Burnside to Greens 400kV Connection

Environmental Appraisal Appendix B: Air Quality

Document No	UKCAL-RPS-03-CSE-ENV-RPT-00002	**Rev**	01
Classification	Public	**Rev Date**	24/11/2025
Reason for Issue	Accepted for Use		

Document Notes

Confidentiality Notice and Disclaimer

This document contains proprietary information and/or intellectual property belonging to Ocean Winds UK Limited or affiliated companies and shall be used only for the purpose for which it was supplied. It has been supplied to you solely for your information and may not be relied upon and Ocean Winds does not offer any warranty as to the accuracy or completeness of the information contained in the document. It shall not be copied, reproduced, disclosed or otherwise used, nor shall such information be furnished in whole or in part to third parties, except in accordance with the terms of any agreement under which it was supplied or with the prior consent of Ocean Winds and shall be returned upon request. By accepting or processing this document and its contents, the recipient represents that they are entitled to receive it.

Document History

Rev	Date	Reason for Issue	Originator	Reviewer	Approver	Modifications
01	24/11/2025	Final	Stephen McAfee	Surabhi Verma	Jessica Antas	

Table of Contents

1 Introduction

1.1 Air Quality Impact Assessment

RPS TetraTech were commissioned to conduct an air quality impact assessment (AQIA) in relation to up to four 400 kilovolt (kV) underground cable circuits, connecting Caledonia Offshore Wind Farm Burnside Onshore Substations to the Scottish and Southern Energy Networks Transmission (SSEN-T) Greens Substation, together with associated works, hereafter referred to as the 'Proposed Development'. The Proposed Development is located approximately 6km southeast of Turriff and about 4km southwest of New Deer (the 'Site').

This air quality assessment covers the following:

- Construction phase – an evaluation of the temporary effects from fugitive construction dust and construction vehicle exhaust emissions; and the
- Operation phase – an evaluation of the impacts of the Proposed Development and whether the assessment needs to be upgraded to a detailed operational air quality assessment or if the operational phase can be screened out.

This report begins by setting out the policy and legislative context for the assessment. The methods and criteria used to assess potential air quality effects have then been described in Section 3. The baseline air quality conditions have been established taking into account the Department for Environment, Food and Rural Affairs (DEFRA) estimates, local authority documents and the results of any local monitoring. The results of the assessment of air quality impacts have been presented in Section 5. A conclusion has been drawn on the significance of the residual construction-phase effects.

The dust assessment methodology and baseline environment are detailed in the following annexes:

- Annex A: Detailed Construction Dust Assessment Methodology.
- Annex B: Baseline Environment.

1.2 Site Location

The Proposed Development is located within Aberdeenshire Council's jurisdiction, approximately 6 km southeast of Turriff and 4km southwest of New Deer. The area is predominantly agricultural land used for pasture and arable farming, with commercial forestry to the northwest. The site location is illustrated in Figure 1-1.

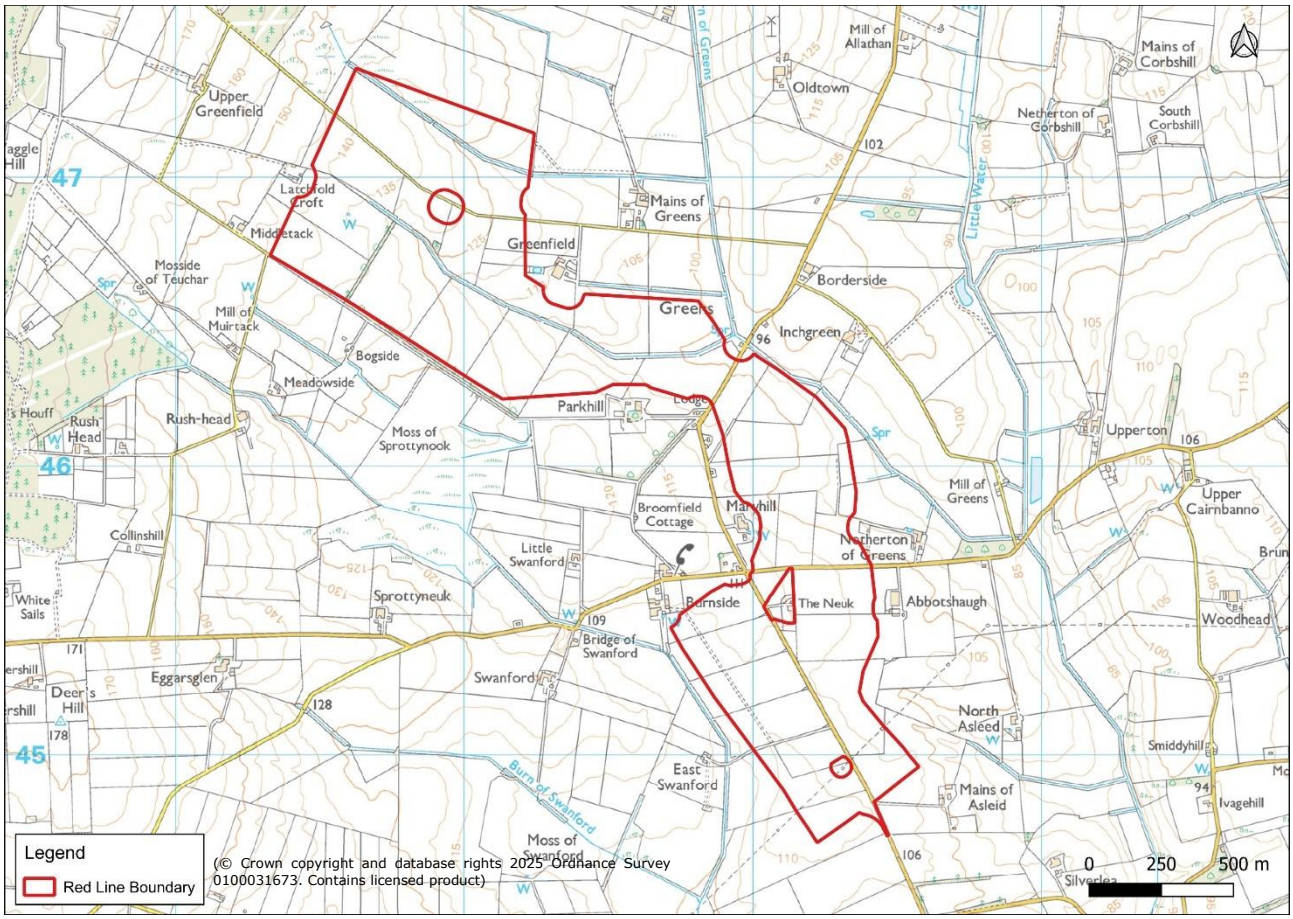

Figure 1-1: Site Location

1.3 Site Surroundings

Surrounding land uses are primarily rural with agricultural fields bounded by field boundary treatments, farmsteads including Burnside and Abbotshaugh, and isolated dwellings nearby. The character of the area is predominantly agricultural with limited residential properties in proximity to Site.

The Site benefits from a relatively rural and open landscape with commercial forestry to the northwest and agricultural activities dominating the surroundings. The Site extent avoids settlements and has been informed in response to an approach which minimises environmental and technical conflicts with existing infrastructure, such as the Moray East cable route, overhead lines, underground cables and environmental sensitivities.

2 Policy and Legislative Context

Air pollution can have an effect on people's health. Exposure to air pollution can have long-term effects on health, it also has negative impacts on the environment. The UK Governments' and Scottish Governments' primary objective is to ensure that all members of the public should have access to outdoor air without significant risk to their health, where this is economically and technically feasible.

While some UK legislation on air quality and pollution prevention is applicable to Scotland, the Scottish Government is responsible for developing most of the domestic policies and legislation to address air quality and reduce associated impacts on human health in Scotland, which are summarised in this section below.

2.1 EU legislation and policy

The following EU Directives set limits for air pollutants in ambient air:

- Cleaner air for Europe (CAFÉ directive – 2008/50/EC); and,
- Air quality 4th daughter directive.

2.2 National legislation and Policy

2.2.1 UK Air Quality Strategy

Local authorities are responsible for reviewing the state of air quality in their council area. To assist them with this process, an Air Quality Strategy (AQS) has been devised for the UK. This sets out standards and objectives for the air quality pollutants causing the problems and enables councils to review air quality in their area against these. Scottish Ministers also have a responsibility to ensure limit values, target values and alert thresholds for specified pollutants are not exceed. The AQS is presented in two volumes:

- **Volume 1 of the UK air quality strategy,**
- **Volume 2 of the UK air quality strategy.**

In most cases, the AQS objectives are identical to the EC Directive limit values, the only differences being the more stringent dates by which the former must be achieved.

2.2.2 Scotland Legislation

EU Directive 2008/50/EC Ambient Air Quality and Cleaner Air for Europe (European Commission, 2008) was published to consolidate previous European Directives on ambient air quality. The Directive forms the basis for UK air quality legislation and was transposed to UK law via The Air Quality Standards (Scotland) Regulations 2010 (Scottish Government, 2010). The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007) (AQS; Defra et al. 2007) is consistent with The Air Quality Standards (Scotland) Regulations 2010 (Scottish Government, 2010).

In 2016, Scotland became the first country in Europe to adopt the 2005 WHO recommended annual mean guideline value for $PM_{2.5}$ of 10µg/m^3 and so currently, the Scottish Air Quality Objectives (AQOs) for particulate matter are 18µg/m^3 and 10µg/m^3 for PM_{10} and $PM_{2.5}$, respectively.

Prior to Brexit, the UK Government was responsible to the European Commission (EC) for ensuring that it complied with the provisions of the EU Directive. Although this is no

longer the case, the Air Quality Standards (Scotland) Regulations 2010 remain in force and compliance with the Limit Values (LVs) within these regulations is still required.

The UK Government and governments of other member states are currently in negotiations with the EC over breaching limit values for nitrogen dioxide (NO_2) and PM_{10} (particulate matter with an aerodynamic diameter of less than 10 microns).

Although the UK is no longer subject to the direct oversight and enforcement mechanisms of EU institutions, including the European Court of Justice (CJEU), the Air Quality Standards (Scotland) Regulations 2010 remain in force as retained EU law, and compliance with the Limit Values (LVs) within these regulations is still required. Responsibility for meeting these limit values is now a devolved matter, with the Scottish Government having the lead role in developing and implementing air quality policy and legislation for Scotland, notably through its Cleaner Air for Scotland 2 strategy.

2.2.2.1 National Air Quality Standards

The AQOs applicable to Local Air Quality Management (LAQM) in Scotland are set out in The Air Quality (Scotland) Regulations 2000 and its associated amendments (The Air Quality (Scotland) Amendment Regulations 2002; and 2016), whilst LVs are set out in The Air Quality Standards (Scotland) Regulations 2010. AQOs are health-based standards set at a level to provide protection to the whole population. The pollutants relevant to this assessment are NO_X, NO_2, PM_{10} and $PM_{2.5}$. The relevant AQOs / LVs for these pollutants are presented in Table 2.1. The AQS also provides for a non-statutory objective for NO_X. This is currently not assessed by Scottish local authorities.

Pollutants such as benzene and 1,3-butadiene, for which AQOs have been set, are associated with the use of fuels for road transport (petrol). Other pollutants are also potentially associated with emissions from diesel combustion. However, based on review and assessment of air quality across the UK, DMRB LA 105 specifies that there is no potential risk of exceedance of the AQOs or significant impacts for any pollutants other than NO_2 and PM owing to a road scheme[1].

[1] The Proposed Development is not a road scheme, but the same principle applies with regard to vehicle emission and traffic movements.

Table 2.1 Relevant Air Quality Limit Values and National Air Quality Objectives

Pollutant	Concentration	Averaging Period
NO_2	40µg/m^3	Annual mean
	200µg/m^3 (not to be exceeded more than 18 times/yr)	1-hour mean
PM_{10}	18µg/m^3	Annual mean
	50µg/m^3 (not to be exceeded more than 7 times/yr)	24-hour mean
$PM_{2.5}$	10µg/m^3	Annual mean
NO_x	30µg/m^3	Annual mean

There are no assessment methods available that can produce robust predictions of short-term concentrations from road traffic. Therefore, compliance with the short-term AQOs/LVs are usually assessed by following the guidance presented in LAQM Technical Guidance (Defra, 2022) (hereafter referred to as LAQM TG(22)), which provides a relationship between the annual mean concentration and the number of periods per year where the short-term AQO is likely to be exceeded. These relationships have been derived from examination of monitoring data across the UK.

The responsibilities of local authorities with respect to meeting AQOs are not the same as the responsibilities of the UK government for meeting legally binding air quality LVs. Local authorities do have statutory duties for LAQM, however, they are not obliged to ensure AQOs are met, but rather that they are worked towards in the shortest practical time. Under Part IV of the Environment Act 1995, the UK Government introduced LAQM, which placed duties on local authorities to undertake periodic reviews of air quality in their areas to assess present and likely future air quality against the AQOs. Where these AQOs are not likely to be met, the local authority must designate an Air Quality Management Area (AQMA) and produce an action plan for improvement in air quality.

It is important to recognise the difference between the LVs (for which compliance is determined at a national level by government) and AQOs (for which compliance is determined at a local level by local authorities under the LAQM regime). Whilst the LVs and AQOs for a pollutant may be set at the same concentration value (e.g. 40µg/m^3, as an NO_2 annual mean) the means of determining compliance are fundamentally different, and they must be considered separately.

Article 3 of the EU Directive required Member States[2] to nominate the competent authority for the assessment of air quality (which in the UK was the Secretary of State for the Environment) and it may be interpreted that only the competent authority can determine compliance with the Limit Values.

Compliance with air quality LVs is determined via the National Monitoring Network and National Model (the Pollution Climate Mapping (PCM) model). There are important

[2] *The Directive is not binding but adopted guidance reflects Limit Value Compliance*

differences between this, and the monitoring/modelling carried out by local authorities to determine compliance with AQOs. Some of these differences are summarised in Table 2.2.

Table 2.2: Comparison Between National and Local Compliance Approaches

Exposure Type	National Compliance	Local Compliance
Relevant exposure	LVs apply everywhere there is public access, within 15m of the running lane/kerbside. However, paths running perpendicular to the road are excluded.	Annual mean AQOs only apply at locations where public exposure is relevant to the averaging period, e.g. at residential building façades.
Treatment of junctions	Monitoring is not carried out within 25m of a junction and the same constraint is applied to the modelling.	Junctions are specifically considered in both monitoring and modelling.
Microscale	Excludes micro-environments and focuses on locations representative of 100m lengths of roads.	Focuses on 'hot-spot' locations (e.g. residential properties near too busy road junctions) where exposure to air pollution is likely to be highest.
Roadside	Modelled concentrations apply to a distance of 4m from kerbside of the national road network. Local roads are excluded from the model.	Focus is on concentrations at the building façade, whatever distance from the kerb and alongside any road.
Monitoring	Restricted to monitoring stations in the national network, operated to meet the Data Quality Objectives of the Directive.	Principally based on local authority monitoring, including both automatic and passive diffusion samplers.

Because of these differences, there are many locations across the UK where the national compliance with the LVs, and local compliance with the AQOs, are not in agreement. They are treated separately in this assessment, which is consistent with the advice in the relevant Planning Advice Notes (PANs), discussed below, produced by the Scottish Government (which provide further guidance on specific topics) and with DMRB LA 105 'Air Quality' guidance.

2.2.2.2 National Planning Framework

National Planning Framework 4 (NPF4) 2023 was adopted in February 2023 (Scottish Government, 2023). NPF4 outlines the Scottish Ministers' policies and proposals for development and land-use in Scotland and details the long-term spatial strategy, spatial principles, priority actions and National Developments up to 2045. The following policy is related to air quality in the context of the Proposed Development:

Health and Safety - Policy 23d "*Development proposals that are likely to have significant adverse effects on air quality will not be supported. Development proposals will consider opportunities to improve air quality and reduce exposure to poor air quality. An air quality assessment may be required where the nature of the proposal or the air quality in the location suggest significant effects are likely*".

Planning Advice Note (PAN) 51 summarises the statutory responsibilities of the environmental protection bodies (Scottish Executive, 2006). Its purpose is to support the existing policy on the role of the planning system in relation to the environmental protection regimes.

2.2.2.2.1 Policy 23 Health and safety

Health and Safety Policy 23 from NPF4 is in place to protect people and places from environmental harm, mitigate risks arising from safety hazards and encourage, promote and facilitate development that improves health and wellbeing

Development proposals that are likely to have significant adverse effects on air quality will not be supported. Development proposals will consider opportunities to improve air quality and reduce exposure to poor air quality. An air quality assessment may be required where the nature of the proposal or the air quality in the location suggest significant effects are likely.

2.2.2.2.2 Planning Policy

NPF4 in Scotland aims to improve air quality by integrating it into the spatial planning process. NPF4 policies encourage development that minimises emissions and adapts to climate change, guiding development to sustainable locations and supporting measures to reduce emissions from existing developments. It also aligns with the Cleaner Air for Scotland 2 (CAFS2) strategy, which sets out measures to improve air quality and protect public health.

2.2.2.2.3 Key Aspects of NPF4 related to Air Quality

Spatial Planning

NPF4 integrates air quality considerations into the overall spatial strategy for Scotland, ensuring that development is located and designed to minimise its impact on air quality.

Minimising Emissions

Policies within NPF4 encourage development to minimise lifecycle greenhouse gas emissions, including those from transportation, heating, and industrial processes.

Climate Change Adaptation

NPF4 also addresses the need for development to adapt to the impacts of climate change, including those related to air quality, such as increased temperatures and changes in rainfall patterns.

Integration with CAFS2

NPF4 works in tandem with CAFS2, Scotland's second air quality strategy, to achieve cleaner air.

Long-term Vision

NPF4 provides a long-term vision for Scotland's development, including a commitment to achieving net-zero emissions and improving air quality for future generations.

2.2.2.2.4 Additional Policies and Actions

Policy 2 (NPF4)

Specifically addresses air quality by stating that development should be sited and designed to minimise lifecycle greenhouse gas emissions and adapt to climate change risks.

Supporting Retrofitting

NPF4 supports development proposals that implement measures to reduce emissions or adapt to climate change in existing buildings.

Local Development Plans (LDPs)

LDPs are required to align with NPF4's principles, ensuring that local planning decisions contribute to the overall goals of improved air quality. In essence, NPF4 is a framework that embeds air quality considerations into the planning process, ensuring that development contributes to a healthier and more sustainable environment.

2.2.3 Aberdeenshire Council Local Development Plan January 2023

The Aberdeenshire Council Local Development Plan forms part of the statutory development plan for the area. The Aberdeen City and Shire Strategic Development Plan (SDP) 2020 (prepared jointly with Aberdeen City Council) establishes the shared vision, spatial priorities and broad principles for development in the Aberdeen City Region, including the amount and general location of land required for development. Although Strategic Development Plans are no longer a statutory requirement, the SDP continues to act as the Regional Spatial Strategy by identifying strategic development needs, outcomes, delivery priorities and proposed locations. The Aberdeenshire Local Development Plan implements the SDP at a local level, setting detailed policies for determining planning applications and specifying where development is expected to occur over the next five years and up to 2031. The part of Aberdeenshire within Cairngorms National Park is covered by a separate development plan prepared by the Cairngorms National Park Authority.

Scottish Planning Policy encourages planning authorities to create high-quality places through a design-led approach and to direct appropriate development to suitable locations. The Aberdeenshire Design Review Panel recognises that good design requires a comprehensive approach, from site selection and layout to detailed design, addressing the full range of factors that contribute to place quality. The aim is not to replicate the past but to promote suitable design solutions, whether contemporary or traditional. A broad design approach is advocated, providing a structured process that supports the emergence of high-quality outcomes and that incorporates design statements, design appraisal methods and public engagement during the development of proposals.

2.2.3.1 Policy P4 Hazardous and Potentially Polluting Developments and Contaminated Land

Developments likely to cause significant pollution or nuisance (including adverse effects on air quality) will be refused. Where an Air Quality Assessment demonstrates a proposed development could significantly worsen air quality, suitable mitigation must be provided; applications may be refused if insufficient information is submitted to demonstrate impacts or if impacts are unclear.

2.2.3.2 Policy PR1 Protecting Important Resources

Proposals will be expected to protect important environmental resources related to air quality. Development that would materially harm air quality will only be permitted where clear public, economic or social benefits substantially outweigh the adverse effects and no reasonable alternative site is available. Where these tests are met, appropriate measures must be put in place to avoid, minimise or mitigate impacts on air quality. The following policy detailing air quality is summarised below:

PR1.2

"New developments should not have a significant adverse impact on air quality. An Air Quality Assessment may be required to demonstrate that the development has no significant adverse impact on air quality, and that appropriate mitigation to minimise any adverse effects can be provided and implemented."

2.2.4 Local Air Quality Management Technical Guidance 2022

Local Air Quality Management Technical Guidance LAQM.TG22 supersedes all previous versions, including LAQM.TG16. This guidance is issued by the Scottish Ministers under section 88(1) of the Environment Act 1995. Scottish local authorities should have regard to it when undertaking their LAQM duties, as required under section 88(2) of the Act. The guidance should be taken into account by all local authority departments involved in LAQM, including environmental health, corporate services, planning, economic development, and transport planning. It complements the information and advice contained in Cleaner Air for Scotland 2 – Towards a Better Place for Everyone (CAFS2), published in July 2021, and these documents should therefore be read in conjunction. Section 12 of this guidance, which addresses air quality and land use planning, should be read together with NPF4 and PAN 51. The guidance may be material in preparing development plans and determining planning applications. It will also be of interest to others involved with LAQM and those whose actions may impact local air quality. The Scottish air quality website[3] and database provide a wide range of resources to support local authorities in their LAQM work, and authorities are strongly encouraged to make full use of these tools.

Authorities will continue to appraise air quality, with the main emphasis on those pollutants shown to be challenging in respect of compliance i.e. NO_2, PM_{10} and Sulphur Dioxide (SO_2), whilst introducing a new role for local authorities to work towards reducing levels of $PM_{2.5}$ in England and a statutory objective for this pollutant in Scotland. At the core of LAQM delivery are three pollutant objectives; these are:

- NO_2,
- PM_{10},
- $PM_{2.5}$, and;
- SO_2.

All current AQMA's across the UK are declared for one or more of these pollutants, with NO_2 accounting for the majority. It is a statutory requirement for local authorities to regularly review and assess air quality in their area and take action to improve air quality when objectives set out in regulation cannot be met.

Reflecting feedback under the LAQM review process, the UK Government has decided to retain Benzene, 1,3 -Butadiene, Carbon Monoxide and Lead in regulations for England. In recognition of the fact that all of the objectives for these pollutants have been met for several years and are well below limit values, local authorities in England do not have to report on these pollutants unless local circumstances indicate otherwise. These pollutants remain a statutory reporting requirement in Scotland, Wales, and Northern Ireland.

As of February 2022, there were more than 600 AQMAs currently declared across the UK (over 500 of which are in England). There are currently 214 Local Authorities that have one or more AQMAs declared within their jurisdiction. Of these, the vast majority (over 95%) are related to road traffic emissions, where attainment of the annual mean

[3] https://www.scottishairquality.scot/

objective for NO_2 is considered unlikely, sometimes in association with exceedances of the 24-hour mean PM_{10} objective, or in Scotland the annual mean PM_{10} objective.

Examples of where air quality objective may apply is given in Table 2.3.

Table 2.3: Example of Where Air Quality Objectives Apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual-mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building's façades), or any other location where public exposure is expected to be short-term.
Daily mean	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's façade), or any other location where public exposure is expected to be short-term.
Hourly-mean	All locations where the annual and 24-hour mean would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks and bus stations etc which were not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations to which the public might reasonably be expected to spend 1-hour or longer	Kerbside sites where the public would not be expected to have regular access.

2.3 Summary of Key Legislation

The key air quality legislation and associated strategies relevant to this assessment are summarised in Table 2.4.

Table 2.4: Relevant Air Quality Legislation

Legislation / Strategy	Description and Relevance to the Proposed Development
Environment Protection Act 1990; amended by the Pollution Prevention and Control Act 1999. (UK Government, 1990 & 1999)	Part III provides statutory nuisance provisions for dust.

Legislation / Strategy	Description and Relevance to the Proposed Development
Environment Act 1995, Part IV (UK Government, 1995)	Introduced a system of Local Air Quality Management (LAQM) in the UK. This requires local authorities to review and assess air quality within their boundaries regularly and systematically against Air Quality Objectives (AQOs), appraise development and transport plans against these assessments and make plans to meet the AQOs where these are exceeded. Where relevant, an air quality assessment should demonstrate the potential interaction with the LAQM process being undertaken by local authorities.
The Air Quality (Scotland) Regulations 2000, and The Air Quality (Scotland) Amendment Regulations 2002 (Scottish Government, 2000 & 2002)	Legislates for the AQOs for pollutants set out in the 2000 Air Quality Strategy, which was revised in 2007 (Defra, 2007). AQOs exist for a variety of pollutants including NO_X, NO_2, PM_{10} and $PM_{2.5}$. These are established for both the protection of human health and the protection of vegetation and ecosystems.
The National Air Quality Strategy (AQS) for England, Scotland, Wales, and Northern Ireland (Defra, 2007).	Updates the 2000 Air Quality Strategy, and sets out how local air quality is managed, through the application of AQOs based on the above Air Quality (Scotland) Regulations 2000 and 2002 Amendments.
Directive 2008/50/EC on ambient air quality and cleaner air for Europe (European Commission, 2008).	Consolidates previous European Directives on ambient Air Quality. These Directives form the basis for UK air quality legislation and were transposed into UK law via The Air Quality Standards (Scotland) Regulations 2010. The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland (2007) (AQS; Defra et al. 2007) is consistent with The Air Quality Standards (Scotland) Regulations 2010 (Scottish Government, 2010).
The Air Quality Standards (Scotland) Regulations 2010 (Scottish Government, 2010).	Transposes the formalised Limit Values (LVs) set out in the European Union (EU) Ambient Air Quality Directive 2008/50/EC (European Commission, 2008) to UK law.
Cleaner Air for Scotland (CAFS) (Scottish Government, 2015).	A national strategy setting out the Scottish Government's proposals for delivering further improvements to air quality for compliance with EU air quality legislation. Commits to aligning the AQOs in relation to PM with the World Health Organisation (WHO) recommendations.
The Air Quality (Scotland) Amendment Regulations 2016 (Scottish Government, 2016).	Updates the annual mean $PM_{2.5}$ AQOs from the Air Quality (Scotland) Regulations 2000.
The Environment and Trade in Animals and Related Products (EU Exit) (Scotland) (Miscellaneous Amendment)	Made amendments to environmental laws to ensure continued effectiveness after the end of the implementation period. Amendments to directly applicable retained EU law. Regulations 2,3 and 4 make changes to secondary legislation that implemented EU environmental

Legislation / Strategy	Description and Relevance to the Proposed Development
Regulations 2022 (Scottish Government, 2020).	laws relating to air quality and endangered species. Regulations 5 and 6 make minor changes to Regulations made under 8(1) of the EU (Withdrawal) Act 2018, relating to air quality and chemicals. It also includes an amended LV for $PM_{2.5}$ of 20µg/m^3 (excluding Scotland). 2018 c. 16; paragraph 21(b) of schedule 7 was amended by the European Union (Withdrawal Agreement) Act 2020 (c. 1), section 41(4) and schedule 5, paragraph 53(2)(b).
The Environment Strategy for Scotland: visions and outcomes (Scottish Government, 2020).	This provides the framework and policy priorities for Scotland.
Cleaner Air for Scotland 2 (CAFS2) (Scottish Government, 2021).	CAFS2 supersedes CAFS and sets out actions to improve air quality and how these will be delivered based upon the 2020 Environment Strategy for Scotland.

3 Assessment Methodology

3.1 Construction Phase – Methodology

The methodology for assessing air quality in relation to the Proposed Development, primarily focuses on the impacts arising from construction activities.

Dust is the generic term used to describe particulate matter in the size range 1-75µm in diameter. Particles greater than 75µm in diameter are termed grit rather than dust. Dusts can contain a wide range of particles of different sizes. The normal fate of suspended (i.e., airborne) dust is deposition. Particle deposition is mainly controlled by particle size and density, which determine how far particles travel and how long they remain airborne before settling. Some particles may clump together into fewer, larger particles, while others undergo chemical reactions.

The effects of dust are linked to particle size and two main categories are usually considered:

- PM_{10} particles, those up to 10µm in diameter, remain suspended in the air for long periods and are small enough to be breathed in and so can potentially impact on health; and
- Dust, generally considered to be particles larger than 10µm which fall out of the air quite quickly and can soil surfaces (e.g., a car, windowsill, laundry). Additionally, dust can potentially have adverse effects on vegetation and fauna at sensitive habitat sites.

The IAQM Guidance on the assessment of dust from construction sets out 250m as the distance from the site boundary and 50m from the site traffic route(s) in up to 250m of the entrance, within which there could potentially be nuisance dust and PM_{10} effects on human receptors. For sensitive ecological receptors, the corresponding distances are 50m in both cases. These distances are set to be deliberately conservative.

Concentration-based limit values and objectives have been set for the PM_{10} suspended particle fraction, but no statutory or official numerical air quality criterion for dust annoyance has been set at a UK, European or WHO level. Construction dust assessments have tended to be risk based, focusing on the appropriate measure to be used to keep dust impacts at an acceptable level.

The IAQM dust guidance aims to estimate the impacts of both PM_{10} and dust through a risk-based assessment procedure. Within Section 11 Professional Judgement of the IAQM dust guidance, the document states: *"This is necessary, because the diverse range of projects that are likely to be subject to dust impact assessments means that it is not possible to be prescriptive as to how the assess the impacts. Also, a wide range of factors affect the amount of dust that may arise, and these are not readily quantifies."*

Consistent with the recommendations in the IAQM dust guidance, a risk-based assessment has been undertaken for the Proposed Development, using the well-established source-pathway-receptor approach:

- The dust impact (the change in dust levels attribute to the development activity) at a particular receptor will depend on the magnitude of the dust source and the effectiveness of the pathway (i.e., the route through the air) from source to receptor.
- The effects of dust are the results of these changes in dust levels on the exposed receptors, for example annoyance or adverse health effects. The effect

experienced for a given exposure depends on the sensitivity of the particular receptor to dust. An assessment of the overall dust effect for the area as a whole has been made using professional judgement taking into account both the change in dust levels (as indicated by the Dust Impact Risk for individual receptors) and the absolute dust levels, together with the sensitivities of local receptors and other relevant factors for the area.

The detail of the dust assessment methodology is provided in **Annex A**.

The dust risk categories that have been determined for each of the three activities (earthworks, construction and trackout) have been used to define the appropriate site-specific mitigation measures based on those described in the IAQM dust guidance. As there is no demolition required for the Proposed Development, this construction activity has been screened out and is not therefore assessed. The guidance states that provided the mitigation measures are successfully implemented; the resultant effects of the dust exposure will normally be 'not significant'.

3.1.1 Summary of Key Pollutants Considered

For the construction phase of the Proposed Development the key pollutant is dust, covering both the PM_{10} fraction that is suspended in the air that can be breathed, and the deposited dust that has fallen out of the air onto surfaces and which can potentially cause temporary annoyance effects.

Regarding exhaust emissions from construction-related vehicles (contractors' vehicles and Heavy Goods Vehicles (HGVS), diggers, and other diesel-powered vehicles), these are unlikely to have a significant impact on local air quality except for large, long-term construction sites: the Environmental Protection UK (EPUK) & Institute of Air Quality Management (IAQM) Land-Use Planning & Development Control: Planning For Air Quality[4] document indicates that air quality assessments should include developments increasing annual average daily Heavy Duty Vehicle (HDV) traffic flows by more than 25 within or adjacent to an AQMA and more than 100 elsewhere.

3.2 Operational Phase- Methodology

3.2.1 IAQM Land Use Planning & Development Control: Planning for Air Quality

This IAQM document sets out indicative criteria for requiring an air quality assessment. These points are set out in Table 3.1.

Table 3.1 IAQM Indicative Criteria for requiring an Air Quality Assessment

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment	Does this Proposed Development satisfy the criteria?
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV	A change of LDV flows of: - more than 100 AADT within or adjacent to an AQMA - more than 500 AADT elsewhere	**No**

[4] air-quality-planning-guidance.pdf

The development will:	Indicative Criteria to Proceed to an Air Quality Assessment	Does this Proposed Development satisfy the criteria?
= cars and small vans <3.5t gross vehicle weight)		
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors. (HDV = goods vehicles + buses >3.5t gross vehicle weight).	A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere.	**No**
3. Realign roads, i.e. changing the proximity of receptors to traffic lanes.	Where the change is 5m or more and the road is within an AQMA.	**No**
4. Introduce a new junction or remove an existing junction near to relevant receptors	Applies to junctions that cause traffic to significantly change vehicle accelerate/decelerate, e.g. traffic lights, or roundabouts.	**No**
5. Introduce or change a bus station.	Where bus flows will change by: - more than 25 AADT within or adjacent to an AQMA - more than 100 AADT elsewhere	**No**
6. Have an underground car park with extraction system.	The ventilation extract for the car park will be within 20 m of a relevant receptor. Coupled with the car park having more than 100 movements per day (total in and out).	**No**
7. Have one or more substantial combustion processes, where there is a risk of impacts at relevant receptors. *NB. this includes combustion plant associated with standby emergency generators (typically associated with centralised energy centres) and shipping*	Typically, any combustion plant where the single or combined emission rate is less than 5 mg/sec* is unlikely to give rise to impacts, provided that the emissions are released from a vent or stack in a location and at a height that provides adequate dispersion. In situations where the emissions are released close to buildings with relevant receptors, or where the dispersion of the plume may be adversely affected by the size and/or height of adjacent buildings (including situations where the stack height is lower than the receptor) then consideration will need to be given to potential impacts at much lower emission rates. Conversely, where existing NO_2 concentrations are low, and where the dispersion conditions are favourable, a much higher emission rate may be acceptable.	**No**

**As a guide, the 5 mg/s criterion equates to a 450 kW ultra-low NOx gas boiler or a 30kW CHP unit operating at <95mg/Nm^3.*

The Proposed Development does not meet any of the requirements for assessment for an operational air quality assessment in accordance with the IAQM. An operational assessment for air quality can therefore be screened out according to the IAQM guidance.

3.2.2 Design Manual for Roads and Bridges (DMRB)

3.2.2.1 LA 105 Air Quality[5]

The following traffic scoping criteria shall be used to determine whether the air quality impacts of a project can be scoped out or require an assessment based on the changes between the do something traffic (with the project) compared to the do minimum traffic (without the project) in the opening year:

- annual average daily traffic (AADT) >=1,000; or
- heavy duty vehicle (HDV) AADT >=200; or
- a change in speed band; or
- a change in carriageway alignment by >=5m.

For this Proposed Development none of the 4 criteria are met. There is not predicted to be any significant change in traffic volumes when the Proposed Development is operational compared to the existing baseline scenario. In addition to this, in terms of designated ecological sites, the Proposed Development site is not located within or in close proximity to relevant ecological features pertaining to considering impacts from air quality. Designated sites that should be considered for assessment are those in which the designated features are sensitive to air pollutants, either directly or indirectly, and which could be adversely affected by the effect of local air quality on vegetation with the following nature conservation sites: Special Areas of Conservation (SACs) (Sites of Community Importance (SCIs) or SACs), Special Protection Areas (SPAs), proposed Special Protection Areas (pSPAs), Site of Special Scientific Interest (SSSIs) and Ramsar sites.

3.2.3 IAQM Guide to The Assessment of Air Quality Impacts on Designated Nature Conservation Sites[6]

The IAQM guide to assessing air quality impacts on designated nature conservation sites draws upon guidance from the Design Manual for Roads and Bridges (DMRB)

The DMRB describes the approach for the assessment of the impact of emissions from schemes on the strategic road network. A quantitative air quality assessment is required if European Sites are within 200m of affected roads. Within this context, the distance of the affected road from the designated site is an important consideration. Air pollution levels fall sharply within the first few tens of metres from a road before reducing more slowly with distance. The air quality impact of a given change in traffic on a designated site where the relevant habitat/species is 100m from a road will be very different to one that abuts the road.

For strategic planning, where substantial changes in traffic volumes are being considered, there is the potential for wider-scale impacts, which can potentially affect the future background concentrations, as well concentrations within 200m of individual

[5] Available at HTML Document View
[6] Available at air-quality-impacts-on-nature-sites-2020.pdf

roads within the affected network. In these circumstances, the modelling may need to encompass a large road network.

In some cases, a road surface and its adjacent verges may be included within a designated site's boundary. This does not necessarily mean that they will be of nature conservation interest and form part of a qualifying feature. This inclusion might simply be for convenience, e.g. for defining a boundary. These areas will, therefore, be of no special nature conservation interest. Conversely, at some sites, roadside verges may have been deliberately included within a site boundary and be an integral part of a designated site. It is important that the air quality specialist works with the project ecologist to make these decisions.

The closest designated site to the Proposed Development is the Turclossie Moss SAC, approximately 11.6km from the Proposed Development. Therefore, the Proposed Development does not satisfy any of the requirements for assessment or an operational air quality assessment in accordance with the IAQM.

4 Baseline Air Quality Conditions

Baseline air quality data and information gathering has been undertaken and is presented in **Annex B** of this report.

5 Impact Assessment

5.1 Construction

The type of activities that could cause fugitive dust emissions are earthworks; handling and disposal of spoil; wind-blown particulate material from stockpiles; handling of loose construction materials; and movement vehicles, both on and off site. The level and distribution of construction dust emissions will vary according to factors such as the type of dust, duration and location of dust-generating activity, weather conditions and the effectiveness of suppression methods.

The main effect of any dust emission, if not mitigated, could be annoyance due to soiling of surfaces particularly windows, cars and laundry. However, it is normally possible; by implementation of proper control, to ensure that dust deposition does not give rise to significant adverse effects, although short-term events may occur (for example, due to technical failure or exceptional weather conditions). The following assessment, using IAQM methodology, predicts the risk of dust impacts and the level of mitigation that is required to control the residual effects to a level that is "not significant".

5.2 Risk of Dust Impacts

5.2.1 Source

Table 5.1 Dust Emission Magnitude for Earthworks, Construction and Trackout

Earthworks	Construction	Trackout
Large	Medium	Medium

5.3 Pathway and Receptor- Sensitivity of the Area

All earthworks and construction activities are assumed to occur within the Red Line Boundary. As such, receptors at distances within 20m, 50m, 100m, and 250m of the Red Line Boundary have been identified and are illustrated in Figure 5-1. The sensitivity of the area has been classified, and the results are provided below in Table 5.2 and Table 5.3.

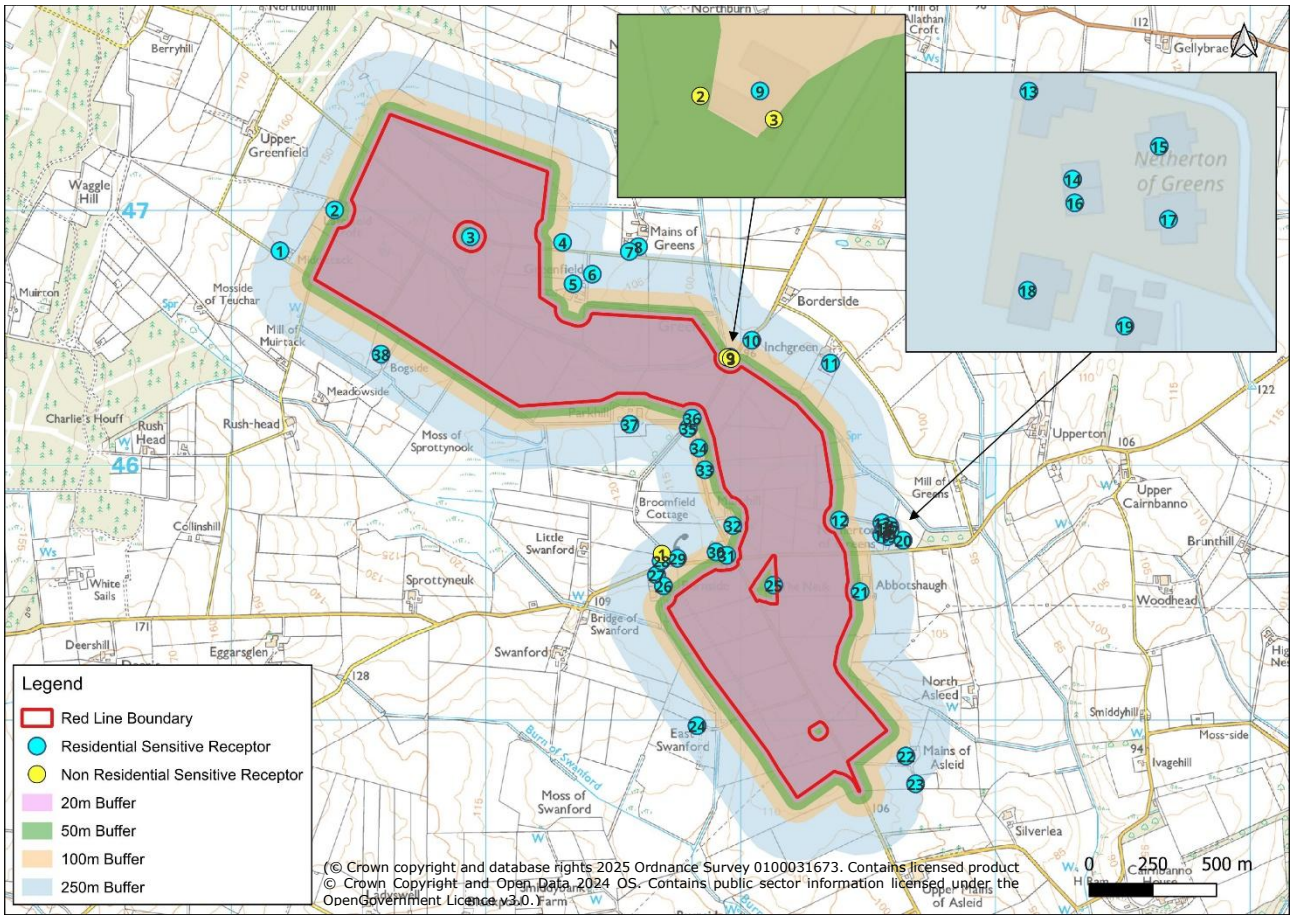

Figure 5-1 Construction Dust Assessment – Distance Bandings (m) from Site Boundary

Table 5.2 Sensitivity of the Surrounding Area Earthworks and Construction

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	Medium	1-10 High Sensitive Receptors within 20m of the site boundary
Human Health	Low	1-10 High Sensitive Receptors within 20m of the site boundary Background PM_{10} concentrations for the assessment = 8.1 µg/m^3 (See Annex B Table 10.9 DEFRA Location 5) 1-10 High Sensitive Receptors located within 20m of the site boundary and PM_{10} less than 14 µg/m^3

Figure 10-4 in **Annex B** illustrates the residential and non-residential receptor locations surrounding the Proposed Development with further detail provided in Table 10.17 and Table 10.18. The nearest residential sensitive receptor is Residential Sensitive Receptor ID 25 at approximately 11m, and the nearest non-residential sensitive receptor is Non-Residential Sensitive Receptor ID 2 at approximately 48m.

The Dust Emissions Magnitude for trackout is classified as Medium and trackout may occur on roads up to 200m from the site. The major routes within 200m of the site are rural unclassified roads. The sensitivity of the area has been classified, and the results are provided in Table 5.3.

Table 5.3 Sensitivity of the Surrounding Area for Trackout

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	Medium	1-10 High Sensitive Receptors within 20m of the site boundary
Human Health	Low	1-10 High Sensitive Receptors within 20m of the site boundary Background PM_{10} concentrations for the assessment = 8.1 µg/m^3 (See Table 10.9 within **Annex B** DEFRA Location 5) 1-10 High Sensitive Receptors located within 20m of the site boundary and PM_{10} less than 14 µg/m^3

5.4 Overall Dust Risk

The Dust Emission Magnitude has been considered in the context of the Sensitivity of the Area **Annex A** to give the Dust Impact Risk. **Error! Reference source not found.** below summarises the Dust Impact Risk for the three activities.

Table 5.4 Dust Impact Risk for, Earthworks, Construction and Trackout

Source	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Medium
Human Health	Low	Low	Low
Risk	**Medium Risk**	**Medium Risk**	**Low Risk**

Taking the site as a whole, the overall risk is deemed to be **Medium Risk**. The mitigation measures appropriate to a level of risk for the site as a whole and for each of the phases are set out in Section 6.

Provided the mitigation measures detailed out in Section 6 are implemented, the residual construction dust effects will not be significant. A Dust and Air Quality Management Plan (DAQMP) will be produced post consent, prior to construction and included by the contractor within the Final Construction Environmental Management

Plan (CEMP). The DAQMP will detail how construction dust will be managed throughout construction and air quality impacts avoided and minimised.

Section 9 STEP 4: Determine Significant Effects of the IAQM dust guidance states that *"For almost all construction activity, the aim should be to prevent significant effects on receptors through the use of effective mitigation. Experience shows that this is normally possible. Hence the residual effect will normally be 'not significant'."* The IAQM dust guidance recommends that significance is only assigned to the effect after the activities are considered with mitigation in place.

5.5 Construction Traffic

The traffic generation associated with the construction phase has been assessed in detail, considering the monthly, daily and hourly traffic flows during construction. The most onerous construction month has been considered within the assessment to ensure the most robust analysis of the proposal.

The most onerous construction month (month 8) is predicted to generate an average of 5no. HGV movements per hour (assuming a 12no. hour working day). There will also be 30no. staff arriving by car to the site in the AM peak hour and 30no. staff departing by car the site in the PM peak hour.

Based on the baseline traffic flows and the construction vehicles predicted during the most onerous construction month is unlikely to have a significant impact upon the surrounding highway network.

6 Mitigation

6.1 Mitigation During Construction

The 2024 IAQM dust guidance list mitigation measures for low, medium and high dust risks.

As summarised in Table 6.2 Measures Specific to Earthworks, Construction and Trackout and **Error! Reference source not found.** below, the predicted Dust Impact Risk is classified as **Medium Risk** for Earthworks, **Medium Risk** for Construction and **Low Risk** for Trackout.

Key to tables:

- **H** Highly recommended
- **D** Desirable
- **N** Not required

Table 6.1 Mitigation for all Sites

Mitigation measure	Low Risk	Medium Risk	High Risk
Communications			
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.		**H**	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority. The level of detail will depend on the risk and should include as a minimum the highly recommended measures in this document. The desirable measures should be included as appropriate for the site.		**H**	
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.		**H**	
Make the complaints log available to the local authority when asked.		**H**	
Monitoring – No Dust Monitoring Proposed			

Mitigation measure	Low Risk	Medium Risk	High Risk
Preparing and Maintaining the Site			
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.		**H**	
Erect solid screens or barriers along boundaries nearest sensitive receptors, or the site boundary that are at least as high as any stockpiles on site.		**H**	
Avoid site runoff of water or mud.		**H**	
Keep site fencing, barriers and scaffolding clean using wet methods.		**H**	
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site.		**H**	
Cover, seed or fence stockpiles to prevent wind whipping.		**H**	
Operating Vehicle/Machinery and Sustainable Travel			
Ensure all vehicles switch off engines when stationary - no idling vehicles.		**H**	
Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable.		**H**	
Construction Works			
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.		**H**	
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate.		**H**	

Mitigation measure	Low Risk	Medium Risk	High Risk
Use enclosed chutes and conveyors and covered skips.		**H**	
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.		**H**	
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.		**H**	
Waste Management			
Avoid bonfires and burning of waste materials.		**H**	

Table 6.2 Measures Specific to Earthworks, Construction and Trackout

Mitigation Measure	Low Risk	Medium Risk	High Risk
Earthworks			
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.		**D**	
Only remove the cover in small areas during work and not all at once		**D**	
Construction			
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.		**H**	
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.		**D**	

Mitigation Measure	Low Risk	Medium Risk	High Risk
For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.		**D**	
Trackout			
Avoid dry sweeping of large areas	**D**		
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	**D**		

The IAQM dust guidance states that with the recommended dust mitigation measures in place residual effect will normally be *"not significant",* and recommends the mitigation is secured by for example planning conditions, a legal obligation, or by legislation.

7 Conclusion

This assessment has considered air quality impacts effects during the construction phase of the proposed 400 kV underground cable to connect Burnside Substation to Greens Substation, Aberdeenshire (the 'Proposed Development) located approximately 6km southeast of Turriff and about 4km southwest of New Deer.

Impacts during construction, such as dust generation and plant vehicle emissions, are predicted to be of short duration and only relevant during construction phase. The results of the risk assessment of construction dust impacts undertaken using the IAQM dust guidance, indicates that before the implementation of mitigation measures as described in the IAQM construction dust guidance should be residual dust effects to a level categorised as "not significant".

The nearest residential sensitive receptor is Residential Sensitive Receptor ID 25 at approximately 11m, and the nearest non-residential sensitive receptor is Non-Residential Sensitive Receptor ID 2 at approximately 48m.

Overall, the Proposed Development is considered to have a **medium risk** on the surrounding area. This effect is considered to be **not significant**. This is based on a consideration of the different magnitude of effects at individual receptors, and the number of receptors that would experience these different effects.

An assessment of the operational phase of the Proposed Development has been screened out in this instance with the evidence presented in this report.

8 References

2025 Air Quality Annual Progress Report (APR) for Aberdeenshire Council;

Air Quality in Scotland (2025) Scottish Air Quality background maps;

Clean Air for Europe (CAFE) Directive (2008/50/EC) (European Parliament, 2008);

Department for Environment, Food & Rural Affairs (Defra) (2022) Local Air Quality Management Technical Guidance LAQM.TG(22). Available at: https://laqm.defra.gov.uk/wp-content/uploads/2021/03/LAQM-TG22-May-25-v2.1.pdf;

Department for Environment, Food and Rural Affairs (DEFRA) Mapped Concentration Estimates;

National Highways (formerly Highways England/Agency), Transport Scotland, Welsh Government, and Department for Infrastructure (Northern Ireland) (2024). Design Manual for Roads and Bridges (DMRB): LA 105 Air quality, Version 0.1.0;

Institute of Air Quality Management (2024), Guidance on the assessment of dust from demolition and construction, v2.2, 2024; and

World Health Organisation Air Quality Guidelines 2005 (WHO, 2005).

9 Annex A – Detailed Construction Dust Assessment Methodology

9.1 Introduction

The main air quality impacts that may arise during demolition and construction activities are:

1. Dust deposition, resulting in the soiling of surfaces.
2. Visible dust plumes, which are evidence of dust emissions.
3. Elevated PM_{10} concentrations, as a result of dust generating activities on site; and
4. An increase in concentrations of airborne particles and NO_2 due to exhaust emissions from diesel powered vehicles and equipment used on site (non-road mobile machinery) and vehicles accessing the site.

As there is no demolition required for the Proposed Development, this construction activity has been screened out and is not therefore assessed.

The most common impacts are dust soiling and increased ambient PM_{10} concentrations due to dust arising from activities on the site. Dust soiling will arise from the deposition of dust in all size fractions. The ambient dust relevant to health outcomes will be that measured as PM_{10}, although most of this will be in the course ($PM_{2.5-10}$) fraction, rather than the $PM_{2.5}$ fraction. Research undertaken in the USA suggests that 85% to 90% by weight of the fugitive dust emissions of PM_{10} from construction sites are $PM_{2.5-10}$ and 10% to 15% are in the $PM_{2.5}$ fraction.

Experience of assessing the exhaust emissions from on-site plant (also known as non-road mobile machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed. For site plant and on-site traffic, consideration should be given to the number of plant/vehicles and their operating hours and locations to assess whether a significant effect is likely to occur. For site traffic on the public highway, if it cannot be scoped out (for example by using the EPUK's criteria), then it should be assessed using the same methodology and significance criteria as operational traffic impacts. The impacts of exhaust emissions from on-site plant and site traffic are not considered further in this Guidance.

9.2 Receptors

9.2.1 Human Receptor

A 'human receptor' refers to any location where a person or property may experience the adverse effects of airborne dust or dust soiling, or exposure to PM over a time period relevant to the air quality objectives, as defined in the Government's technical guidance for Local Air Quality Management. In terms of annoyance effects, this will most commonly relate to dwellings but may also refer to other premises such as buildings housing cultural heritage collections (e.g. museums and galleries), vehicle showrooms, food manufacturers, electronics manufacturers, amenity areas and horticultural operations (e.g. salad or soft-fruit production). Care should be taken to ensure that the assessment takes into account whether exposure will arise in practice (e.g. computer chip manufacture is sensitive to dust and so premises are likely to have extensive dust filtering equipment and exposure may therefore not be increased).

9.2.2 Ecological Receptor

An 'ecological receptor' refers to any sensitive habitat affected by dust soiling. This includes the direct impacts on vegetation or aquatic ecosystems of dust deposition, and the indirect impacts on fauna (e.g. on foraging habitats). For locations with a statutory designation, e.g. Special Areas of Conservation (SACs) and Areas of Special Scientific Interest (ASSIs), consideration should be given as to whether the particular site is sensitive to dust, and this will depend on why it has been designated. Some non-statutory sites (i.e. local wildlife sites) and/or locations with very specific sensitivities may also be considered if appropriate. The inclusion or exclusion of sites should be justified in the assessment.

Dust from construction sites deposited on vegetation may create ecological stress within the local plant community. During long dry periods dust can coat plant foliage adversely affecting photosynthesis and other biological functions. Rainfall removes the deposited dust from foliage and can rapidly leach chemicals into the soil. Plant communities near short-term works are likely to recover within a year of the dust soiling stress ceasing. However, large scale construction sites may give rise to dust deposition over an extended period of time and adversely affect vascular plants. For example, cement dust deposited on leaves can increase the surface alkalinity, which in turn can hydrolyse lipid and wax components, penetrate the cuticle, and denature proteins, finally causing the leaf to wilt.

Limestone dust coating of lichen has been shown to damage its photosynthetic apparatus. These types of damage over a long period have the potential to change plant community structure and function. Noticeable effects include the increase in ruderal and pioneer plant communities

9.3 Risk of Dust Emissions

The risk of dust emissions from a construction site causing loss of amenity and/or health or ecological impacts is related to:

1. The activities being undertaken (number of vehicles and plants etc.).
2. The duration of these activities.
3. The size of the site.
4. The meteorological conditions (wind speed, direction and rainfall).
5. The proximity of receptors to the activities.
6. The adequacy of the mitigation measures applied to reduce or eliminate dust; and
7. The sensitivity of the receptors to dust.

The quantity of dust emitted from construction operations will be related to the area of land being worked, and the level of construction activity (nature, magnitude and duration). Emissions from construction vehicles passing over unpaved ground can be particularly important. These will be related to the silt content of the soil (defined by the US Environmental Protection Agency as particles smaller than 75 micrometers [µm] in diameter), as well as the speed and weight of the vehicle, the soil moisture content, the distance covered and the frequency of vehicle movements.

9.3.1 Weather

Although not specifically required as part of the IAQM dust assessment method, analysis of the local climatic conditions was also undertaken to provide additional context to the risk assessment and assist in the determination of the sensitivity of the area.

The wind direction, wind speed and rainfall, at the time when a construction activity is taking place, will also influence whether there is likely to be a dust impact. Due to the variability of the weather, it is impossible to predict what the weather conditions will be when specific construction activities are undertaken.

Local wind speed and direction influences the dispersion of dust. This will depend on the frequency that the receptor is downwind and the distance of the receptors from the construction activities. Higher wind speeds will result in the highest potential release of dust from a site. Buildings, structures and trees can also influence dispersion.

Adverse impacts can occur in any direction from a site. They are, however, more likely to occur downwind of the prevailing wind direction and/or close to the site. It should be noted that the 'prevailing' wind direction is usually the most frequent direction over a long period such as a year; whereas construction activity may occur over a period of weeks or months during which the most frequent wind direction might be quite different. The most frequent wind direction may also not be the direction from which the wind speeds are highest. The use of the prevailing wind direction in the assessment of risk is most useful, therefore, for construction projects of long duration.

Dust impacts are more likely to occur during drier periods, as rainfall acts as a natural dust suppressant.

9.3.2 Topography & Natural Barriers

Local conditions also need to be accounted for. Topography and natural barriers (e.g. woodland) will reduce airborne concentrations due to impaction. In addition, if the locality has a history of dust generating activities, such as quarrying, a given level of additional dust may be more acceptable, i.e. more readily tolerated, than in a suburban residential area. Alternatively, impacts may be less acceptable, where nearby residents have become sensitised to dust, have a history of complaining and may therefore be more likely to complain about a new dust source. Similarly, in rural areas agricultural activities may generate dust and this should be taken into account in the assessment of risk.

9.3.3 Assessment Procedure

9.3.3.1 (Risk/Magnitude/Impact highlighted as appropriate to this Proposed Development)

The IAQM Assessment of dust from demolition and construction 2024 V2.2 provides a framework for the assessment of risk. Every site is different and therefore this guidance cannot be too prescriptive and professional judgement is required. Any judgements must be fully auditable in the dust assessment report, with the source(s) defined and choice of dust risk category justified for each activity (see below). Where justification cannot be given, a precautionary approach must be taken and the highest level of mitigation recommended.

Activities on construction sites have been divided into four types to reflect their different potential impacts. These are:

A. Earthworks;
B. Construction; and
C. Trackout.

The potential for dust emissions is assessed for each activity that is likely to take place. Obviously, if an activity is not taking place, e.g. demolition, then it does not need to be assessed.

The assessment methodology considers three separate dust impacts:

1. annoyance due to dust soiling;
2. the risk of health effects due to an increase in exposure to PM_{10}; and
3. harm to ecological receptors with account being taken of the sensitivity of the area that may experience these effects.

The assessment is used to define appropriate mitigation measures to ensure that there will be no significant effect.

The assessment steps are summarised below and in Figure 9-1**.**

STEP 1 is to screen the requirement for a more detailed assessment.

No further assessment is required if there are no receptors within a certain distance of the works.

STEP 2 is to assess the risk of dust impacts. This is done separately for each of the four activities (earthworks; construction; and trackout) and takes account of:

1. the scale and nature of the works, which determines the potential dust emission magnitude (STEP 2A); and
2. the sensitivity of the area (STEP 2B).
3. These factors are combined in STEP 2C to give the risk of dust impacts.

Risks are described in terms of there being a low, medium or high risk of dust impacts for each of the four separate potential activities. Where there are low, medium or high risks of an impact, then site-specific mitigation will be required, proportionate to the level of risk. Based on the threshold criteria and professional judgement one or more of the groups of activities may be assigned a 'negligible' risk. Such cases could arise, for example, because the scale is very small and there are no receptors near to the activity.

STEP 3 is to determine the site-specific mitigation for each of the four potential activities in STEP 2. This will be based on the risk of dust impacts identified in STEP 2. Where a local authority has issued guidance on measures to be adopted at construction sites, these should also be taken into account.

STEP 4 is to examine the residual effects and to determine whether or not these are significant.

STEP 5 is to prepare the dust assessment report.

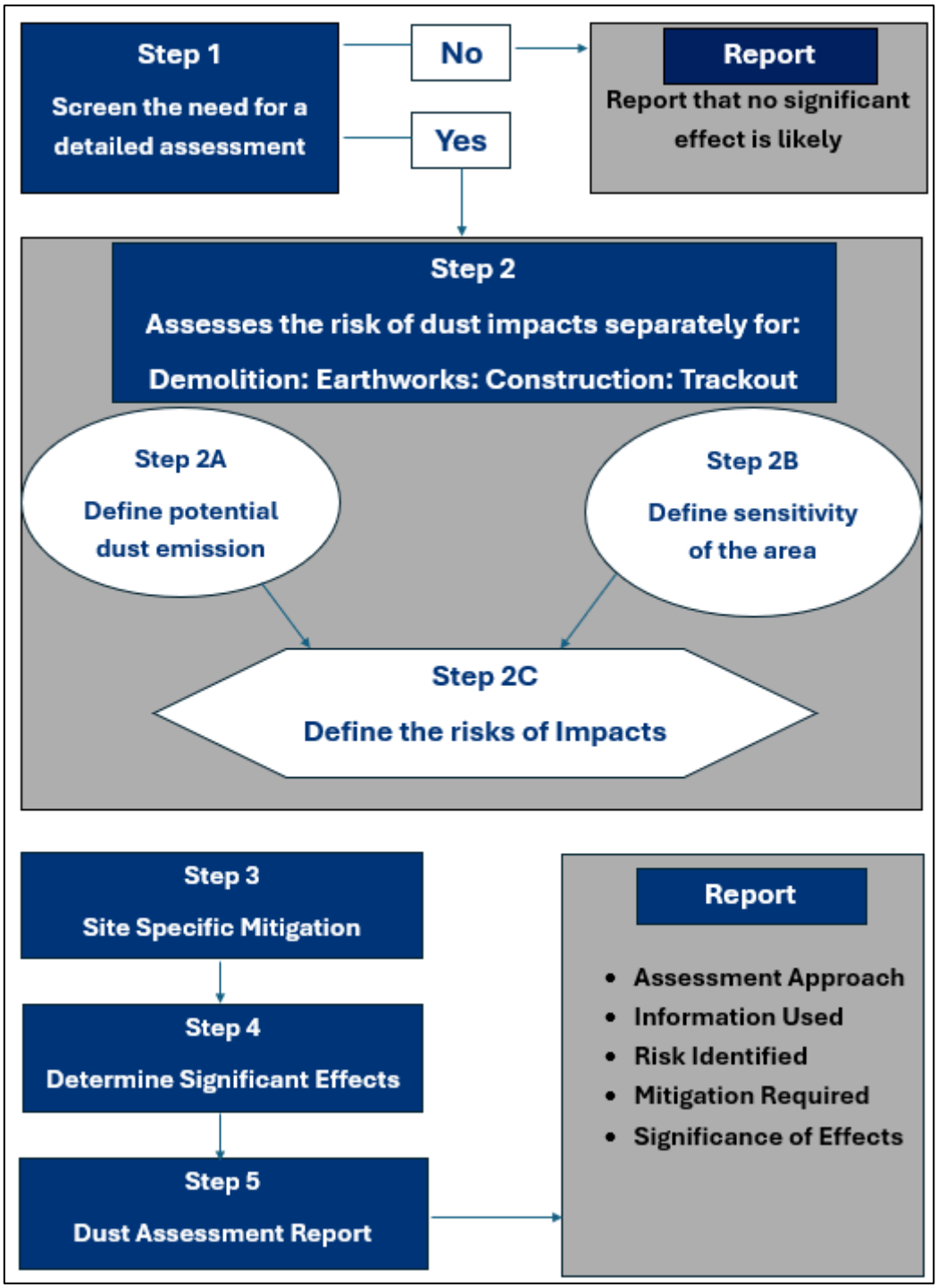

Figure 9-1 Steps to Perform a Dust Assessment

STEP 1: SCREEN THE NEED FOR A DETAILED ASSESSMENT

This step is deliberately chosen to be conservative and will require assessments for most schemes. The distances cited here, and in subsequent sections, take account of the exponential decline in both airborne concentrations and the rate of deposition with distance, as well as practical experience of members of the Working Group.

Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is "negligible", and any effects will be not be significant.

Box 1 Screening Criteria

An assessment will normally be required where there is:

- a 'human receptor' within:
  - 250 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).
- an 'ecological receptor' within:
  - 50 m of the boundary of the site; or
  - 50 m of the route(s) used by construction vehicles on the public highway, up to 250 m from the site entrance(s).

STEP 2: ASSESS THE RISK OF DUST IMPACTS

The risk of dust arising in sufficient quantities to cause annoyance and/or health and/or ecological impacts should be determined using four risk categories: negligible, low, medium and high risk. A site is allocated to a risk category based on two factors:

1. the scale and nature of the works, which determines the potential dust emission magnitude as small, medium or large (STEP 2A); and
2. the sensitivity of the area to dust impacts (STEP 2B), which is defined as low, medium or high sensitivity.

These two factors are combined in **STEP 2C** to determine the risk of dust impacts with no mitigation applied. The risk category assigned to the site can be different for each of the four potential activities (earthworks, construction and trackout). More than one of these activities may occur on a site at any one time.

Where appropriate, the site can be divided into 'zones' for the dust risk assessment. This may result in different mitigation levels being applied to each zone. This could be where different parts of a large site are different distances from the nearest receptors, or where development activities move away from a receptor through time on a large scheme.

However, on complex sites where activities are not easily segregated the mitigation appropriate for the highest risk category should be applied. The aim is to ensure that it is clear what mitigation is supposed to be implemented on a site and to make auditing this simpler.

Every site is different in terms of timing (seasonality), building type (construction materials), duration and scale (area, volume and height), and therefore professional judgement must be applied by a technically competent assessor (see**: Box 2**) when allocating activities into one of the three potential dust emission magnitude categories. Justification of the category used must be stated in the report. Where there is doubt, the higher risk category should be applied (e.g. if the site is assessed as low/ medium then mitigation appropriate to a medium site should be applied).

Box 2 Technical Competency of Assessor

The following risk assessment procedure requires 'professional judgement'. Those who are responsible for making this judgement must be able to demonstrate technical competency in the assessment of dust impacts. It is difficult to define precisely who has sufficient experience and expertise to make reasonable judgements, but a person with full Membership of IAQM and experience of assessing dust impacts for a minimum of 10 diverse projects, including some complex multi-phase projects and similar projects to that being assessed, is likely to be technically competent.

IAQM is the only professional body specifically for air quality practitioners in the UK, although there are a number of more general environmental professional bodies, whose members may be competent.

STEP 2A: DEFINE THE POTENTIAL DUST EMISSION MAGNITUDE

The dust emission magnitude is based on the scale of the anticipated works and should be classified as Small, Medium, or Large.

The following are examples of how the potential dust emission magnitude for different activities can be defined. Note that, in each case, not all the criteria need to be met, and that other criteria may be used if justified in the assessment:

Earthworks: Earthworks will primarily involve excavating material, haulage, tipping and stockpiling. This may also involve levelling the site and landscaping. Example definitions for earthworks are:

Large: Total site area >110,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >6 m in height;

Medium: Total site area 18,000 m^2 – 110,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 3m - 6m in height; and

Small: Total site area <18,000 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <3 m in height.

The proposed developed dust emission magnitude for Earthworks is **Large.**

Box 3 Crushing and Screening

Mobile crushing equipment can be a significant source of dust associated with the construction phase. This equipment is regulated by District Councils or Unitary Authorities in England and Wales, SEPA in Scotland and District Councils in Northern Ireland, under the Environmental Permitting Regulations 2010 in England and Wales, and equivalent legislation in Scotland and Northern Ireland.

Equipment should be designed and operated in accordance with the most recent version of Process Guidance Note 3/16 for Mobile Crushing and Screening (note this is under review).

Professional judgement will be required to determine how the use of crushing and screening equipment will affect the dust emission magnitude. For example, it may be appropriate to increase the dust emission magnitude by one or more classes

Box 4 Concrete Batching Plant

Concrete batching equipment is regulated by District Councils or Unitary Authorities in England and Wales, SEPA in Scotland and District Councils in Northern Ireland under the Environmental Permitting Regulations 2010 and equivalent legislation in Scotland and Northern Ireland.
Such equipment should be operated in accordance with the latest version of Process Guidance Note 3/1 on Guidance for Blending, Packing, Loading, Unloading and Use of Bulk Cement.
Professional judgement will be required to determine how the use of concrete batching equipment will affect the dust emission magnitude. For example, it may be appropriate to increase the dust emission magnitude by one or more classes.

Construction: The key issues when determining the potential dust emission magnitude during the construction phase include the size of the building(s)/infrastructure, method of construction, construction materials, and duration of build. Example definitions for construction are:

Large: Total building volume >75,000 m^3, on site concrete batching, sandblasting;

Medium: Total building volume 12,000 m^3 – 75,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and

Small: Total building volume <12,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The proposed developed dust emission magnitude for Construction is **Medium.**

Trackout: Factors which determine the dust emission magnitude are vehicle size, vehicle speed, vehicle numbers, geology and duration. As with all other potential sources, professional judgement must be applied when classifying trackout into one of the dust emission magnitude categories. Example definitions for trackout are:

Large: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m;

Medium: 20-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m; and

Small: <20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

The proposed developed dust emission magnitude for Trackout is **Small.**

These numbers are for vehicles that leave the site after moving over unpaved ground, where they will accumulate mud and dirt that can be tracked out onto the public highway.

STEP 2B: DEFINE THE SENSITIVITY OF THE AREA

The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

The type of receptors at different distances from the site boundary or, if known, from the dust generating activities, should be included. Consideration also should be given to the number of 'human receptors'. Exact counting of the number of 'human receptors', is not required. Instead, it is recommended that judgement is used to determine the approximate number of receptors (a residential unit is one receptor) within each distance band. For receptors which are not dwellings professional judgement should be used to determine the number of human receptors for use in the tables, for example a school is likely to be treated as being in the >100 receptor category.

The likely routes the construction traffic will use should also be included to enable the presence of trackout receptors to be included in the assessment. As general guidance, without site-specific mitigation, trackout may occur along the public highway up to 500 m from large sites (as defined in STEP 2A), 200 m from medium sites and 50 m from small sites, as measured from the site exit.

A number of attempts have been made to categorise receptors into high, medium and low sensitivity categories; however, there is no unified sensitivity classification scheme that covers the quite different potential effects on property, human health and ecological receptors.

A series of boxes provide guidance on the sensitivity of different types of receptors to dust soiling (**Box 5**), health effects (**Box 6**) and ecological effects (**Box 7**).

In all cases the specific circumstances should be taken into account and may mean that on occasion the examples given will be subject to exceptions. For instance, the first occupants moving into residential dwellings on a large, phased housing development, may reasonably be expected to be less sensitive to dust soiling effects (albeit for a limited time) than other residential receptors. **Box 8** contains additional factors that may need to be taken into account.

Box 5: Sensitivities of People to Dust Soiling Effects

For the sensitivity of people and their property to soiling, the IAQM recommends that the air quality practitioner uses professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the following general principles:

High sensitivity receptor – surrounding land where:

- users can reasonably expect enjoyment of a high level of amenity; or
- the appearance, aesthetics or value of their property would be diminished by soiling; and
- the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.
- indicative examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.

Medium sensitivity receptor

- users would expect[a] to enjoy a reasonable level of amenity, but would not reasonably expect[a] to enjoy the same level of amenity as in their home; or
- the appearance, aesthetics or value of their property could be diminished by soiling; or
- the people or property wouldn't reasonably be expected[a] to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.
- indicative examples include parks and places of work.

Low sensitivity receptor

- the enjoyment of amenity would not reasonably be expected[a]; or
- property would not reasonably be expected[a] to be diminished in appearance, aesthetics or value by soiling; or
- there is transient exposure, where the people or property would reasonably be expected[a] to be present only for limited periods of time as part of the normal pattern of use of the land.
- indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks[b] and roads.

[a] People's expectations will vary depending on the existing dust deposition in the area,.
[b] Car parks can have a range of sensitivities depending on the duration and frequency that people would be expected to park their cars there, and the level of amenity they could reasonably expect whilst doing so. Car parks associated with work place or residential parking might have a high level of sensitivity compared to car parks used less frequently and for shorter durations, such as those associated with shopping. Cases should be examined on their own merits.

Box 6: Sensitivities of People to the Health Effects of PM_{10}

For the sensitivity of people to the health effects of PM_{10} , the IAQM recommends that the air quality practitioner assumes that there are three sensitivities based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, consistent with the Defra's advice for local air quality management, Defra LAQM Technical Guidance LAQM.TG(22):

High sensitivity receptor:

- locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).[a]
- indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.

Medium sensitivity receptor

- locations where the people exposed are workers[b], and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).
- indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.

Low sensitivity receptor

- locations where human exposure is transient[c].
- indicative examples include public footpaths, playing fields, parks and shopping streets.

[a] This follows Defra guidance as set out in LAQM.TG(22).
[b] Notwithstanding the fact that the air quality objectives and limit values do not apply to people in the workplace, such people can be affected to exposure of PM10 . However, they are considered to be less sensitive than the general public as a whole because those most sensitive to the effects of air pollution, such as young children are not normally workers. For this reason workers have been included in the medium sensitivity category.

[c] There are no standards that apply to short-term exposure, e.g. one or two hours, but there is still a risk of health impacts, albeit less certain.

Box 7: Sensitivities of Receptors to Ecological Effects

Dust deposition due to demolition, earthworks, construction and trackout has the potential to affect sensitive habitats and plant communities.

Dust can have two types of effect on vegetation: physical and chemical. Direct physical effects include reduced photosynthesis, respiration and transpiration through smothering. Chemical changes to soils or watercourses may lead to a loss of plants or animals for example via changes in acidity. Indirect effects can include increased susceptibility to stresses such as pathogens and air pollution. These changes are likely to occur only as a result of long-term demolition and construction works adjacent to a sensitive habitat. Often impacts will be reversible once the works are completed, and dust emissions cease.

The advice of an ecologist should be sought to determine the need for an assessment of dust impacts on sensitive habitats and plants.[a] Professional judgement is required to identify where on the spectrum between high and low sensitivity a receptor lies, taking into account the likely effect and the value of the ecological asset. A habitat may be highly valuable but not sensitive, alternatively it may be less valuable but more sensitive to dust deposition. Consequently, specialist ecological advice should also be sought to determine the sensitivity of the ecological receptors to dust impacts. In general most receptors will either be of high sensitivity or low sensitivity i.e. either sensitive or not to dust deposition. The following provides an example of possible sensitivities:

High sensitivity receptor

- locations with an international or national designation and the designated features may be affected by dust soiling; or
- locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain.[b]
- indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.

Medium sensitivity receptor

- locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or
- locations with a national designation where the features may be affected by dust deposition.
- indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.

Low sensitivity receptor

- locations with a local designation where the features may be affected by dust deposition.
- indicative example is a local Nature Reserve with dust sensitive features.

[a] Habitat Regulation Assessment of the site may be required as part of the planning process, if the site lies close to an internationally designated site i.e. Special Conservation Areas (SACs), Special Protection Areas (SPAs) designated under the Habitats Directive (92/43/EEC) and RAMSAR sites.

[b] Cheffing C. M. & Farrell L. (Editors) (2005), The Vascular Plant. Red Data List for Great Britain, Joint Nature Conservation Committee.

Table 9.1 and Error! Reference source not found. show how the sensitivity of the area may be determined for dust soiling, human health and ecosystem impacts respectively. These tables take account of a number of factors which may influence the sensitivity of the area. When using these tables, it should be noted that distances are to the dust source and so a different area may be affected by trackout than by on-site works. The highest level of sensitivity from each table should be recorded. It is not necessary to work through the whole of each table once it is clear that the highest level of sensitivity has been determined.

While these tables are necessarily prescriptive, professional judgement may be used to determine alternative sensitivity categories, and the factors set out in **Box 8** may be useful to consider.

Box 8: Additional Factors to Consider when Determining the Sensitivity of the Area

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any known specific receptor sensitivities which go beyond the classifications given in this document.

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)[c]			
		<20	<50	<100	<250
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	**Medium**	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

[a] The sensitivity of the area should be derived for each of the four activities: construction, earthworks and trackout. See **STEP 2B**, **Box 6** and **Box 9**.

[b] Estimate the total number of receptors within the stated distance. Only the highest level of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors <50 m is 102. The sensitivity of the area in this case would be high.

[c] For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site- specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.

Table 9.1 Sensitivity of the Area to Human Health Impacts [a] [b]

Receptor Sensitivity	Annual Mean PM_{10} concentration[c]	Number of Receptors[d]	Distance from the Source (m)[e]			
			<20	<50	<100	<250
High	>32 µg/m³ (>18 µg/m³ in Scotland)	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32 µg/m³ (16-18 µg/m³ in Scotland)	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28 µg/m³ (14-16 µg/m³ in Scotland)	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m³ (<14 µg/m³ in Scotland)	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	**Low**	Low	Low	Low
Medium	>32 µg/m³ (>18 µg/m³ in Scotland)	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32 µg/m³ (16-18 µg/m³ in Scotland)	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28 µg/m³ (14-16 µg/m³ in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m³ (<14 µg/m³ in Scotland)	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	≥1	Low	Low	Low	Low

[a] *The sensitivity of the area should be derived for each of the three activities: construction, earthworks and trackout. See **STEP 2B**, **Box 5** and **Box 8**.*

[b] *Estimate the total within the stated distance (the total within 250 m and not the number between 100 and 250 m), noting that only the highest level of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors <20 m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors <50 m is 102. If the annual mean PM10 concentration is 29 µg/m^3, the sensitivity of the area would be high.*

[c] *Most straightforwardly taken from the national background maps but should also take account of local sources. The values are based on 32 µg/m^3 being the annual mean concentration at which an exceedance of the 24-hour objective is likely in England, Wales and Northern Ireland. In Scotland there is an annual mean objective of 18µg/m^3.*

[d] *In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.*

[e] *For trackout, the distances should be measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge of the road.*

Table 9.2 Example of the Outcome of Defining the Sensitivity of the Area

Potential Impact	Sensitivity of the Surrounding Area		
	Earthworks	Construction	Trackout
Dust Soiling	Medium	Medium	Small
Human Health	Low	Low	Low
Ecological	Negligible	Negligible	Negligible

STEP 2C DEFINE THE RISK OF IMPACTS

The dust emission magnitude determined at **STEP 2A** should be combined with the sensitivity of the area determined at **STEP 2B** to determine the risk of impacts with no mitigation applied. The matrices in Table 9.3, Table 9.4 and Table 9.5 provide a method of assigning the level of risk for each activity. This should be used to determining the level of mitigation that must be applied. Mitigation is discussed in **STEP 3**. For those cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation will be required.

Table 9.3 Risk of Dust Impacts- Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	**Low Risk**
Medium	**Medium Risk**	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 9.4 Risk of Dust Impacts- Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	**Low Risk**
Medium	Medium Risk	**Medium Risk**	Low Risk
Low	Low Risk	Low Risk	Negligible

Table 9.5 Risk of Dust Impacts- Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	**Low Risk**
Medium	Medium Risk	Low Risk	**Negligible**
Low	Low Risk	Low Risk	Negligible

10 Annex B – Baseline Environment

10.1 Overview

Baseline conditions have been determined by considering information and data from the following sources provided below:

- 2025 Air Quality Annual Progress Report (APR) for Aberdeenshire Council
- Scottish Air Quality background maps (Scottish Air Quality, 2025); and
- Defra background maps (Defra, 2025).

A review and assessment of the current air quality information in the vicinity of the Proposed Development has been undertaken to establish the 'baseline' (current) situation. This has included a desk-based review of Local Authority reports (under LAQM), a review of the latest air quality monitoring, together with air quality background mapping produced by Scottish Air Quality and Defra. The baseline air quality situation for the Proposed Development falls within the local authority area of Aberdeenshire Council

10.2 Pollutants

Air quality is measured in relation to the concentrations of certain pollutants in the air, taking account of the effects of these pollutants on sensitive receptor locations. NO_X (which refers to NO and NO_2) and PM; including PM_{10} and $PM_{2.5}$ are all pollutants arising from vehicle traffic emissions that have been considered in the local air quality assessment for the Proposed Development. In rural areas, vehicle emissions represent the main sources of air pollutants, including along the Proposed Development. Changes to road alignments and junctions can affect air quality as they can alter the volume and speed of traffic at particular locations and the distribution of traffic more widely across the local road network.

NO_2 is a colourless, odourless gas which has been shown to have adverse health effects, including cardio-pulmonary effects. Combustion in air forms mainly NO and some NO_2 (collectively termed NO_X) from the combination of atmospheric nitrogen and oxygen.

For PM_{10} and $PM_{2.5}$, the numbers denote the size of particulate matter in the air with an average aerodynamic diameter of less than 10µm and 2.5µm respectively, which allows them to settle deep within the lungs causing a range of adverse health effects including cardiovascular and respiratory illnesses. Primary PM is formed from the incomplete combustion of fuel (e.g. soot from diesel exhausts), sea-salt and wind-blown dust. Secondary PM is formed in the atmosphere from other pollutants such as ammonia, NO_X and SO_2. PM has a residence time of several days in the atmosphere, so pollution events can also occur in the UK when polluted air is blown in from the continent.

10.3 Aberdeenshire Council Air Quality Annual Progress Report 2025

10.3.1 Local Authority Reports

Under Part IV of the Environment Act 1995, which established the LAQM regime, all local authorities are required to undertake a regular review of air quality in their area of jurisdiction. The local authority must designate an AQMA where ambient concentrations of pollutants exceed or are predicted to exceed the relevant air quality thresholds. The Proposed Development is within the administrative boundaries of

Aberdeenshire Council. Therefore, the most recent Aberdeenshire Air Quality Annual Progress Report 2025 was reviewed. This describes recent air quality conditions within the Midlothian administrative area, including monitoring and the status of AQMAs.

10.3.1.1 Purpose of the Progress Report

This report fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Progress Report (APR) summarises the work being undertaken by Aberdeenshire Council to improve air quality and any progress that has been made.

10.3.1.2 Description of Local Authority Area

Aberdeenshire is located on the north-east coast of Scotland and surrounds the Aberdeen City Council area. In terms of land area it is the fourth largest region in Scotland covering 6,313 square kilometres and is predominantly a rural area.

Aberdeenshire's population continues to grow, making it the 6th most populous council area in Scotland, with an estimated 264,320 residents as of mid-2023. This ongoing population increase has led to a rise in proposed housing developments through the planning process. Although largely rural, the region includes six towns with populations exceeding 10,000: Peterhead, Inverurie, Fraserburgh, Westhill, Stonehaven, and Ellon. Among these, Peterhead is the largest, with a population approaching 20,000.

A significant portion of Aberdeenshire's workforce is employed in the Energy Sector. Traditional industries such as farming, forestry, food production, and fishing remain vital, with the area producing around one-third of Scotland's agricultural output. Additionally, Peterhead hosts one of the busiest white fish and processing ports in Europe.

10.3.2 Air Quality Management Areas (AQMA)

There are no AQMAs within Aberdeenshire.

10.3.3 Air Quality Management

The air quality objectives fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995), as amended by the Environment Act (2021), and the relevant Policy and Technical Guidance documents, and are shown in Table 10.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrams per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 10.1 Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective Concentration	Air Quality Objective Measured as	Date to be Achieved by
NO_2	200 µg/m³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
NO_2	40 µg/m³	Annual mean	31.12.2005
PM_{10}	50 µg/m³, not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
PM_{10}	18 µg/m³	Annual mean	31.12.2010
$PM_{2.5}$	10 µg/m³	Annual mean	31.12.2021
SO_2	350 µg/m³, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
SO_2	125 µg/m³, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
SO_2	266 µg/m³, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m³	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m³	Running 8-Hour mean	31.12.2003

10.3.4 Automatic Monitoring Sites

Aberdeenshire Council does not undertake any automatic (continuous) monitoring within the authority's area.

10.3.5 Non-Automatic Monitoring Sites

Aberdeenshire Council undertook non- automatic (passive) monitoring of NO_2 at 11 sites during 2024.

A summary of the complete non-automatic monitoring sites in close proximity to the Proposed Development is illustrated in Figure 10-1, with detailed presented in Table 10.2.

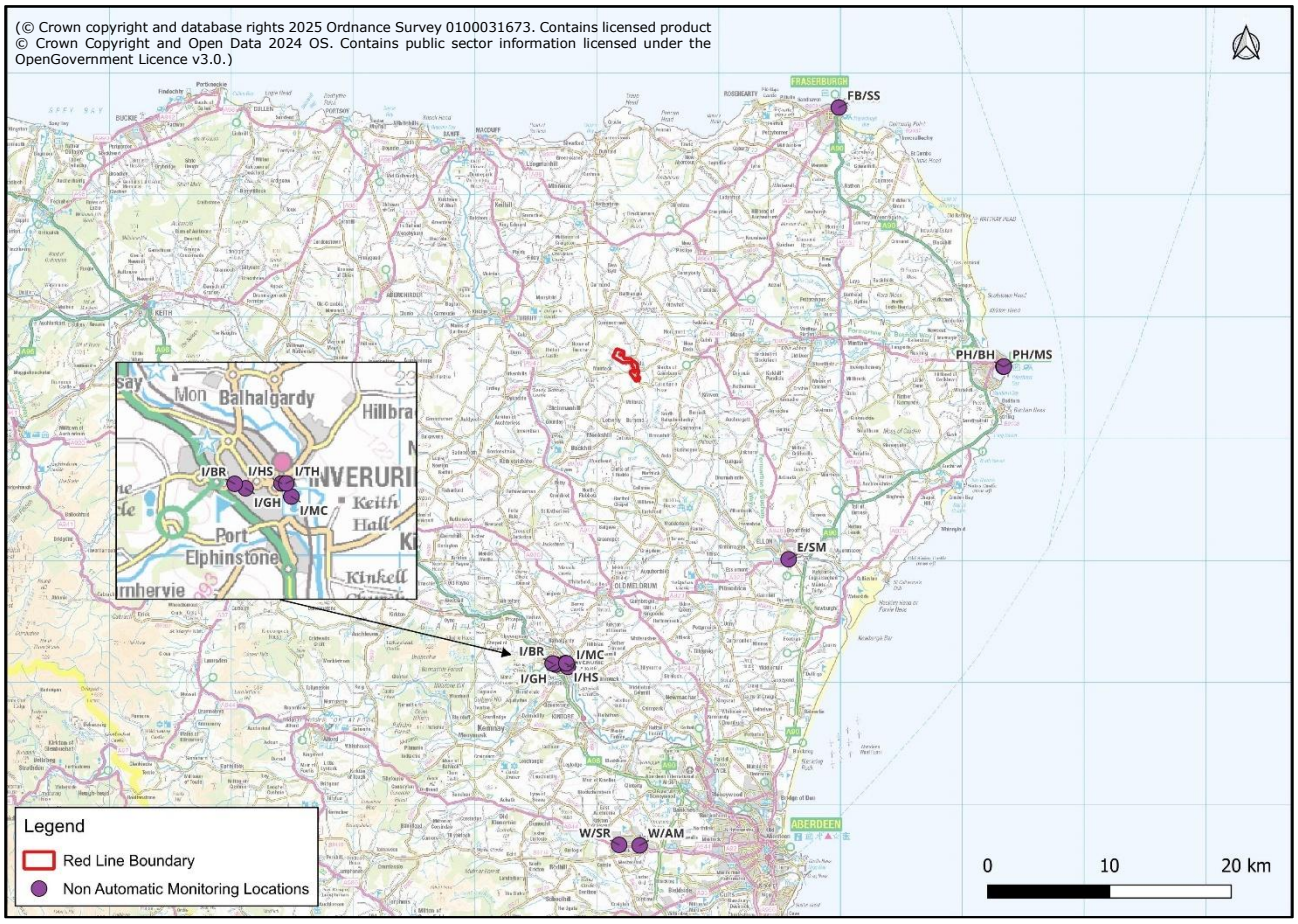

Figure 10-1 Location of Non Automatic Monitoring Site

Table 10.2 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?
I/HS	Inverurie 1	Roadside	377408	821583	NO_2	No	1.8	1.5	No
I/GH	Inverurie 2	Urban Background	376622	821476	NO_2	No	46.0	53.0	No
I/MC	Inverurie MC	Roadside	377624	821295	NO_2	No	0.0	1.5	No

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube co-located with a Continuous Analyser?
I/BR	Inverurie BR	Roadside	376382	821574	NO_2	No	2.0	2.0	No
I/TH	Inverurie TH	Roadside	377512	821584	NO_2	No	4.0	2.0	No
W/AM	Westhill AM	Roadside	383526	806645	NO_2	No	149.0	3.0	No
W/SR	Westhill 2	Roadside	381837	806691	NO_2	No	10.0	2.4	No
E/SM	Ellon SM	Kerbside	395750	830115	NO_2	No	4.7	0.5	No
PH/BH	Peterhead BH	Roadside	413379	845906	NO_2	No	10.0	2.0	No
PH/MS	Peterhead MS	Kerbside	413420	845918	NO_2	No	0.0	0.8	No
FB/SS	Fraserburgh SS	Roadside	399870	867168	NO_2	No	0.3	3.0	No

10.3.6 Comparison of Monitoring Results with Air quality Objectives

10.3.6.1 Diffusion Tube Data

Data from the nearest tubes to the Proposed Development site for each month during 2024 has been summarised in Table 10.3 alongside historical data where it is available in

Table 10.4**.**

Table 10.3 NO_2 2024 Monthly Diffusion Tube Results (µg/m^3)

DT ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I/HS	22.0	28.0	18.0	14.0	14.0	12.0	12.0	14.0	16.0	26.0	22.0	24.0
I/GH	9.0	10.0	6.0	5.0	5.0	5.0	5.0	5.0	6.0	7.0	11.0	10.0

DT ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I/MC	19.0	22.0	20.0	16.0	18.0	12.0	12.0	11.0	15.0	17.0	20.0	18.0
I/BR	17.0	21.0	14.0	-	12.0	11.0	9.0	8.0	13.0	15.0	18.0	18.0
I/TH	15.0	20.0	15.0	10.0	12.0	9.0	8.0	10.0	11.0	16.0	18.0	14.0
W/AM	13.0	21.0	20.0	10.0	18.0	-	9.0	12.0	14.0	17.0	17.0	16.0
W/SR	10.0	15.0	13.0	8.0	12.0	8.0	7.0	6.0	11.0	11.0	13.0	14.0
E/SM	12.0	20.0	15.0	13.0	17.0	12.0	12.0	12.0	14.0	18.0	-	14.0
PH/BH	35.0	25.0	22.0	13.0	22.0	18.0	20.0	32.0	19.0	28.0	20.0	15.0
PH/MS	35.0	23.0	18.0	12.0	18.0	14.0	18.0	34.0	17.0	27.0	17.0	15.0
FB/SS	14.0	21.0	22.0	17.0	24.0	14.0	16.0	16.0	22.0	17.0	12.0	18.0

Table 10.4 Annual Mean NO_2 Monitoring Results: Non-Automatic Monitoring (µg/m^3)

Site ID	Site Type	Valid Data Capture for Monitoring Period (%)	Valid Data Capture 2024 (%)	Annual Mean Concentration (adjusted for bias) µg/m^3				
				2020	2021	2022	2023	2024
I/HS	Roadside	100.0	100.0	14.1	15.0	19.2	15.1	14.1
I/GH	Urban Background	100.0	100.0	4.0	4.0	5.4	5.2	5.3
I/MC	Roadside	100.0	100.0	13.6	17.0	15.2	14.9	12.7
I/BR	Roadside	100.0	92.5	11.9	12.0	11.9	11.5	10.8
I/TH	Roadside	100.0	100.0	10.7	13.0	13.6	12.1	10.0
W/AM	Roadside	100.0	92.5	11.3	14.0	13.7	12.7	11.5
W/SR	Roadside	100.0	100.0	9.4	11.0	9.3	9.0	8.1
E/SM	Roadside	100.0	92.5	10.4	14.0	11.1	12.1	11.0
PH/BH	Roadside	100.0	100.0	14.1	17.0	16.6	16.5	17.0
PH/MS	Kerbside	100.0	100.0	11.9	15.0	15.0	14.8	15.7
FB/SS	Roadside	100.0	100.0	12.3	15.0	13.6	14.2	13.5

10.3.7 Conclusions from New Monitoring Data

Aberdeenshire Council carried out diffusion tube monitoring at 11 sites across the local authority area. The diffusion tube monitoring data presented in this report demonstrates that concentrations of NO_2 in Aberdeenshire continue to remain well below the national air quality objectives. The highest annual mean result, 17 µg/m^3, being less than half the national air quality objective. Apart from the slight increase in the Peterhead area the level of NO_2 has reduced compared to the 2023 results. No AQMAs have been declared in the Aberdeenshire Council area and no requirement for detailed assessment has been identified.

10.4 Scotland Background Maps

Ricardo provides maps of pollutant concentrations across Scotland on behalf of the Scottish Government as part of the Scottish Air Quality Database (SAQD) project. The most recent maps, representing data from 2023, show the spatial distribution of background annual mean concentrations for gravimetric equivalent PM_{10}, $PM_{2.5}$, NOx, and NO_2. Background concentrations are presented at a spatial resolution of 1 km by 1 km.

The Scottish modelling methodology follows the UK Pollution Climate Mapping (PCM) approach. This modelling incorporates only Scottish pollutant measurement data, meteorological data from the Weather Research and Forecasting (WRF) model, and spatially disaggregated emissions data from the UK's National Atmospheric Emissions Inventory (NAEI). The latest modelled air pollutant concentration results and maps for 2022 are published in a technical report available online, which includes interactive features such as tables and maps to enhance accessibility. These maps can also be explored using an interactive tool provided.

Projections of background annual mean concentrations for NOx, NO_2, PM_{10}, and $PM_{2.5}$ have been calculated for the years 2021 through 2040, based on 2021 as the base year. These projected maps, produced using the Scottish-specific model with Scottish measurement and WRF meteorological data, are available for download for use in Local Authority Review and Assessment. An interactive ambient air quality map tool allows users to explore the Pollution Climate Mapping model data from 2019 through the most recent model year. Users can toggle between background maps for NOx, NO_2, PM_{10}, and $PM_{2.5}$ using drop-down menus.

10.4.1 Background Annual Mean Concentrations

The most recent maps are for the year 2023 (illustrated within Figure 10-2) and provide representation of the spatial distribution of background annual mean concentrations for:

- gravimetric equivalent PM_{10} concentration (PM_{10});
- gravimetric equivalent $PM_{2.5}$ concentration ($PM_{2.5}$);
- NO_x and NO_2.

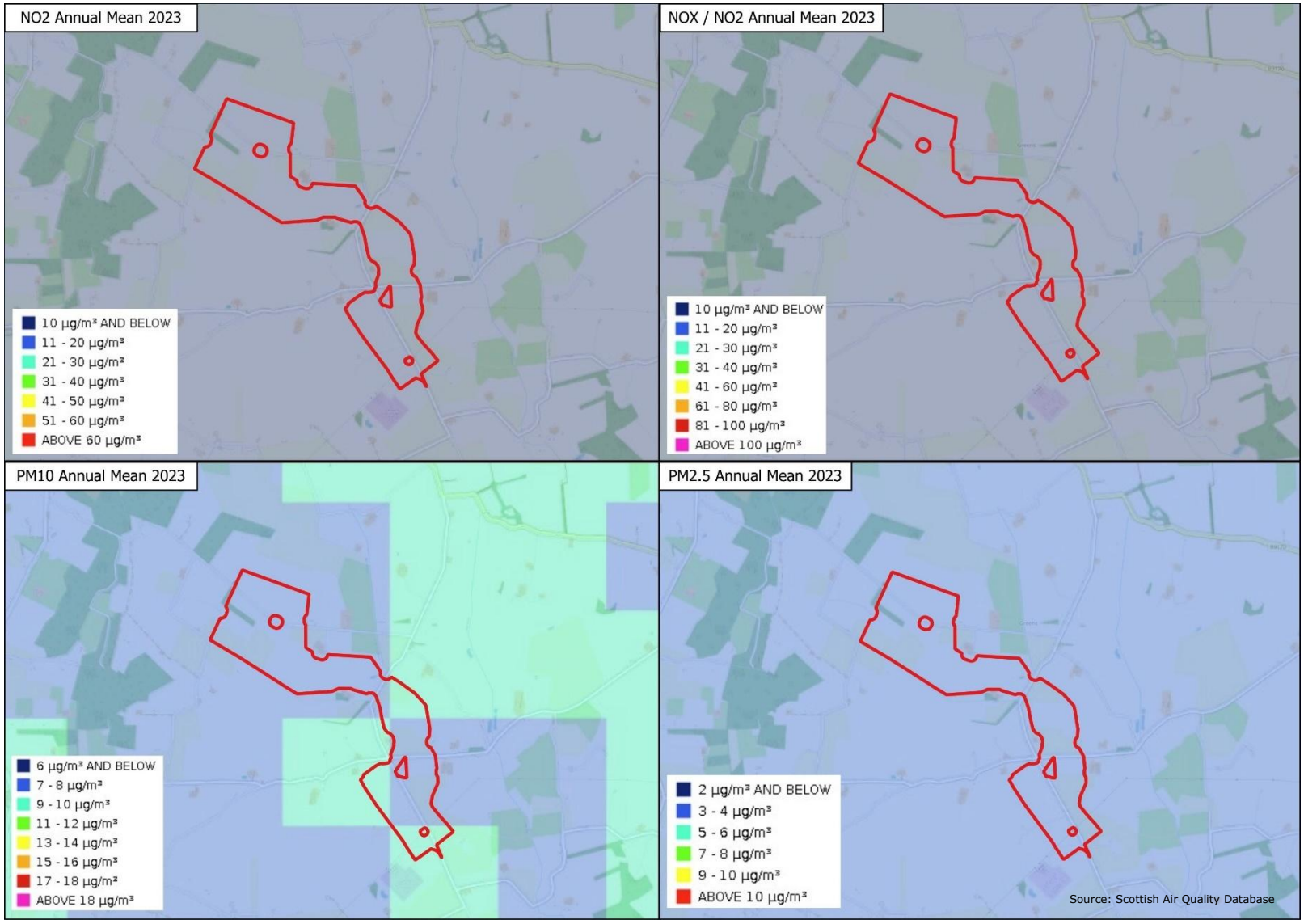

Figure 10-2 Background Annual Mean Concentrations (2023)

10.4.2 DEFRA Mapped Concentration Estimates

DEFRA issued revised 2021 based background maps for NOx, NO_2, PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling. The main purpose of the background maps is to provide estimates of background concentrations for specific pollutants. These can then be used in air quality assessments to better understand the contribution of local sources to total pollutant concentrations. They provide information on how pollutant concentrations change over time and across a wide area; they also provide an estimated breakdown of the relative sources of pollution.

The total concentration of a pollutant comprises those from explicit local emission sources such as, roads, chimneystacks, etc., and those that are transported into an area by the wind from further away. If all the local sources were removed, all that would remain is that which comes in from further away; it is this component that is called 'background'.

In many situations the background contribution may represent a significant or dominant proportion of the total pollutant concentration, so it is important that authorities give this careful consideration. A good understanding of background concentrations is important when completing air quality assessments as it allows for a good understanding of local pollutant sources.

The current background concentration maps for Scotland (2021 reference year) are available. A file is also available for each year between 2021 and 2040 covering all Scotland that provides the on the British National Grid. The use of background concentrations within the air quality concentration prediction process ensures that pollutant sources other than traffic are represented appropriately. Background sources of pollutants within the vicinity of the study site include industrial, domestic and road emissions. DEFRA issued revised 2021 based background maps for NO_X, NO_2, PM_{10} and $PM_{2.5}$ which incorporate updates to the input data used for modelling.

The results from 2023 – 2023 for the background pollutant levels for each of the nearest Defra air quality concentration predictions are summarised in Table 10.5 –

Table 10.16 below. Figure 10-3 illustrates DEFRA Results for the 12 closest locations to the site.

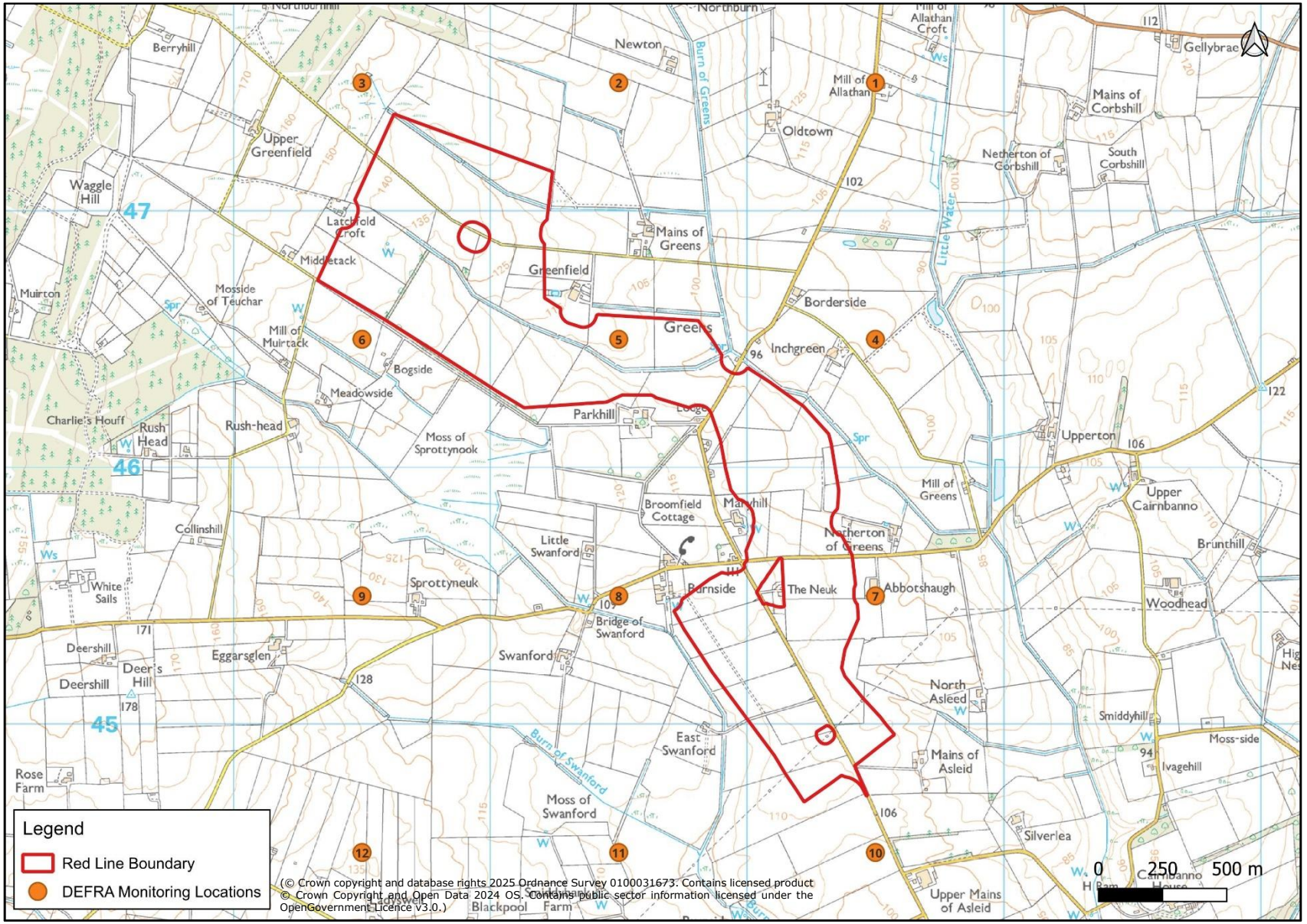

Figure 10-3 DEFRA Monitoring Locations

Table 10.5 DEFRA Location 1 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 1						
Easting (BNG): 383500				Northing (BNG): 847500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.3	1.2	1.2	1.1
PM_{10}	8.8	8.8	8.7	8.7	8.7	8.6
$PM_{2.5}$	3.2	3.2	3.1	3.1	3.1	3.1

Table 10.6 DEFRA Location 2 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 2						
Easting (BNG): 382500				Northing (BNG): 847500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.2	1.2	1.2	1.1
PM_{10}	8.2	8.2	8.2	8.1	8.1	8.1
$PM_{2.5}$	3.1	3.1	3.1	3.1	3.0	3.0

Table 10.7 DEFRA Location 3 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 3						
Easting (BNG): 381500				Northing (BNG): 847500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.2	1.2	1.2	1.1
PM_{10}	8.4	8.3	8.3	8.3	8.2	8.2
$PM_{2.5}$	3.1	3.1	3.1	3.1	3.0	3.0

Table 10.8 DEFRA Location 4 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 4						
Easting (BNG): 383500				Northing (BNG): 846500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.2	1.2	1.2	1.1
PM_{10}	7.8	7.8	7.7	7.7	7.7	7.6
$PM_{2.5}$	3.1	3.1	3.0	3.0	3.0	3.0

Table 10.9 DEFRA Location 5 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 5						
Easting (BNG): 382500				Northing (BNG): 846500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.3	1.2	1.2	1.1
PM_{10}	8.2	8.1	8.1	8.1	8.1	8.0
$PM_{2.5}$	3.1	3.1	3.1	3.1	3.0	3.0

Table 10.10 DEFRA Location 6 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 6						
Easting (BNG): 383500				Northing (BNG): 846500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.3	1.2	1.2	1.1
PM_{10}	9.6	9.6	9.5	9.5	9.5	9.4
$PM_{2.5}$	3.3	3.2	3.2	3.2	3.2	3.1

Table 10.11 DEFRA Location 7 Background Results (NOx, NO2, PM10, PM2.5)

DEFRA Location 7						
Easting (BNG): 383500				Northing (BNG): 845500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.2	1.2	1.2	1.1
PM_{10}	7.7	7.7	7.7	7.6	7.6	7.6
$PM_{2.5}$	3.1	3.1	3.0	3.0	3.0	3.0

Table 10.12 DEFRA Location 8 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 8						
Easting (BNG): 382500				Northing (BNG): 845500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.3	1.3	1.2	1.2	1.2	1.1
PM_{10}	8.6	8.6	8.6	8.5	8.5	8.5
$PM_{2.5}$	3.2	3.2	3.1	3.1	3.1	3.0

Table 10.13 DEFRA Location 9 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 9						
Easting (BNG): 381500				Northing (BNG): 845500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.4	1.4	1.3	1.2	1.2	1.2
PM_{10}	8.0	8.0	8.0	7.9	7.9	7.9
$PM_{2.5}$	3.1	3.1	3.1	3.0	3.0	3.0

Table 10.14 DEFRA Location 10 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 10						
Easting (BNG): 383500				Northing (BNG): 844500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.4	1.4	1.3	1.2	1.2	1.2
PM_{10}	7.9	7.8	7.8	7.8	7.7	7.7
$PM_{2.5}$	3.1	3.1	3.1	3.0	3.0	3.0

Table 10.15 DEFRA Location 11 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 11						
Easting (BNG): 382500				Northing (BNG): 844500		
	2023	2024	2025	2026	2027	2028
No_x	1.6	1.6	1.5	1.5	1.4	1.4
NO_2	1.4	1.4	1.3	1.2	1.2	1.2
PM_{10}	7.4	7.4	7.4	7.4	7.3	7.3
$PM_{2.5}$	3.1	3.1	3.1	3.0	3.0	2.9

Table 10.16 DEFRA Location 12 Background Results (NO_x, NO_2, PM_{10}, $PM_{2.5}$)

DEFRA Location 12						
Easting (BNG): 381500				Northing (BNG): 844500		
	2023	2024	2025	2026	2027	2028
No_x	1.7	1.6	1.5	1.5	1.5	1.4
NO_2	1.4	1.4	1.3	1.2	1.2	1.2
PM_{10}	8.8	8.8	8.8	8.7	8.7	8.7
$PM_{2.5}$	3.2	3.2	3.2	3.1	3.1	3.1

The predicted background concentrations of key air pollutants—NO_x, NO_2, PM_{10}, and $PM_{2.5}$ across the DEFRA locations from 2023 to 2028 indicate a gradual overall decline, reflecting anticipated improvements in air quality. NO_x and NO_2 show a consistent but slight reduction at all locations, with NOx concentrations generally decreasing from around 1.6–1.7 µg/m³ in 2023 to approximately 1.4 µg/m³ by 2028. Similarly, NO_2 levels range from 1.1 to 1.4 µg/m³, with a steady downward trend across the period.

PM_{10} and $PM_{2.5}$ concentrations also exhibit minor decreases or remain stable, with PM_{10} values typically between 7.4 and 9.6 µg/m³ and $PM_{2.5}$ ranging from 2.9 to 3.3 µg/m³. Notably, Location 6 consistently records the highest particulate levels, suggesting a relatively elevated background particulate load in this area. Conversely, Location 11 shows some of the lowest particulate concentrations, with PM_{10} remaining stable around 7.3–7.4 µg/m³ and $PM_{2.5}$ gradually decreasing to 2.9 µg/m³ by 2028.

Overall, the narrow range of pollutant concentrations across the sites indicates relatively uniform background air quality within the study area. These trends provide valuable insight for air quality assessments, highlighting the importance of considering both local emissions and broader background contributions in understanding pollutant dynamics over time.

10.5 Sensitive Receptors

10.5.1 People and Property

The air quality residential and non-residential sensitive receptors are illustrated in Figure 10-4, with a summary of their receptor ID and distance from site boundary demonstrated in Table 10.17 and Table 10.18.

The nearest residential sensitive receptor is Residential Sensitive Receptor ID 25 at approximately 11m, and the nearest non-residential sensitive receptor is Non-Residential Sensitive Receptor ID 2 at approximately 48m.

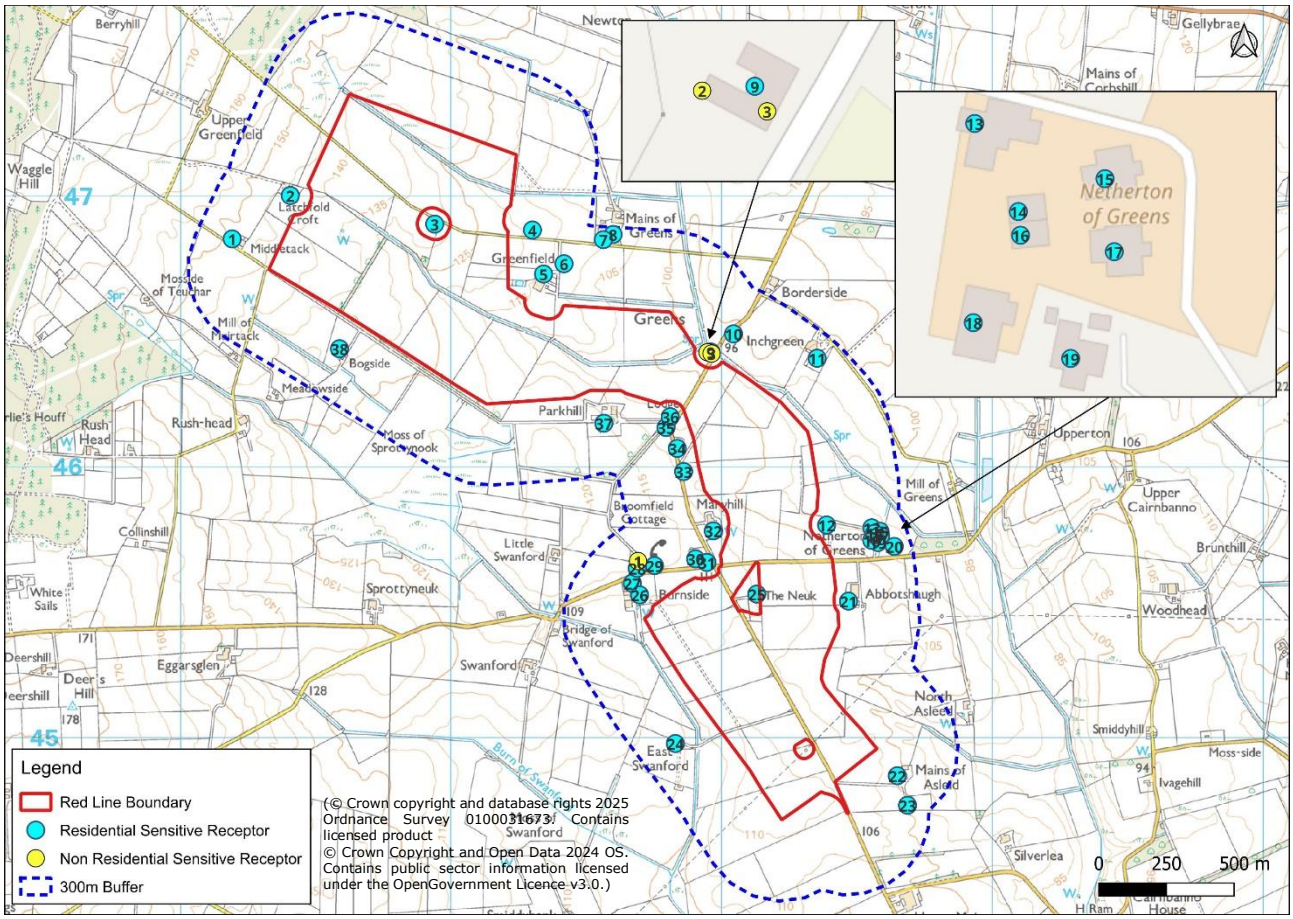

Figure 10-4: Residential and Non-Residential Sensitive Receptors within 300m Buffer

Table 10.17 Residential Sensitive Receptors within 300m Buffer

ID	Easting (BNG)	Northing (BNG)	Distance to Boundary (m)
1	381191	846843	170
2	381406	847003	72
3	381940	846897	55
4	382261	846913	90
5	382342	846713	115
6	382418	846751	155
7	382563	846840	252
8	382599	846859	273
9	382960	846425	55
10	383044	846492	112
11	383353	846402	211
12	383388	845786	54
13	383555	845776	184
14	383565	845755	183
15	383585	845763	204
16	383566	845750	181
17	383587	845746	198
18	383555	845730	162
19	383577	845721	179
20	383638	845707	234
21	383469	845505	53
22	383649	844860	124
23	383687	844751	220
24	382829	844979	162
25	383130	845531	11
26	382697	845528	65
27	382670	845571	114
28	382688	845626	147

ID	Easting (BNG)	Northing (BNG)	Distance to Boundary (m)
29	382752	845636	118
30	382904	845661	69
31	382946	845648	49
32	382969	845765	54
33	382860	845983	58
34	382836	846069	66
35	382795	846146	83
36	382810	846186	55
37	382565	846162	121
38	381588	846437	118

Table 10.18 Non Residential Sensitive Receptors within 300m Buffer

ID	Easting (BNG)	Northing (BNG)	Distance to Boundary (m)
1	382691	845653	167
2	382948	846424	48
3	382963	846419	49