17.0 Air Quality and Dust

Introduction

17.1 This chapter details the air quality assessment undertaken for the proposed development (see **Chapter 2.0** for further details pertaining to the development proposals). The local authority, Dumfries and Galloway Council (DGC), has not currently designated any Air Quality Management Areas (AQMAs).

17.2 This air quality assessment covers the:

- Construction phase - an evaluation of the temporary effects from fugitive construction dust[1] and construction-vehicle exhaust emissions; and
- Operational phase – an evaluation of the impacts of emissions from the development traffic and boat movements on the local area.

17.3 The chapter 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. 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 and mitigation measures recommended, where appropriate. A conclusion has been drawn on the significance of the construction-phase effects and operational-phase effects.

17.4 There are four appendices that provide further detail to this assessment, which can be found in **Volume 2** of this EIAR:

Appendix 17.1 – Construction Dust Assessment Methodology;

Appendix 17.2 – Model Verification;

Appendix 17.3 – Air and Noise Traffic Calculations; and

Appendix 17.4 - Technical Note: Stranraer Marina – Air and Noise Traffic Calculations.

17.5 It is to be noted that the data in Appendix 17.3 supersedes that of Appendix 17.4 and includes the most recent consented development (Planning Application 24/1407/FUL); however, Appendix 17.4 contains details of the methodology.

Competency Statement

17.6 Air quality guidance advises that the organisation engaged in assessing the overall risks should hold relevant qualifications and/or extensive experience in undertaking air quality assessments. The RPS air quality team members involved at various stages of this assessment have professional affiliations that include Member of the Institute of Air Quality Management and

[1] Solid particles suspended in air or settled out onto a surface after having been suspended in air

Institution of Environmental Sciences and have the required academic qualifications for these professional bodies.

17.7 This Chapter has been prepared by Jinho Looi MSci, MA (Cantab) and Dr. Steven Lees PhD, BSc (Hons).

17.8 Jinho is an Associate Member of the Institute of Air Quality Management and Associate Member of the Institution of Environmental Sciences. Jinho has over 2 years of experience within air quality, working in both the planning and permitting sectors. His work includes providing specialist input into Environmental Impact Assessments (EIAs) on a range of projects throughout the UK. He has worked on numerous projects, from inception to completion, across a range of sectors including residential, commercial, and industrial.

17.9 Steven is a Member of the Institute of Air Quality Management and Member of the Institution of Environment Sciences. Steven has over 14 years of experience within air quality, working in both the planning and permitting sectors. His work includes providing specialist input into Environmental Impact Assessments (EIAs) on a range of projects throughout the UK. He has worked on numerous projects, from inception to completion, across a range of sectors including residential, commercial, agricultural, industrial and power. Steven also holds a PhD researching the effects of air pollution on designated habitat sites at the University of Sheffield.

Legislation, Guidance and Policy

Legislation, Guidance and Policy

Air Quality Standards Regulations

17.10 The Air Quality Standards Regulations 2010[2], amended by The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020[3], sets limit values for ambient air concentrations for the main air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene, certain toxic heavy metals (arsenic, cadmium and nickel) and polycyclic aromatic hydrocarbons (PAHs).

17.11 These limit values are legally binding on the Secretary of State. The Scottish Government operate various national ambient air quality monitoring networks to measure compliance and develop plans to meet the limit values.

UK Air Quality Strategy

17.12 The Environment Act 1995, as amended by the Environment Act 2021[4], established the requirement for the UK Government and the devolved administrations to produce a National Air

[2] Defra, 2010, The Air Quality Standards Regulations
[3] The Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020
[4] Environment Act 2021. Available at: https://www.legislation.gov.uk/ukpga/2021/30/contents

Quality Strategy (AQS) for improving ambient air quality, the first being published in 1997 and having been revised several times since, with the latest published in 2007[5]. The Strategy sets UK air quality standards[6] and objectives[7] for the pollutants in the Air Quality Standards Regulations plus 1,3-butadiene and recognises that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem. There is no legal requirement to meet objectives set within the UK AQS except where equivalent limit values are set within the Air Quality Standards Regulations.

17.13 The 1995 Environment Act also established the UK system of Local Air Quality Management (LAQM), that requires local authorities to go through a process of review and assessment of air quality in their areas, identifying places where objectives are not likely to be met, then declaring Air Quality Management Areas (AQMAs) and putting in place Air Quality Action Plans to improve air quality. These plans also contribute, at local level, to the achievement of the limit values in the Air Quality Standards (Scotland) Regulations.

17.14 The limit values and objectives relevant to this assessment are summarised in Table **17.1**. Where the limit values and the AQS objectives differ, the more stringent has been used.

Table 17.1: Summary of Relevant Air Quality Limit Values and Objectives

Pollutant	**Averaging Period**	**Objectives/Limit Values**	**Not to be Exceeded More Than**
Nitrogen Dioxide (NO_2)	1 hour	200 µg.m^{-3}	18 times per calendar year
	Annual	40 µg.m^{-3}	-
Particulate Matter (PM_{10})	24 Hour	50 µg.m^{-3}	7 times per calendar year
	Annual	18 µg.m^{-3}	-
Particulate Matter ($PM_{2.5}$)	Annual	10 µg.m^{-3}	-

[5] Defra, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Volume 2
[6] Standards are concentrations of pollutants in the atmosphere which can broadly be taken to achieve a certain level of environmental quality. Standards, as the benchmarks for setting objectives, are set purely with regard to scientific evidence and medical evidence on the effects of the particular pollutant on health, or on the wider environment, as minimum or zero risk levels.
[7] Objectives are policy targets expressed as a concentration that should be achieved, all the time or for a percentage of time, by a certain date.

National Planning Policy Context

National Planning Framework 4 (NPF4)

17.15 Scotland's 'Fourth National Planning Framework 4' (NPF4)[8] is 'a long-term spatial strategy'. There are six overarching spatial principles throughout the document which outline the Government's aims, namely: just transition; conserving and recycling assets; local living; compact urban growth; rebalanced development; and rural revitalisation. NPF4 Policy 23 (impacting just transition, local living, compact urban growth, and rebalanced development) states that:

"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."

17.16 A presumption in favour of sustainable development lies at the heart of Scottish policy. For determining planning applications, this means approving development proposals if they accord with the local development plan, unless material considerations indicate otherwise. If the development plan is absent, silent or the policies are out of date, then planning permission should be granted unless any adverse impacts would significantly outweigh the benefits, or specific policies in Scottish planning policy indicate that development should be restricted.

17.17 Planning Advice Notes (PANs) provide advice on good practice. PAN 51 (Scottish Executive, 2006)[9] is entitled Planning, Environmental Protection and Regulation and supports existing policy on the role of the planning system in relation to the environmental protection regimes.

National and Regional Strategies

17.18 On 14 January 2019, Defra published the 'Clean Air Strategy 2019'. The report sets out actions that the Government intends to take to reduce emissions from transport, in the home, from farming and from industry.

Local Policy and Guidance

Dumfries and Galloway Council Local Development Plan 2 (LDP2)

17.19 The Local Development Plan 2 (LDP2) was adopted by Dumfries and Galloway on 3 October 2019. The policy most relevant to this chapter is listed below.

Policy OP1: Development Considerations

"Development proposals should be compatible with the character and amenity of the area and should not conflict with nearby land uses. The following issues which may result from the

[8] Scottish Government: National Planning Framework 4: February 2023
[9] Planning Advice Note 51: planning, environmental protection and regulation October 2006

development will be a material consideration in the assessment of proposals: […] emissions including dust, smoke, soot, ash, dirt or grit or any other environmental pollution to water, air, or soil"

Methodology Used For Assessment

Introduction

17.20 The approach is consistent with the EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document[10], the IAQM Guidance on the assessment of dust from demolition and construction[11], and, where relevant, Defra's Local Air Quality Management Technical Guidance: LAQM.TG22[12]. It includes the key elements listed below:

- assessment of the existing air quality in the study area (existing baseline) and prediction of the future air quality without the development in place (future baseline), using official government estimates from Defra, publicly available air quality monitoring data for the area, and relevant Air Quality Review and Assessment (R&A) documents;
- an assessment of likely construction-phase impacts with mitigation and controls in place, including the impacts of the construction traffic on the local area; and
- a quantitative prediction of the future operational-phase air quality impact with the development in place (with any necessary mitigation), encompassing the impacts of the development traffic on the local area.

17.21 LAQM.TG22 provides criteria to determine the risk of exceedance of the short-term objectives for NO_2, PM_{10} and SO_2 in relation to ports and shipping emissions. These criteria are reproduced below:

- *"Are there more than 5,000 large ship movements per year, with relevant exposure within 250m of the berths and main areas of manoeuvring: or*
- *Are there more than 15,000 large ship movements per year, with relevant exposure within 1km of these areas?"*

17.22 It is understood that the aforementioned criteria will not be triggered as a result of the proposed development. Therefore, emissions associated with shipping movements have been scoped out and are not considered further in this chapter.

Consultation

17.23 Dumfries and Galloway Council (DGC) was consulted with to agree the scope and methodology. Table **17.2** below summarises the consultations and responses:

[10] EPUK & IAQM, January 2017, Land-Use Planning & Development Control: Planning For Air Quality
[11] IAQM, 2024, Guidance on the assessment of dust from demolition and construction
[12] Defra, 2022, Local Air Quality Management Technical Guidance, 2022 (LAQM.TG22)

Table 17.2: Consultation Responses Relevant to this Chapter

Date	Consultee and Issues Raised	How/Where Addressed
February 2023	Marine Scotland – Licensing Operations Team Scoping Opinion The Scottish Ministers agreed with the proposal to scope in emissions from plant and vehicles and dust from construction activities. In addition, the Scottish Ministers agreed with the proposal to scope out the effect of air pollutant emissions at the operational phase.	Construction dust assessment undertaken to assess dust from construction activities. Detailed road traffic emissions modelling undertaken for both the first year of construction and operation of the development, as operational road traffic emissions was subsequently scoped into the assessment.
October 2024	Environmental Health Communities Directorate, Dumfries and Galloway Council – Agreement with the proposed methodology.	Methodology for the assessment was agreed during discussions with the council. Therefore, the assessment has been undertaken in accordance with the methodology set out in this section.

Study Area

17.24 The assessment study area differs between construction-phase fugitive dust and transport emissions during the construction and operational-phases. The study areas in each case are described in detail within the methodology that follows, referencing the relevant guidance documents.

17.25 With respect to construction-phase fugitive dust, the Institute of Air Quality Management guidance[13] on the assessment of dust from demolition and construction sets out 250 metres as the distance from the site boundary or 50 metres from the centreline of the site traffic routes up to 250 metres from the entrance, where there could potentially be nuisance dust and PM_{10} effects on human receptors. This guidance defines the study area. These distances are set to be deliberately conservative.

17.26 With respect to transport emissions, the Environmental Protection UK (EPUK) & IAQM Land-Use Planning & Development Control: Planning For Air Quality document[14] states that roads

[13] IAQM, 2024, Guidance on the assessment of dust from demolition and construction
[14] Environmental Protection UK (EPUK)/IAQM, January 2017, Land-Use Planning & Development Control: Planning For Air Quality

which are anticipated to experience an increase in Annual Average Daily Traffic (AADT) flows of 500 or more Light Duty Vehicles (LDVs) and/or 100 or more Heavy Duty Vehicles (HDVs) has the potential to have significant impacts on the surrounding area. The construction traffic and operation traffic study areas therefore consider all road links where the EPUK & IAQM threshold criteria are exceeded and all main roads within 200 metres of the Site boundary.

Baseline conditions

17.27 The background concentration often represents a large proportion of the total pollution concentration, so it is important that the background concentration selected for the assessment is realistic. EPUK & IAQM guidance highlight public information from Defra and local monitoring studies as potential sources of information on background air quality. LAQM.TG22 recommends that Defra mapped concentration estimates are used to inform background concentrations in air quality modelling and states that: "*Where appropriate these data can be supplemented by and compared with local measurements of background, although care should be exercised to ensure that the monitoring site is representative of background air quality".* On behalf of the Scottish Government, and as part of the Scottish Air Quality Database (SAQD) project, mapped concentrations of pollutants were commissioned for Scotland and have been used instead of Defra mapped concentration estimates (where possible).

17.28 For this assessment, the background air quality has been characterised by drawing on information from the following public sources:

- Scottish Air Quality Database background maps[15], which show estimated pollutant concentrations across Scotland in 1 km grid squares;
- Defra maps[16], which show estimated pollutant concentrations across the UK in 1 km grid squares; and
- published results of local authority Review and Assessment (R&A) studies of air quality, including local monitoring and modelling studies.

Impact Assessment Methodology

Construction Phase – Fugitive Dust (Temporary)

17.29 Dust is the generic term used to describe particulate matter in the size range 1-75 µm in diameter[17]. Particles greater than 75 µm 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. The rate of deposition depends largely on the size of the particle and its density; together these influence the aerodynamic and gravitational effects that determine the distance it travels and how long it stays suspended in the air before it settles out onto a surface.

[15] Scottish Air Quality Database background maps, https://www.scottishairquality.scot/data/mapping
[16] Drawn from Defra Maps at http://uk-air.defra.gov.uk/data/laqm-background-maps?year=2021
[17] British Standard Institute, 1983, BS 6069:Part 2:1983, ISO 4225-1980 Characterization of air quality. Glossary

In addition, some particles may agglomerate to become fewer, larger particles; whilst others react chemically.

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

- PM_{10} particles, those up to 10 µm 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 10 µm which fall out of the air quite quickly and can soil surfaces (e.g. a car, window sill, laundry). Additionally, dust can potentially have adverse effects on vegetation and fauna at sensitive habitat sites.

17.31 The IAQM Guidance on the assessment of dust from demolition and construction sets out 250 m as the distance from the site boundary and 50 m from the site traffic route(s) up to 250 m 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 50 m in both cases. In this particular application, there are no ecological receptors within the distances and ecological effects have been scoped out. These distances are set to be deliberately conservative.

17.32 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 World Health Organisation (WHO) level. Construction dust assessments have tended to be risk based, focusing on the appropriate measures to be used to keep dust impacts at an acceptable level.

17.33 The IAQM dust guidance aims to estimate the impacts of both PM_{10} and dust through a risk-based assessment procedure. The IAQM dust guidance document states: *"The magnitude of impacts depend on the mitigation measures adopted. Therefore the emphasis in this document is on classifying the risk of dust impacts from a site, which will then allow mitigation measures commensurate with that risk to be identified."*

17.34 The IAQM dust guidance provides a methodological framework, but notes that professional judgement is required to assess effects: *"This is necessary, because the diverse range of projects that are likely to be subject to dust impact assessment means that it is not possible to be prescriptive as to how to assess the impacts. Also a wide range of factors affect the amount of dust that may arise, and these are not readily quantified."*

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

- The dust impact (the change in dust levels attributable 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 the 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.

17.36 The detail of the dust assessment methodology is provided in **Appendix 17.1 (Volume 2)**.

17.37 The dust risk categories that have been determined for each of the four activities (demolition, earthworks, construction and trackout[18]) have been used to define the appropriate site-specific mitigation measures based on those described in the IAQM dust guidance. The guidance states that provided the mitigation measures are successfully implemented, the resultant effects of the dust exposure will normally be 'not significant'.

17.38 Dredging vessels have been screened out of the construction dust assessment as they would operate on water surfaces which act as natural dust suppression and, therefore, have not been considered further.

Construction Phase (Temporary) – NRMM Emissions

17.39 Non-Road Mobile Machinery (NRMM) refers to mobile machines, transportable industrial equipment or vehicles which are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads. Where NRMM is employed, the pollutants of concern for local air quality are NO_2 and particulate matter (i.e. PM_{10} and $PM_{2.5}$).

17.40 LAQM.TG(22) states that *"experience of assessing the exhaust emissions from on-site plant (NRMM) and site traffic suggests that, with suitable controls and site management, they are unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed …".*

17.41 On the basis of the above, providing that suitable measures are put in place for the operation of NRMM it is considered that NRMM emissions on local air quality would likely be 'insignificant' and have not been considered further within this assessment.

[18] The transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network

Operational Phase (Permanent) and Construction Phase (Temporary) – Transport and Vessels

17.42 Traffic movements generated by the proposed development have been compared with the relevant threshold criteria in the EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document to determine the likely impact of the development on the surrounding area and IAQM A guide to the assessment of air quality impacts on designated nature conservation sites.

Modelled Scenarios

17.43 The following scenarios were modelled:

- Construction Phase:
  - Without Development – without the proposed development but with approved developments in the first year construction activities are expected to commence, 2026; and
  - With Development – with the proposed development and approved developments in the first year construction activities are expected to commence, 2026.
- Operational Phase:
  - Without Development – without the proposed development but with approved developments in the first year the development is expected to be fully operational, 2028; and
  - With Development – with the proposed development but with approved developments in the first year the development is expected to be fully operational, 2028.

Model Input Data

Traffic Flow Data

17.44 Traffic data used in the assessment have been provided by the project's transport consultants, Fairhurst. The traffic flow data provided for this assessment are taken from the traffic note, *'161379_Air Noise Traffic calculations 20250729 rev1'* (see appendix 17.3), and are summarised in Table 17.3. The modelled road links are illustrated in Figure 17.1.

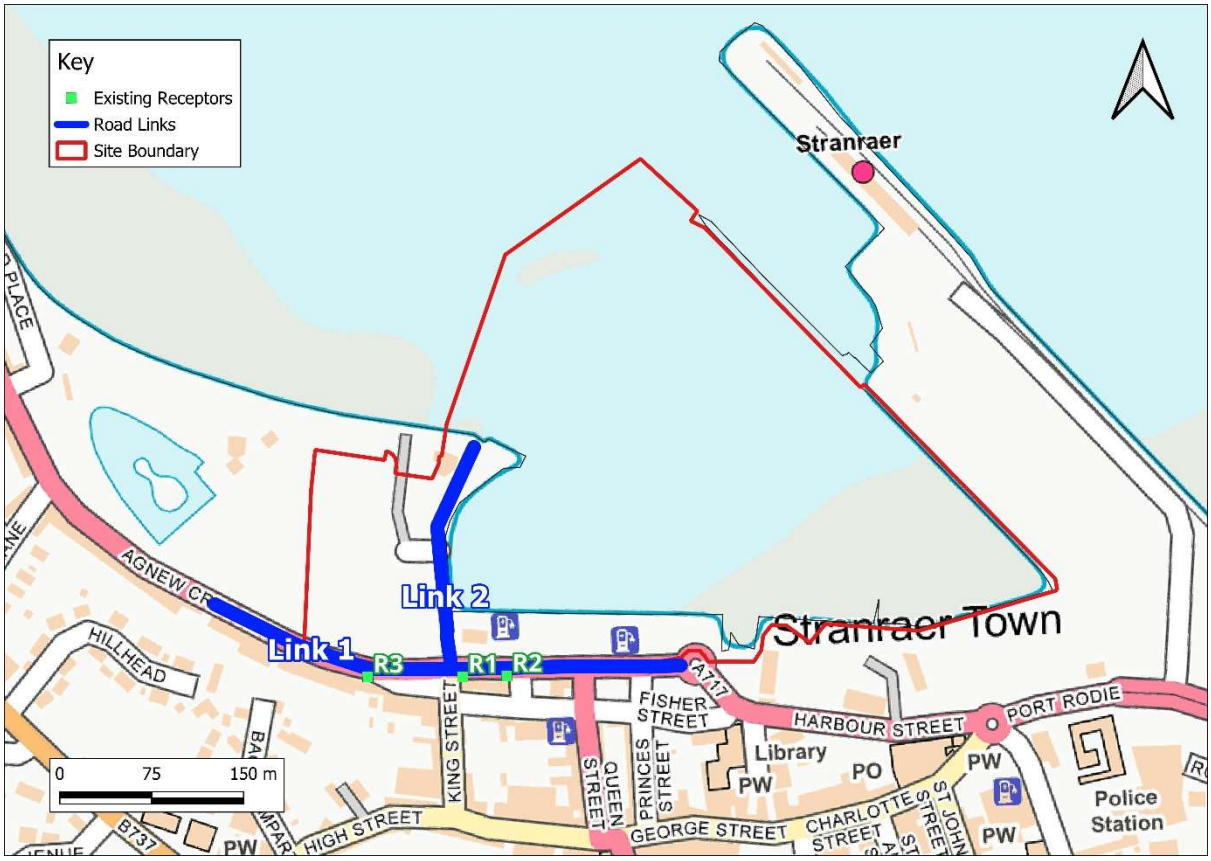

Figure 17.1: Modelled Road Links and Receptors

Table 17.3: Traffic Data Used Within the Assessment

Road Link ID	Road Link Name	Speed (km.hr^{-1})	Daily Two Way Vehicle Flow							
			Without Development (2026 Construction)		With Development (2026 Construction)		Without Development (2028 Operational)		With Development (2028 Operational)	
			Total Vehicles	HDVs	Total Vehicles	HDVs	Total Vehicles	HDVs	Total Vehicles	HDVs
1	Market Street	48	5994	443	6194	543	6409	421	6745	421
2	Harbour Access Road	24	101	25	301	125	53	1	53	1

Notes:
HDV = Heavy Duty Vehicle - vehicles greater than 3.5 t gross vehicle weight including buses

17.45 The average speed on each road has been reduced by 10 km.hr^{-1} (or to 20 km.hr^{-1} for roads where the AADT > 10,000) to take into account the possibility of slow-moving traffic near junctions and at roundabouts in accordance with LAQM.TG22.

17.46 Further road links along the wider network in Stranraer have been excluded from the modelling assessment as trip-generation along these links, as result of the proposed development, do not exceed the thresholds in the EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document during both the construction and operational phases (i.e. a change of more than 500 LDV 24-hour AADT or more than 100 HDV 24-hour AADT).

17.47 Furthermore, the trip-generation thresholds detailed within the IAQM 'A guide to the assessment of air quality impacts on designated nature conservation sites' document are not anticipated to be exceeded in-isolation or in-combination (i.e. in-combination with relevant committed development) for any roads on the local network (i.e. a change of more than 1,000 total 24-hour AADT or more than 200 HDV 24-hour AADT). On this basis, further assessment for designated habitat sites in the wider area (e.g. Auchrochar Wetlands SSSI and Loch of Inch and Torrs Warren SSSI / SPA / Ramsar) has been scoped out.

17.48 Regarding operational vessel movements, national air quality guidance (LAQM.TG22) gives the following criteria for port extensions leading to a likely increase in shipping activity:

- Are there more than 5,000 large shipping movements per year, with relevant exposure within 250m of the berths and main areas of manoeuvring: or
- Are there more than 15,000 large ship movements per year, with relevant exposure within 1km of these areas?

17.49 The project planners have advised that neither of the above criteria will be exceeded so an exceedance of the short-term objectives for NO_2, PM_{10} and SO_2 would not be expected. Consequently, vessel movements have not been considered further in this assessment.

Vehicle Emission Factors

17.50 The modelling has been undertaken using Defra's 2024 emission factor toolkit (version 13) which draws on emissions generated by the European Environment Agency (EEA) COPERT 5.8 emission calculation tool.

Meteorological Data

17.51 ADMS-Roads requires detailed meteorological data as an input. The most representative observing station for the region of the study area that supplies the data in the required format is West Freugh, approximately 8.1 km southeast of the Application Site. Meteorological data from that station in 2022 (supplemented by data from Dundrennan in 2022) have been used within the dispersion model. The wind rose is presented in **Figure 17.2**.

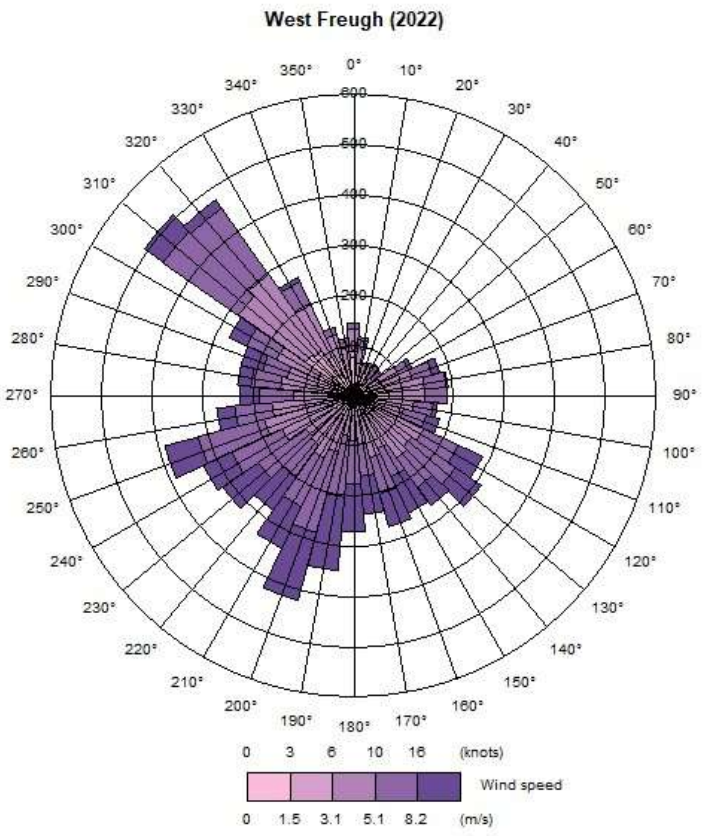

Figure 17.2: Wind Rose - West Freugh (2022)

Sensitivity of Receptor

17.52 The air quality assessment predicts the impacts at locations that could be sensitive to any changes. For assessing human-health impacts, such sensitive receptors should be selected

where the public is regularly present and likely to be exposed over the averaging period of the objective. LAQM.TG22 provides examples of exposure locations and these are summarised in

17.53 Table 17.4.

Table 17.4: Examples of Air Quality Objectives

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.
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, bus stations and railway stations etc which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations 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.

17.54 Representative sensitive receptors have been selected on the façades of the proposed development. Proposed receptors have been modelled at various heights. These are listed in Table 17.5 and shown in Figure 17.1.

Table 17.5: Modelled Sensitive Receptors

ID	Description	X	Y	Z
R1	Flats at corner of King Street and Market Street	205834	560986	1.5
R2	Residential property on Market Street	205870	560985	1.5
R3	Residential property on Agnew Crescent	205756	560988	1.5

17.55 Ecological receptors were screened out of the traffic assessment as there were no designated sites within 200 m of any modelled road links.

17.56 The annual, daily and hourly-mean AQS objectives apply at the façades of all residential properties. The approaches used to predict the concentrations for these different averaging periods are described below.

Magnitude of Impact

17.57 Annual-mean NOx and PM_{10} concentrations have been predicted at representative sensitive receptors using ADMS-Roads, then added to relevant background concentrations. Primary NO in the NO_X emissions is converted to NO_2 to a degree determined by the availability of atmospheric oxidants locally and the strength of sunlight. For road traffic sources, annual-mean NO_2 concentrations have been derived from the modelled road-related annual-mean NOx concentration using Defra's calculator[19].

17.58 In order to predict the likelihood of exceedances of the hourly-mean AQS objectives for NO_2 and the daily-mean AQS objective for PM_{10}, the following relationships between the short-term and the annual-mean values at each receptor have been considered.

17.59 Research undertaken in support of LAQM.TG22 has indicated that the hourly-mean limit value and objective for NO_2 is unlikely to be exceeded at a roadside location where the annual-mean NO_2 concentration is less than 60 $\mu g.m^{-3}$. The threshold of 60 $\mu g.m^{-3}$ NO_2 has been used as the guideline for considering a likely exceedance of the hourly-mean nitrogen dioxide objective.

17.60 The number of exceedances of the daily-mean AQS objective for PM_{10} of 50 $\mu g.m^{-3}$ may be estimated using the relationship set out in LAQM.TG22:

*"Number of Exceedances of Daily Mean of 50 $\mu g.m^{-3}$ = -18.5 + 0.00145 * (Predicted Annual-mean PM_{10})^3 + 206 / (Predicted Annual-mean PM_{10} Concentration)."*

[19] NOx to NO2 Calculator Available at: https://laqm.defra.gov.uk/air-quality/air-quality-assessment/nox-to-no2-calculator/

17.61 This relationship suggests that the daily-mean AQS objective for PM_{10} is likely to be met if the predicted annual-mean PM_{10} concentration is 22.4 $\mu g.m^{-3}$ or less.

17.62 The daily mean objective is not considered further within this assessment if the annual-mean PM_{10} concentration is predicted to be less than 22.0 $\mu g.m^{-3}$.

17.63 Transport PM_{10} emissions arise from both the tailpipe exhausts and from fugitive sources such as brake and tyre wear and re-suspended road dust. Improvements in vehicle technologies are reducing PM_{10} exhaust emissions; therefore, the relative importance of fugitive PM_{10} emissions is increasing. Current official vehicle emission factors for particulate matter include brake dust and tyre wear which studies suggest may account for approximately one-third of the total particulate emissions from road transport; but not re-suspended road dust (which remains unquantified).

Significance of Effect

17.64 The EPUK & IAQM Land-Use Planning & Development Control: Planning For Air Quality document advises that:

"The significance of the effects arising from the impacts on air quality will depend on a number of factors and will need to be considered alongside the benefits of the development in question. Development under current planning policy is required to be sustainable and the definition of this includes social and economic dimensions, as well as environmental. Development brings opportunities for reducing emissions at a wider level through the use of more efficient technologies and better designed buildings, which could well displace emissions elsewhere, even if they increase at the development site. Conversely, development can also have adverse consequences for air quality at a wider level through its effects on trip generation."

17.65 When describing the air quality impact at a sensitive receptor, the change in magnitude of the concentration should be considered in the context of the absolute concentration at the sensitive receptor. Table 17.6 provides the EPUK & IAQM approach for describing the long-term air quality impacts at sensitive human-health receptors in the surrounding area.

Table 17.6: Impact Descriptors for Individual Sensitive Receptors

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>10
75 % or less of AQAL	Negligible	Negligible	Slight	Moderate
76 - 94 % of AQAL	Negligible	Slight	Moderate	Moderate

Long term average concentration at receptor in assessment year	% Change in concentration relative to Air Quality Assessment Level			
	1	2-5	6-10	>10
95 - 102 % of AQAL	Slight	Moderate	Moderate	Substantial
103 - 109 % of AQAL	Moderate	Moderate	Substantial	Substantial
110 % or more of AQAL	Moderate	Substantial	Substantial	Substantial

1. AQAL = Air Quality Assessment Level, which may be an air quality objective, limit value, or an Environment Agency 'Environmental Assessment Level (EAL)'.

2. The table is intended to be used by rounding the change in percentage pollutant concentration to whole numbers, which then makes it clearer which cell the impact falls within. The user is encouraged to treat the numbers with recognition of their likely accuracy and not assume a false level of precision. Changes of 0%, i.e. less than 0.5% will be described as negligible.

3. The table is only designed to be used with annual mean concentrations.

4. Descriptors for individual receptors only; the overall significance is determined using professional judgement. For example, a 'moderate' adverse impact at one receptor may not mean that the overall impact has a significant effect. Other factors need to be considered.

5. When defining the concentration as a percentage of the AQAL, use the 'without scheme' concentration where there is a decrease in pollutant concentration and the 'with scheme;' concentration for an increase.

6. The total concentration categories reflect the degree of potential harm by reference to the AQAL value. At exposure less than 75% of this value, i.e. well below, the degree of harm is likely to be small. As the exposure approaches and exceeds the AQAL, the degree of harm increases. This change naturally becomes more important when the result is an exposure that is approximately equal to, or greater than the AQAL.

7. It is unwise to ascribe too much accuracy to incremental changes or background concentrations, and this is especially important when total concentrations are close to the AQAL. For a given year in the future, it is impossible to define the new total concentration without recognising the inherent uncertainty, which is why there is a category that has a range around the AQAL, rather than being exactly equal to it.

17.66 The human-health impact descriptors above apply at individual receptors. The EPUK & IAQM guidance states that the impact descriptors *"are not, of themselves, a clear and unambiguous guide to reaching a conclusion on significance. These impact descriptors are intended for application at a series of individual receptors. Whilst it maybe that there are 'slight', 'moderate' or 'substantial' impacts at one or more receptors, the overall effect may not necessarily be judged as being significant in some circumstances."*

Limitations to Assessment

17.67 All air quality assessment tools, whether models or monitoring measurements, have a degree of uncertainty associated with the results. The choices that the practitioner makes in setting-up the model, choosing the input data, and selecting the baseline monitoring data will decide whether the final predicted impact should be considered a central estimate, or an estimate tending towards the upper bounds of the uncertainty range (i.e. tending towards worst-case).

17.68 The atmospheric dispersion model itself contributes some of this uncertainty, due to it being a simplified version of the real situation: it uses a sophisticated set of mathematical equations to approximate the complex physical and chemical atmospheric processes taking place as a pollutant is released and as it travels to a receptor. The predictive ability of even the best model is limited by how well the turbulent nature of the atmosphere can be represented.

17.69 Each of the data inputs for the model, listed earlier, will also have some uncertainty associated with them. Where it has been necessary to make assumptions, these have mainly been made towards the upper end of the uncertainty range informed by an analysis of relevant, available data.

17.70 The atmospheric dispersion model used for this assessment, ADMS Roads, has been validated by its supplier and is widely used by professionals in the UK and overseas. A site-specific verification (calibration) provides additional certainty and is particularly important when air quality levels are close to exceeding the objectives/limit values.

17.71 LAQM.TG22 requires that local authorities verify the results of any detailed modelling undertaken for the purposes of fulfilling their R&A duties. Model verification refers to the checks that are carried out on model performance at a local level. Modelled concentrations are compared with the results of monitoring. Where there is a disparity between modelled and monitored concentrations, the first step is to review the appropriateness of the data inputs to determine whether the performance of the model can be improved. Once reasonable efforts have been made to reduce the uncertainties in the data inputs, an adjustment may be established and applied to reduce any remaining disparity between modelled and monitored concentrations. No adjustment factor is deemed necessary where the modelled concentrations are within 25% of the monitored concentrations.

17.72 For the verification and adjustment of NOx/NO_2 concentrations for R&A purposes, it is recommended that the comparison involves a combination of automatic and diffusion monitoring, rather than a single automatic monitor. This is to ensure any adjustment factor derived is representative of all locations modelled and not unduly weighted towards the characteristics at a single site. Where only diffusion tubes are used for the model verification, the study should consider a broad spread of monitoring locations across the study area to provide sufficient information relating to the spatial variation in pollutant concentrations.

17.73 Local Authorities generally implement a broad spread of monitoring, particularly in areas that are known to be sensitive to changes in air quality. Consequently, Local Authorities are usually able to verify the models they use for R&A purposes; however for individual developments, there is less likely to be a broad range of monitoring locations within the relevant study area. Notwithstanding this, a monitoring location has been identified within the study area and a model verification study has been undertaken for the proposed development and is included at **Appendix 17.2** (**Volume 2**).

17.74 The main components of uncertainty in the total predicted concentrations, made up of the background concentration and the modelled fraction, include those summarised in **Table 17.7**.

Table 17.7: Approaches to Dealing with Uncertainty used Within the Assessment

Concentration	Source of Uncertainty	Approach to Dealing with Uncertainty	Comments
Background Concentration	Characterisation of current baseline air quality conditions	The background concentration used within the assessment is the most conservative value from a comparison of measured and Defra mapped concentration estimate	The background concentration is the major proportion of the total predicted concentration.
	Characterisation of future baseline air quality (i.e. the air quality conditions in the future assuming that the development does not proceed)	The future background concentration used in the assessment is the same as the current background concentration and no reduction has been assumed. This is a conservative assumption as, in reality, background concentrations are likely to reduce over time as cleaner vehicle technologies form an increasing proportion of the fleet.	The conservative assumptions adopted ensure that the background concentration used within the model contributes to the result being towards the top of the uncertainty range, rather than a central estimate.
Fraction from Modelled Sources	Traffic flow estimates	Traffic flows provided have all been based on traffic counts, rather than flows derived from a traffic model.	The modelled fraction is a minor proportion of the total predicted concentration.
	Traffic speed estimates	The average speed has been reduced in congested areas to take account of slow-moving and queuing traffic.	The modelled fraction is likely to contribute to the result being between a central estimate and the top of the uncertainty range.
	Road-related emission factors – projection to future years	The most recently published emission factors have been used within the modelling and these are based on the current and best understanding of the variation in emission factors in future years.	
	Meteorological Data	Uncertainties arise from any differences between the conditions at the met station and the development site, and between the historical met years and the future years. These have been minimised by using	

		meteorological data collated at a representative measuring site. The model has been run for a full year of meteorological conditions. This means that the conditions in 8,760 hours have been considered in the assessment.	
	Receptors	Receptor locations have been identified where concentrations are highest or where the greatest changes are expected.	
	Dispersion Modelling	The model predictions have been compared with monitored concentrations. The model outputs have been adjusted accordingly.	

17.75 The analysis of the component uncertainties indicates that, overall, the predicted total concentration is likely to be towards the top of the uncertainty range rather than being a central estimate. The actual concentrations that will be found when the development is operational are unlikely to be higher than those presented within this report and are more likely to be lower.

Baseline Conditions

Local Background Monitoring

17.76 As described in Paragraph 17.28, the background air quality has been determined through a comparison of Scottish Air Quality Database background maps and the published results of local authority Review and Assessment (R&A) studies.

17.77 There is one local monitoring station where concentrations are measured using continuous automatic instruments. DGC monitors NO_2 at the Eskdalemuir rural location. The most recently measured annual-mean concentration is presented in Table 17.8.

Table 17.8: Automatically Monitored Rural Annual-Mean NO_2 Concentrations

Monitor Name	Site Type	Approximate Distance from the Application Site (km)	Most Recent Concentration (2021) ($\mu g.m^{-3}$)
Eskdalemuir	Rural	125	1.6

17.78 Additionally, DGC manually monitors NO_2 concentrations at an urban background location using passive diffusion tubes and the most recently measured annual-mean concentration is presented in Table 17.9.

Table 17.9: Passively Monitored Background Annual-Mean NO_2 Concentrations

Site Name	Site Type	Approximate Distance from the Application Site (km)	Most Recent Concentration (2022) ($\mu g.m^{-3}$)
Argyll Drive	Urban Background	95	6.8

17.79 As both monitors are located over 90 km from the Site, it would not be considered appropriate to use either monitor to represent the air quality conditions at the Site. The locations of both monitors are shown in Figure 17.3.

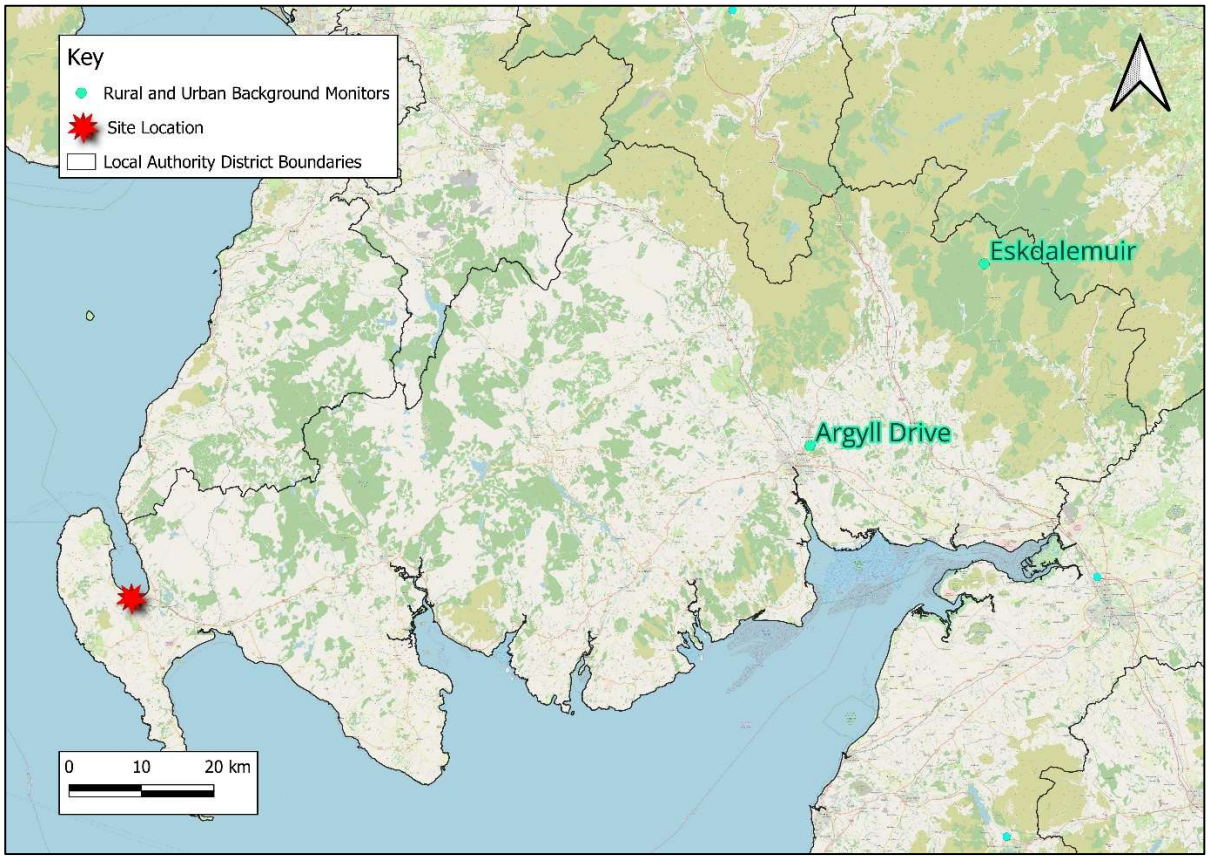

Figure 17.3: Rural and Urban Background Monitoring

Appropriate Background Concentrations for the Development Site

17.80 In the absence of urban background NO_2, PM_{10} and $PM_{2.5}$ monitoring close to the site, the background annual-mean concentrations for NO_2 and PM_{10} at the Site has been derived from the Scottish Air Quality Database mapped background concentration estimates. As the Scottish

Air Quality Database does not model $PM_{2.5}$, the Scottish Government advises that the Defra UK wide background maps be used to estimate the background concentration of $PM_{2.5}$.

17.81 Historically the view has been that background traffic-related NO_2 concentrations in the UK would reduce over time, due to the progressive introduction of improved vehicle technologies and increasingly stringent limits on emissions. After a prolonged period through the last decade where background annual-mean NO_2 concentrations did not generally decrease in line with expectations, the most recent monitoring studies indicate ambient traffic-related NO_2 concentrations are now falling. To ensure that the assessment presents conservative results, no reduction in the background has been applied for future years.

17.82 Table 17.10 summarises the annual-mean background concentrations for NO_2, PM_{10} and $PM_{2.5}$ used in this assessment. These concentrations comprise the highest values for the grid squares which contain the both the Site and the receptors considered within the traffic emissions modelling assessment study area.

Table 17.10: Summary of Background Annual-Mean (Long-term) Concentrations used in the Assessment

Pollutant	Data Source	Concentration (µg.m^{-3})
NO_2	Scottish Air Quality Database (2025)	3.8
PM_{10}	Scottish Air Quality Database (2025)	8.8
$PM_{2.5}$	Defra Background Maps (2025)	3.8

Impact Assessment

Embedded Mitigation

17.83 Mitigation implemented in the design of the development includes consideration of the separation distance between the proposed marina extension and existing receptors.

Construction Phase Dust and Particulate Matter

Construction Dust and Particulate Matter

17.84 This construction dust assessment has considered the risk of dust impacts associated with the following broad activities: demolition, earthworks, construction, and trackout, in accordance with IAQM guidance. The specific key construction activities associated with the proposed development are described in Chapter 2: Project Description. It should be noted that consideration of dredging vessel activities has been screened out of the construction dust assessment as they are assumed to operate entirely on water surfaces which act as natural dust suppression.

17.85 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.

17.86 The main effect of any dust emissions, 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 the 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”. Note that where dust mitigation measures are required, above those recommended by IAQM guidance, for specific construction activities these measures will be included with the Dust Management Plan and Construction Environmental Management Plan in accordance with the recommendations of the appointed contractor.

Risk of Dust Impacts (Source)

17.87 No buildings will be demolished as part of the project so demolition has not been considered further within this chapter.

17.88 The site area is approximately 140,000 m^2 of which approximately 30,000 m^2 is located on land. Given that the works carried out in water are not predicted to generate significant levels of suspended dust, the figure of 30,000 m^2 has been used. As this is between 18,000 and 110,000 m^2, the dust emission magnitude for the earthworks phase is classified as medium.

17.89 The total volume of the buildings to be constructed is estimated to be between 12,000 and 75,000 m^3 and the dust emission magnitude for the construction phase is classified as medium.

17.90 Assuming that the maximum number of outwards movements in any one day is greater than 50 HDVs, the dust emission magnitude for trackout would be classified as large.

Table 17.11: Dust Emission Magnitude for Demolition, Earthworks, Construction and Trackout

Earthworks	Construction	Trackout
Medium	Medium	Large

17.91 These descriptors deviate from EIA terminology and instead borrow from IAQM's *'Guidance on the assessment of dust from demolition and construction'* specific to air quality. The definitions are provided within Appendix 17.1.

Pathway and Receptor – Sensitivity of the Area

17.92 All demolition, earthworks and construction activities are assumed to occur within the site boundary. As such, receptors at distances within 20 m, 50 m, 100 m and 250 m of the site boundary have been identified and are illustrated in Figure 17.4.

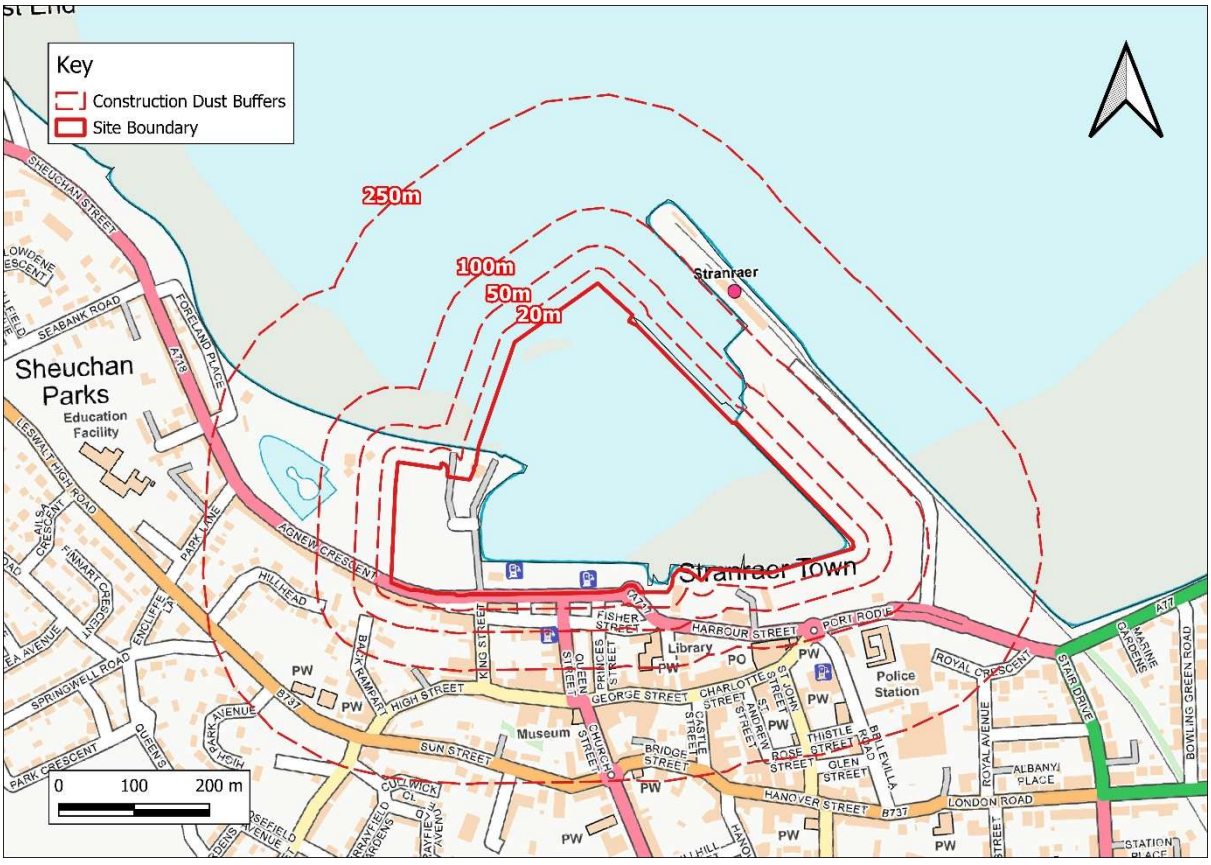

Figure 17.4: Construction Dust Buffers

17.93 The sensitivity of the area has been classified and the results are provided in Table 17.12 below.

Table 17.12: Sensitivity of the Surrounding Area for Earthworks and Construction

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	High	Between 10 - 20 residential properties on Agnew Crescent and Market Street to the south of the site. 10 – 100 high sensitivity receptors located within 20 m of the site boundary.
Human Health	Low	Between 10 - 20 residential properties on Agnew Crescent and Market Street to the south of the site. Background PM_{10} concentrations for the assessment = 8.8 $\mu g.m^{-3}$ 10 – 100 high sensitivity receptors located within 20 m of the site boundary and PM_{10} concentrations below 14 $\mu g.m^{-3}$.

17.94 The Dust Emission Magnitude for trackout is classified as large and trackout may occur on roads up to 250 m from the site. The major routes within 250 m of the site are Market Street and Harbour Access Road. The sensitivity of the area has been classified and the results are provided in Table 17.13.

Table 17.13: Sensitivity of the Surrounding Area for Trackout

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
Dust Soiling	High	Between 10 - 100 residential properties aligning Agnew Crescent and Market Street to the south of the site. 10 – 100 high sensitivity receptors located within 20 m of the site boundary.
Human Health	Low	Between 10 - 100 residential properties aligning Agnew Crescent and Market Street to the south of the site. Background PM_{10} concentrations for the assessment = 8.8 $\mu g.m^{-3}$

Potential Impact	Sensitivity of the Surrounding Area	Reason for Sensitivity Classification
		10 – 100 high sensitivity receptors located within 20 m of the site boundary and PM_{10} concentrations below 14 $\mu g.m^{-3}$.

Overall Dust Risk

17.95 The Dust Emission Magnitude has been considered in the context of the Sensitivity of the Area (**Appendix 17.1**) to give the Dust Impact Risk. Table 17.14 summarises the Dust Impact Risk for the four activities.

Table 17.14: Dust Impact Risk for Demolition, Earthworks, Construction and Trackout

Source	Earthworks	Construction	Trackout
Dust Soling	Medium	Medium	Medium
Human Health	Low	Low	Low
Risk	Medium	Medium	Medium

17.96 Taking the site as a whole, the overall risk is deemed to be medium. The mitigation measures appropriate to a level of risk for the site as a whole and for each of the activities are set out above in Paragraph 17.130 on embedded mitigation.

Construction Non-Road Mobile Machinery Emissions

17.97 Non-Road Mobile Machinery (NRMM) refers to mobile machines, transportable industrial equipment or vehicles which are fitted with an internal combustion engine and not intended for transporting goods or passengers on roads. Where NRMM is employed, the pollutants of concern for local air quality are NO_2 and particulate matter (i.e. PM_{10} and $PM_{2.5}$).

17.98 LAQM.TG(22) states that *"experience of assessing the exhaust emissions from on-site plant (NRMM) and site traffic suggests that, with suitable controls and site management, they are unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed …".*

17.99 On the basis of the above, providing that suitable measures are put in place for the operation of NRMM (as outlined within Paragraph 17.130) it is considered that NRMM emissions on local air quality would likely be 'insignificant' and have not been considered further within this assessment.

Operational Phase and Construction Phase Traffic Emissions

17.100 The EPUK & IAQM Land-Use Planning & Development Control: Planning for Air Quality document provides the following threshold criteria for determining when an air quality assessment should be undertaken for sites outside an AQMA:

- An increase in annual average daily Light Duty Vehicle (LDV) flows by more than 500; or
- An increase in annual average daily HDV flows by more than 100.

17.101 Although no roads are expected to exceed any of the threshold criteria, Market Street and Harbour Access Road have been modelled in the anticipated first-year of construction, 2026, and first-year of operation, 2028, to evaluate the worst-case impacts associated with the proposals.

17.102 The trip-generation thresholds detailed within the IAQM *'A guide to the assessment of air quality impacts on designated nature conservation sites'* document are not anticipated to be exceeded in-isolation or in-combination (i.e. in-combination with relevant committed development) for any roads on the local network (i.e. a change of more than 1,000 total 24-hour AADT or more than 200 HDV 24-hour AADT). On this basis, further assessment for designated habitat sites in the wider area (e.g. Auchrochar Wetlands SSSI and Loch of Inch and Torrs Warren SSSI / SPA / Ramsar) has been scoped out.

Construction-Phase Traffic

Nitrogen Dioxide (NO_2)

17.103 Table 17.15 presents the annual-mean NO_2 concentrations predicted at the façades of existing receptors during the construction-phase.

Table 17.15: Predicted Annual-Mean NO_2 Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	13.9	14.8	2	Negligible
R2	13.6	14.3	2	Negligible
R3	12.8	13.4	2	Negligible
Maximum	**13.9**	**14.8**	**2**	-
Minimum	**12.8**	**13.4**	**2**	-

17.104 Predicted annual-mean NO_2 concentrations in the opening year at the façades of the existing receptors are below the AQS objective for NO_2. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.105 As all predicted annual-mean NO_2 concentrations are below 60 $\mu g.m^{-3}$, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

17.106 Overall, the impact on the surrounding area from NO_2 is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Particulate Matter (PM_{10})

17.107 Table 17.16 presents the annual-mean PM_{10} concentrations predicted at the façades of existing receptors during the construction-phase.

Table 17.16: Predicted Annual-Mean PM_{10} Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	12.7	13.0	2	Negligible
R2	12.6	12.9	1	Negligible
R3	12.3	12.5	1	Negligible
Maximum	**12.7**	**13.0**	**2**	**-**
Minimum	**12.3**	**12.5**	**1**	**-**

17.108 Predicted annual-mean PM_{10} concentrations in the opening year at the façades of the existing receptors are below the AQS objective for PM_{10}. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.109 As all predicted annual mean PM_{10} concentrations are below 22.0 $\mu g.m^{-3}$, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

17.110 Overall, the impact on the surrounding area from PM_{10} is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Fine Particulate Matter ($PM_{2.5}$)

17.111 Table 17.17 presents the annual-mean $PM_{2.5}$ concentrations predicted at the façades of existing receptors during the construction-phase.

Table 17.17: Predicted Annual-Mean $PM_{2.5}$ Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	5.8	6.0	2	Negligible
R2	5.8	5.9	1	Negligible
R3	5.6	5.7	1	Negligible
Maximum	**5.8**	**6.0**	**1**	**-**
Minimum	**5.6**	**5.7**	**1**	**-**

17.112 Predicted annual-mean $PM_{2.5}$ concentrations in the opening year at the façades of the existing receptors are below the AQS objective for $PM_{2.5}$. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.113 Overall, the impact on the surrounding area from $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Operational-Phase Traffic

Nitrogen Dioxide (NO_2)

17.114 Table 17.18 presents the annual-mean NO_2 concentrations predicted at the façades of existing receptors during the operational-phase.

Table 17.18: Predicted Annual-Mean NO_2 Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	12.0	12.1	<1	Negligible
R2	11.8	11.9	<1	Negligible
R3	11.1	11.2	<1	Negligible

Receptor ID	Concentration (µg.m^{-3})		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
Maximum	**12.0**	**12.1**	**<1**	**-**
Minimum	**11.1**	**11.2**	**<1**	**-**

17.115 Predicted annual-mean NO_2 concentrations in the opening year at the façades of the existing receptors are below the AQS objective for NO_2. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.116 As all predicted annual-mean NO_2 concentrations are below 60 µg.m^{-3}, the hourly-mean objective for NO_2 is likely to be met at all receptors. The short-term NO_2 impact can be considered 'negligible' and is not considered further within this assessment.

17.117 Overall, the impact on the surrounding area from NO_2 is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Particulate Matter (PM_{10})

17.118 Table 17.19 presents the annual-mean PM_{10} concentrations predicted at the façades of existing receptors during the operational-phase.

Table 17.19: Predicted Annual-Mean PM_{10} Impacts at Existing Receptors

Receptor ID	Concentration (µg.m^{-3})		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	12.8	12.8	<1	Negligible
R2	12.7	12.7	<1	Negligible
R3	12.3	12.4	<1	Negligible
Maximum	**12.8**	**12.8**	**<1**	-
Minimum	**12.3**	**12.4**	**<1**	-

17.119 Predicted annual-mean PM_{10} concentrations in the opening year at the façades of the existing receptors are below the AQS objective for PM_{10}. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.120 As all predicted annual mean PM_{10} concentrations are below 22.0 $\mu g.m^{-3}$, the daily-mean PM_{10} objective is expected to be met at all receptors and the short-term PM_{10} impact is not considered further within this assessment.

17.121 Overall, the impact on the surrounding area from PM_{10} is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Fine Particulate Matter ($PM_{2.5}$)

17.122 Table 17.20 presents the annual-mean $PM_{2.5}$ concentrations predicted at the façades of existing receptors during the operational-phase.

Table 17.20: Predicted Annual-Mean $PM_{2.5}$ Impacts at Existing Receptors

Receptor ID	Concentration ($\mu g.m^{-3}$)		With – Without Dev as % of the AQS Objective	Impact Descriptor
	Without Development	With Development		
R1	5.9	5.9	<1	Negligible
R2	5.8	5.8	<1	Negligible
R3	5.6	5.7	<1	Negligible
Maximum	**5.9**	**5.9**	**<1**	**-**
Minimum	**5.6**	**5.7**	**<1**	**-**

17.123 Predicted annual-mean $PM_{2.5}$ concentrations in the opening year at the façades of the existing receptors are below the AQS objective for $PM_{2.5}$. When the magnitude of change is considered in the context of the absolute concentrations, the impact descriptor is categorised as 'negligible' at all receptors.

17.124 Overall, the impact on the surrounding area from $PM_{2.5}$ is considered to be 'negligible', using the criteria adopted for this assessment and based on professional judgement.

Summary of Results

17.125 Table 17.21 summarises the results of the previous sections at each receptor.

Table 17.21: Summary of Magnitudes of Impact

Receptor	Construction Phase			Operational Phase		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

17.126 The results of the modelling indicate that with the development, the predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations at existing receptors are below the relevant long and short-term AQS objectives. When the magnitude of change in annual-mean NO_2, PM_{10} and $PM_{2.5}$ concentrations is considered in the context of the absolute predictions, the air quality impacts of the development on existing receptors are categorised as 'negligible'. Taking into account the geographical extent of the impacts predicted in this study, the overall impact of the development on the surrounding area as a whole is considered to be 'negligible', using the descriptors adopted for this assessment.

17.127 Using professional judgement, the resulting air quality effect is considered to be 'not significant' overall.

Do Nothing Scenario

17.128 A *Do Nothing* scenario is presented in Table 17.15 to Table 17.20 under the without development scenario concentrations for the construction and operational phase. All scenarios above factor in the baseline concentrations of the pollutants from Table 17.10. Given the historic trend of background traffic-related NO_2 concentrations decreasing over time as described in Paragraph 17.81, it is expected that in the *Do Nothing* scenario, the actual concentrations will be lower than those presented in Table 17.15 to Table 17.20.

Mitigation, Monitoring and Residual Effects

Mitigation / Monitoring

17.129 The IAQM dust guidance lists mitigation measures for low, medium and high dust risks.

17.130 As later summarised in Table 17.14, the predicted Dust Impact Risk is classified as medium for construction, earthworks and trackout. The general site measures described as 'highly recommended' for medium risks are listed below. There are no 'highly recommended' measures for medium risk earthworks.

Communications

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

Dust Management Plan

- 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. The DMP may include monitoring of dust.

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off- site, and the action taken to resolve the situation in the log book.

Monitoring

- Carry out regular dust soiling checks of surfaces such as street furniture, cars and window-sills within 100 m of site boundary.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.

- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. A shorter monitoring period or concurrent upwind and downwind monitoring may be agreed by the local authority. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction[20].

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. Use screening intelligently where possible – e.g. locating site offices between potentially dusty activities and the receptors.
- Erect solid screens or barriers around the site boundary.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extended period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
- Depending on the duration that stockpiles will be present and their size - cover, seed, fence or water to prevent wind whipping.

Operating Vehicle/machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary – no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

Operations

- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.
- Use enclosed chutes, conveyors and covered skips, where practicable.

[20] IAQM, 2012, Air Quality Monitoring in the Vicinity of Demolition and Construction Sites

- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- 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.

Waste Management

- Avoid bonfires and burning of waste materials.

Medium Risk Measures Specific to 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.

Medium Risk Measures Specific to Trackout

- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as soon as practicable any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

17.131 No further mitigation or monitoring is recommended to address the potential impacts identified above, barring the measures outlined below for NRMM. Note that where dust mitigation measures are required, above those recommended by IAQM guidance (as outlined above), for specific construction activities these measures will be included with the Dust Management Plan and Construction Environmental Management Plan in accordance with the recommendations of the appointed contractor.

Residual Effects

Construction

17.132 Provided the package of mitigation measures is implemented, the residual construction dust effects will not be significant. 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.

17.133 Given that change in concentration at existing sensitive receptors as a whole is categorised as "negligible", using professional judgement, the overall residual air quality effect during the construction phase is considered to be "not significant".

17.134 It is considered that NRMM emissions on local air quality would likely be 'insignificant' on the basis that the following measures are adopted:

- Ensure all equipment complies with appropriate NRMM standards;
- Where feasible, ensure further abatement plant is installed on NRMM equipment, e.g. Diesel Particulate Filters;
- Ensure all vehicles switch off engines when stationary – no idling vehicles;
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where possible; and
- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).

Operation

17.135 Given that change in concentration at existing sensitive receptors as a whole is categorised as "negligible", using professional judgement, the overall residual air quality effect during the operational phase is considered to be "not significant".

Cumulative Effects

17.136 During the construction phase, there is the potential for cumulative dust effects with other foreseeable projects which overlap with the proposed development's study area. However, with the effective implementation of appropriate mitigation measures at all sites, the risk of cumulative dust effects is minimal and as a result no significant effects are anticipated during

the construction phase. Cumulative dust effects are assessed as 'negligible' and "not significant".

17.137 For the construction and operational phase traffic, cumulative effects have been explicitly considered within the traffic flows provided by the project's traffic consultants. Specifically, the cumulative effects associated with consented developments and schemes awaiting determination. Details are contained in the EIA Traffic chapter and the traffic note *'161379_GL_T_TN01.3 Stranraer Marina Air and Noise Calculations 20250402'* (see Appendix 17.4). It is to be noted that in addition to the developments listed within the traffic note, planning application 24/1407/FUL has also been accounted for in the final traffic flows in Appendix 17.3.

Summary and Conclusions

17.138 This chapter considers the air quality impacts from the construction phase and once the proposed development is fully operational. The construction phase assessment considers dust, covering both the PM_{10} fraction that is suspended in the air that can be breathed, and the deposited dust[21] that has fallen out of the air onto surfaces and which can potentially cause temporary annoyance effects. The effects of nitrogen dioxide (NO_2), and particulate matter (PM_{10}, and $PM_{2.5}$) are considered in both the construction and operational phases as these are the main pollutants from road traffic.

Baseline

17.139 The background concentrations were drawn from Scotland's Air Quality Database background maps, Defra maps, and the published results of local authority Review and Assessment studies of air quality. No reduction has been assumed for the future baseline.

Construction

17.140 For the construction phase, the most important consideration is dust. Without appropriate mitigation, dust could cause temporary soiling of surfaces, particularly windows, cars, and laundry. The embedded mitigation measures provided within this chapter should ensure that the risk of adverse dust effects is reduced to a level categorised as "not significant".

17.141 The impacts of Non-Road Mobile Machinery are unlikely to have a significant impact on local air quality, providing that suitable mitigation measures are adopted (as outlined within the Chapter).

17.142 The impact of construction traffic on the surrounding area has been assessed by means of detailed atmospheric dispersion modelling. Modelling was undertaken for the first year in which the construction activities are expected to be fully operational, 2026. The construction traffic impact of the proposed development on existing receptors in the local area is predicted to be 'negligible' taking into account the changes in pollutant concentrations and absolute levels. Using the criteria adopted for this assessment together with professional judgement, the overall impact on the area as a whole is described as 'negligible'.

Operation

17.143 Regarding the operational impact of the proposed development on the surrounding area, detailed atmospheric dispersion modelling has been undertaken for the first year in which the development is expected to be fully operational, 2028. The operational impact of the proposed development on existing receptors in the local area is predicted to be 'negligible' taking into account the changes in pollutant concentrations and absolute levels. Using the criteria adopted

[21] Dust that has settled out onto a surface after having been suspended in air

for this assessment together with professional judgement, the overall impact on the area as a whole is described as 'negligible'.

17.144 Shipping movements as a result of the proposed development are not expected to exceed the screening thresholds provided in LAQM.TG22. Therefore, further consideration of shipping emissions have been scoped out.

Mitigation and Monitoring

17.145 No further mitigation or monitoring are recommended beyond the measures for the construction phase to address the potential dust impacts identified above, with the exception of measures recommended to reduce emissions from Non-Road Mobile Machinery usage during the construction phase.