4%	Negligible	-
R3	Residential Property A85	10.2	10.2	<0.1	0.2%	56.7%	Negligible	-
R4	McDermaid Park	11.2	11.3	N/A	N/A	N/A		-
R5	Residential Property Crieff Road	11.3	11.3	<0.1	0.3%	62.9%	Negligible	-
R6	Residential Property Crieff Road	10.7	10.7	<0.1	0.2%	59.7%	Negligible	-
R7	Residential Property Crieff Road	10.8	10.8	<0.1	0.2%	60.2%	Negligible	-
R8	Residential Property A85	11.6	11.6	<0.1	<0.1%	64.3%	Negligible	-
R9	Residential Property Crieff Road	10.7	10.7	<0.1	0.2%	59.4%	Negligible	-
R10	Perth College UHI	9.6	9.6	<0.1	<0.1%	53.3%	Negligible	-
R11	Residential Property Newhouse Road	12.4	12.5	<0.1	0.3%	69.3%	Negligible	-
R12	Residential Property Newhouse Road	11.9	11.9	<0.1	0.2%	66.3%	Negligible	-
R13	Residential Property Newhouse Road	11.6	11.7	<0.1	0.2%	64.9%	Negligible	-

Table 5-C – Predicted 2024 $PM_{2.5}$ Concentrations at Selected Existing Human Receptors for the With and Without Proposed Development Scenarios

Receptor ID	Receptor Name	Without Proposed Development Concentration (µg/m^3)	With Proposed Development Concentration (µg/m^3)	Numerical Magnitude of change (µg/m^3)	% change relative to AQS	Concentration as % of AQS	Impact Descriptor	
							Negligible/ Slight/ Moderate/ Substantial	Adverse/ Beneficial
R1	Residential Property on Crieff Road/ Castle Brae	6.5	6.5	<0.1	<0.1%	64.8%	Negligible	-
R2	Residential Property A85	6.3	6.3	<0.1	<0.1%	63.0%	Negligible	-
R3	Residential Property A85	5.9	5.9	<0.1	0.2%	59.0%	Negligible	-
R4	McDermaid Park	6.0	6.1	N/A	N/A	N/A		-
R5	Residential Property Crieff Road	6.5	6.5	<0.1	0.3%	65.3%	Negligible	-
R6	Residential Property Crieff Road	6.2	6.2	<0.1	0.2%	61.9%	Negligible	-
R7	Residential Property Crieff Road	6.2	6.2	<0.1	0.2%	62.3%	Negligible	-
R8	Residential Property A85	6.4	6.4	<0.1	<0.1%	63.9%	Negligible	-
R9	Residential Property Crieff Road	6.1	6.2	<0.1	0.2%	61.6%	Negligible	-
R10	Perth College UHI	5.5	5.5	<0.1	<0.1%	55.4%	Negligible	-
R11	Residential Property Newhouse Road	6.9	6.9	<0.1	0.3%	69.1%	Negligible	-
R12	Residential Property Newhouse Road	6.6	6.6	<0.1	0.2%	66.0%	Negligible	-
R13	Residential Property Newhouse Road	6.5	6.6	<0.1	0.2%	65.7%	Negligible	-

Table 5-D – Predicted 2024 NO_2, PM_{10} and $PM_{2.5}$ Annual Mean Concentrations at Proposed Receptors within the Proposed Development

Receptor ID	Receptor Name/Description	Predicted NO_2 Concentration (µg/m^3)	Predicted PM_{10} Concentration (µg/m^3)	Predicted $PM_{2.5}$ Concentration (µg/m^3)
PR1	Proposed Lidl Store	10.3	10.7	6.2
PR2	Proposed Lidl Store	10.9	10.8	6.2
PR3	Proposed Lidl Store	12.3	11.1	6.4

Table 5-E – Predicted 2024 NO_2, PM_{10} and $PM_{2.5}$ Annual Mean Concentrations at Ecological Receptors

Receptor ID	Receptor Name	Without Scheme Concentration (µg/m^3)	With Scheme Concentration (µg/m^3)	Numerical Magnitude of change (µg/m^3)	% change relative to the Critical Level	Without Scheme Concentration as % of the Critical Level	With Scheme Concentration as % of the Critical Level
E1	SAC River Almond	11.1	11.2	0.1	0.4%	36.9%	37.3%
E2	AWI-1	20.9	21.0	<0.1	0.1%	69.7%	69.8%
E3	AWI-2	36.6	36.9	0.3	1.0%	121.9%	122.9%
E4	AWI-3	18.0	18.2	0.1	0.5%	60.1%	60.6%

Appendix 6 Construction Dust Risk Assessment

The study area for the construction phase dust impact assessment 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 Drawing 3.

The dust risk assessment below has been carried out using the criteria in the IAQM Guidance on the assessment of dust from demolition and construction (IAQM, 2014) to determine the impact magnitude and sensitivity of the area around the construction activities associated with the Proposed Development.

The assessment covers the following activities of the construction phase (as relevant):

Demolition;

Construction;

Earthworks; and

Track-out.

In a conservative approach the assessment buffers have been created around the entire Proposed Development site boundary rather than around demolition, earthworks and construction areas (refer to Drawing 3).

There are no designated ecological receptors within 50 m of the site boundary or assumed track-out route. On that basis the assessment of construction phase dust impacts upon designated ecological receptors has been scoped out of the assessment.

Demolition – No demolition is anticipated to take place. Impacts from demolition are therefore 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 hardcore concrete based.

Dust Emission Magnitude

The total area of earthworks is estimated to be 2,500 - 10,000 m^2 (6,000 m^2). In accordance with the IAQM guidance, the potential dust emission magnitude for earthworks is assessed as Medium.

Sensitivity and Risk of Impacts

There are between >100 highly sensitive receptors within 350 m of the proposed earthworks areas. Sensitivity of the area to dust soiling due to earthworks is therefore assessed as Low.

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

The average annual mean 2022 PM_{10} background concentrations all high sensitivity receptors within 350 m of the site boundary is 9.6 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There > 100 highly sensitive receptors within 350 m of the proposed earthworks areas. Sensitivity of the residents to human health impacts due to earthworks is therefore assessed as Low.

The medium magnitude with low sensitivity results in the risk of dust impacts on human health due to earthworks as being 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 buildings volume is estimated to be between <25,000 m^3. The potential dust emission magnitude for construction is therefore assessed as Small.

Sensitivity and Risk of Impacts

There are between >100 highly sensitive receptors within 350 m of the proposed construction areas. Sensitivity of the area to dust soiling due to construction is therefore assessed as Low.

The small magnitude with low sensitivity results in the risk of dust soiling impacts due to construction being assessed as Negligible.

The average annual mean 2022 PM_{10} background concentrations at all high sensitivity receptors within 350 m of the site boundary is 9.6 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There are between >100 highly sensitive receptors within 350 m of the proposed construction areas. Sensitivity of the residents to human health impacts due to construction is therefore assessed as Low.

The small magnitude with the low sensitivity results in the risk of dust impacts on human health due to construction being assessed as Negligible.

Track-out Material – Without site-specific mitigation, the IAQM guidance states that track-out can occur from roads up to 200 m from the site exit of a medium 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.

It has been assumed that the track-out route begins at the east entrance to the site. The vehicles are assumed to take a right onto the A85/ Crieff Road towards the A9. The assumed track-out route is shown on Drawing 3.

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 between 1 – 10 highly sensitive receptors within 50 m of the assumed 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 2022 PM_{10} background concentrations at all high sensitivity receptors within 350 m of the site boundary is 9.6 µg/m^3 which is below the IAQM criterion of 14 µg/m^3. There are between 1 - 10 highly sensitive receptors within 50 m of the assumed track-out route. Sensitivity of the residents 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.

Dust Emission Magnitude

The overall dust emission magnitude is summarised in Table 6-A

Table 6-A – Overall Dust Emission Magnitude

Activities	Dust Emission Magnitude
Demolition	N/A
Earthworks	MEDIUM
Construction	SMALL
Track-out	MEDIUM

Overall Sensitivity of the Surrounding Area

Table 6-B below summarises the sensitivity of the surrounding area.

Table 6-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

Overall Risk of Dust Impacts

Table 6-C below summarises the dust risk to define site-specific mitigation.

Table 6-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	NEGLIGIBLE	LOW
Human Health	N/A	LOW	NEGLIGIBLE	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 logbook.

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:

Prohibit 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:

No demolition is anticipated to take place.

There are >100 highly sensitive receptors within 350 m of earthworks and construction areas;

There are 1-10 highly sensitive receptors within 50 m of the track-out route;

There is a low risk of dust soiling impacts on nearby sensitive receptors as a result of earthworks and track-out and a negligible risk as a result of construction activities;

There is a low risk of human health impact on nearby sensitive receptors as a result of earthworks and track-out and negligible risk as a result of construction activities.

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.

ITPENERGISED

ITPEnergised is a leading, international consultancy offering renewable energy, natural resources, environmental, engineering, technical advisory and asset management services for clients with onshore and offshore projects.

Visit the ITPEnergised group offices in:

Bristol, London, Edinburgh, Glasgow, Buenos Aires, Lisbon, Madrid, Delhi, Beijing, Canberra, Auckland

Sectors:

Onshore Renewables & Storage | Offshore Renewables | Oil & Gas
Property & Urban Regeneration | Corporate, Industrial & Manufacturing