Technical Appendices 15.1-15.3: Air Quality Technical Appendices

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Technical Appendix 15.1: Legislation, Policy and Guidance

National Legislation and Policy

National Planning Policy Framework

The revised National Planning Policy Framework (NPPF)[1] sets out the Government's planning policies for England and how they are expected to be applied. In relation to achieving sustainable development, paragraph 8 states that:

"Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

c) an environmental objective – to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."

So that sustainable development is pursued in a positive way, at the heart of the Framework is a presumption in favour of sustainable development. Paragraph 11 states that plans and decisions should apply a presumption in favour of sustainable development, which for decision-taking means:

"… d) where there are no relevant development plan policies, or the policies which are most important for determining the application are out-of-date, granting permission unless: …

ii. any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole."

Paragraph 56 on planning conditions and obligations states:

"Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations. Planning obligations should only be used where it is not possible to address unacceptable impacts through a planning condition."

Paragraph 108 on promoting sustainable transport states:

"Transport issues should be considered from the earliest stages of plan-making and development proposals, so that: …

d) the environmental impacts of traffic and transport infrastructure can be identified, assessed and taken into account – including appropriate opportunities for avoiding and mitigating any adverse effects, and for net environmental gains; …"

Paragraph 110 continues to state:

"Significant development should be focused on locations which are or can be made sustainable, through limiting the need to travel and offering a genuine choice of transport modes. This can help to reduce congestion and emissions, and improve air quality and public health."

Paragraph 187 on conserving and enhancing the natural environment states:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and…"

Paragraph 198 within ground conditions and pollution states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development."

Paragraph 199 states that:

"Planning policies and decisions should sustain and contribute towards compliance with relevant limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and Clean Air Zones, and the cumulative impacts from individual sites in local areas. Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications. Planning decisions should ensure that any new development in Air Quality Management Areas and Clean Air Zones is consistent with the local air quality action plan."

Paragraph 200 states that:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

Part IV of the Environment Act 1995

The Environment Act[2] sets a target for annual mean PM2.5 concentrations as well as a long-term target for air quality. The targets are:

- An annual mean concentration target of 10 µg/m^3 to be met across England by 2040; and
- A Population Exposure Reduction target of a 35 % reduction in population exposure by 2040 compared to a base year of 2018.

Local Air Quality Management

Part IV of the Environment Act 1995[3] requires the UK Government to publish an Air Quality Strategy and local authorities to review, assess and manage air quality within their areas. This is known as Local Air Quality Management (LAQM).

The 2007 Air Quality Strategy[4] establishes the policy for ambient air quality in the UK. It includes the National Air Quality Objectives (NAQOs) for the protection of human health and vegetation for 11 pollutants. Those NAQOs included as part of LAQM are prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (Amendment) (England) Regulations 2002.

Local authorities are not required to achieve the NAQO but have to demonstrate effort of working towards their achievement. Where a local authority's review and assessment of its air quality identifies that air quality is likely to exceed the NAQOs, it must designate these areas as AQMAs and draw up an Air Quality Action Plan (AQAP) setting out measures to reduce pollutant concentrations with the aim of meeting the NAQOs.

The 2007 Air Quality Strategy also introduced a new policy framework for tackling $PM_{2.5}$ which included an exposure reduction target and a 'backstop' annual mean NAQO. The exposure reduction target is focussed on reducing average concentrations across the most polluted urban areas and is therefore not applicable to individual schemes, whilst the annual mean NAQO can be considered a concentration cap to ensure environmental compliance. The UK NAQO for $PM_{2.5}$ are provided in Table A15.1.1.

Table A15.1.1: UK Objectives for $PM_{2.5}$

Averaging Period	Objective	Target Date
Annual mean	20 µg/m^3	2020
3 year running annual mean	15 % reduction in concentrations measured at urban background sites	Between 2010 and 2020

[1] Department for Levelling Up, Housing and Communities, 2024. National planning Policy Framework.
[2] Secretary of State, 2021. The Environment Act 2021.
[3] Secretary of State, 1995. The Environment Act part IV Air Quality.
[4] Defra, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

Clean Air Strategy

Defra published a new Clean Air Strategy 2019[5] in January 2019, setting out how the UK will significantly reduce harmful air pollutant emissions by 2020 and 2030.

The Clean Air Strategy contains an intention of working towards the 2005 World Health Organisation (WHO) guideline value for $PM_{2.5}$ of 10 µg/m^3.

Regional Policy

Cornwall Local Plan, 2026

The Cornwall Local Plan[6] sets out the planning approach and policies for Cornwall up to 2030 to help deliver the sustainable community strategy.

Policy 13: Development Standards states:

All new development will be expected to achieve the provision of the following: …

Avoidance of adverse impacts, either individually or cumulatively, resulting from noise, dust, odour, vibration, vermin, waste, pollution and visual effects. Such adverse impacts should be avoided or mitigated during the construction, operation or restoration stage of development; …

Policy 16: Health and Wellbeing states:

"To improve the health and wellbeing of Cornwall's communities, residents, workers and visitors, development should:

1. Protect, and alleviate risk to, people and the environment from unsafe, unhealthy and polluted environments by avoiding or mitigating against harmful impacts and health risks such as air and noise pollution and water and land contamination and potential hazards afforded from future climate change impacts; and
2. Where it affects Air Quality Management Areas, demonstrate that singularly or cumulatively, it will not cause increased risk to human health from air pollution or exceeding EU standards. Measures proposed to mitigate this should reflect Cornwall's Air Quality Action Plan and Local Transport Plan and aimed at achieving reductions in pollutant emissions and public exposure; and
3. Maximise the opportunity for physical activity through the use of open space, indoor and outdoor sports and leisure facilities and providing or enhancing active travel networks that support and encourage walking, riding and cycling; and
4. Provide easy, safe and secure storage for cycles and other recreational equipment; and
5. Encourage provision for growing local food in private gardens which are large enough to accommodate vegetable growing or greenhouses or through the provision of allotments; and
6. Provide flexible community open spaces that can be adapted to the health needs of the community and encourage social interaction."

Cornwall Air Quality Action Plan, 2020

The Cornwall Air Quality Action Plan[7] outlines actions across Cornwall to improve local air quality, with a particular focus on air quality management areas. Actions include, but are not limited to:

- Promote awareness of air quality issues and sustainable travel;
- Embed Air Quality Management within the development control process;
- Develop and monitor Travel Plans;
- Improve the walking and cycling network;
- Require electric charging points to be installed in new developments;
- Implement standards for the control of dust and vehicle emissions from large construction sites.

Chief Planning Officer's Advice Note: Planning for Air Quality

The Chief Planning Officer's Advice Note: Planning for Air Quality[8] provides guidance on planning decisions relating to air quality. An air quality assessment is required for developments including:

- Schemes of over 50 dwellings, or a large commercial proposal (with 50+ parking spaces) within, or up to 1km of, an AQMA or Area of Concern, and
- All schemes in excess of 200 dwellings, 300 parking spaces, and also Short Term Operating Reserve (STOR) energy facilities (diesel generators) or largescale industrial uses in any location.

Where moderate or substantial adverse impacts are identified, appropriate mitigation such as electric car charging points or car clubs should be implemented.

National Guidance and Industry Standards

Planning Practice Guidance (PPG)

The Planning Practice Guidance (PPG)[9] was launched as an online resource in March 2014 to support the NPPF and has separate guidance on air quality. Paragraph 001, Reference 32-001-20191101 06 (revision date 1 November 2019) of the PPG provides the following summary as to why air quality is a consideration for planning:

"… It is important that the potential impact of new development on air quality is taken into account in planning where the national assessment indicates that relevant limits have been exceeded or are near the limit, or where the need for emissions reductions has been identified."

The PPG identifies when air quality could be relevant for a development management process, provides guidance on how detailed an assessment needs to be and provides guidance on how an impact on air quality can be mitigated.

Local Air Quality Management Technical Guidance, 2022 (LAQM.TG(22))

LAQM.TG(22)[10] provides advice as to where the NAQOs apply and support to local authorities in carrying out their duties under the Environment Act 1995 and subsequent regulations.

Environmental Protection UK (EPUK)/Institute of Air Quality Management Guidance (IAQM), Land-Use Planning Guidance, 2017

EPUK, together with the IAQM, produced updated guidance in 2017[11] on how air quality impacts should be assessed within the land-use planning and development control process. This guidance provides clear criteria to determine when a detailed air quality assessment is required and a methodology for assessing the significance of air quality effects.

IAQM guidance on the assessment of dust emissions from demolition and construction, 2024

The IAQM produced guidance[12] to assist in the assessment of air quality impacts from demolition and construction activities. This guidance provides a consistent methodology for assessing the risks of dust impacts from demolition and construction activities and for identifying the correct level of mitigation which should be applied to avoid significant air quality effects.

IAQM guidance on the assessment of odour for planning, 2018

The IAQM produced guidance[13] to assist in the assessment of the impacts of odour for developments involving planning applications. This guidance provides a methodology for assessing the impacts of development activities on existing receptors and thereby the effect.

5 Defra, 2019. Clean Air Strategy.
6 Cornwall Council, 206. Cornwall Local Plan Strategic Policies 2010-2030.
7 Cornwall Council, 2020. Cornwall Air Quality Action Plan.
8 Chief Planning Officer, 2017. Chief Planning Officer's Advice Note: Planning for Air Quality.
9 Department for levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, 2019. Air Quality Planning Practice Guidance [Online]. Available at: https://www.gov.uk/guidance/air-quality--3
10 Department for Environment, Farming and Rural Affairs, 2022. Local Air Quality Management Technical Guidance (TG22).
11 Moorcroft and Holman, 2017. Land-Use Planning & Development Control: Planning for Air Quality. Institute of Air Quality Management.
12 Stoaling et al., 2024. Guidance on the assessment of from demolition and construction, v2.2. Institute of Air Quality Management.
13 Bull et al., 2018. IAQM Guidance on the assessment of odour for planning – version 1.1. Institute of Air Quality Management.

Technical Appendix 15.2: Assessment Methodology

Dust Risk Assessment

The assessment of potential demolition and construction dust impacts has followed the IAQM Guidance.

Dust Emission Magnitude

The criteria used to determine the dust emission magnitude for each demolition and construction stage activity are described in Table A15.2.1.

Table A15.2.1: Determining Dust Emission Magnitude

Large	Medium	Small
Demolition		
• Total building volume >75,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • Demolition activities >12 m above ground level	• Total building volume 12,000 m^3 - 75,000 m^3 • Potentially dusty construction • Demolition activities 6 m - 12 m above ground level	• Total building volume <12,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <6 m above ground during wetter months
Earthworks		
• 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	• 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 3 m - 6 m in height	• 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 <4 m in height
Construction		
• Total building volume >75,000 m^3 • On-site concrete batching • Sandblasting	• Total building volume 12,000 m^3 - 75,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site concrete batching	• Total building volume <12,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout		
• >50 HDV (>3.5 t) movements in any one day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100 m	• 20-50 HDV (>3.5 t) movements in any one day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50 m - 100 m	• <20 HDV (>3.5 t) movements in any one day • Surface material with low potential for dust release • Unpaved road length <50 m

Receptor Sensitivity

The criteria used to determine receptor sensitivity to demolition and construction stage activities are described in Table A15.2.2.

Table A15.2.1: Determining Dust Emission Magnitude

High	Medium	Low
Sensitivities of People to Dust Soiling Effects		
• Users can reasonably expect a 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 a 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.	• Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect 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 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.	• The enjoyment of amenity would not reasonably be expected; or • Property would not reasonably be expected to be • Diminished in appearance, aesthetics or value by soiling; or • There is transient exposure, where the people or property would reasonably be expected 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 and roads.
Sensitivities of People to the Health Effects of PM_{10}		
• 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). • 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.	• Locations where the people exposed are workers, 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.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.
Sensitivities of Receptors to Ecological Effects		
• 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	• 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.	• 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.

Table A15.2.1: Determining Dust Emission Magnitude		
the Red Data List For Great Britain. • 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.	• Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.	

Area Sensitivity

The criteria used to determine the sensitivity of the demolition and construction dust risk assessment study area to dust soiling are described in Table A15.2.3.

Table A15.2.3: Dust Soiling Effect on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	**<50**	**<100**	**<250**
High	>100	High	High	Low	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

The criteria used to determine the sensitivity of the demolition and construction dust risk assessment study area to human health impacts are described in Table A15.2.4.

Table A15.2.4: Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration (µg/m^3)	Number of Receptors	Distance from Source (m)			
			<20	**<50**	**<100**	**<250**
High	> 32	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28-32	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24-28	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28-32	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24-28	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

The criteria used to determine the sensitivity of the demolition and construction dust risk assessment study area to ecological impacts are described in Table A15.2.5.

Table A15.2.5: Ecological Impacts

Receptor Sensitivity	Distance from Source (m)	
	<20	**<50**
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Risk of Dust Impact

The criteria used to determine the risk of demolition dust impacts are described in Table A15.2.6.

Table A15.2.6: Risk of Demolition Dust Impacts

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

The criteria used to determine the risk of earthworks dust impacts are described in Table A15.2.7.

Table A15.2.7: Risk of Earthworks Dust Impacts

Receptor Sensitivity	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

The criteria used to determine the risk of construction dust impacts are described in Table A15.2.8.

Table A15.2.8: Risk of Construction Dust Impacts

Receptor Sensitivity	Dust Emission Magnitude		
	Large	**Medium**	**Small**

Table A15.2.8: Risk of Construction Dust Impacts			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

The criteria used to determine the risk of trackout dust impacts are described in Table A15.2.9.

Table A15.2.9: Risk of Trackout Dust Impacts

Receptor Sensitivity	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

Road Traffic Emissions

A detailed dispersion modelling assessment was undertaken using the ADMS-Roads dispersion model. The model requires the user to provide various input data, including AADT flows, the proportion of HDVs, road characteristics (such as road width, road height, street canyon height, gradients), and vehicle speed. A summary of the model setup used for this assessment is provided in Table A15.2.10.

Table A15.2.10: ADMS-Roads Setup and Processing

Data	Description
ADMS-Roads	Version 5.0.1.3
Time Varying Emission Factors	Based on Department for Transport statistics. Table TRA0307. Motor vehicle traffic distribution by time of day and day of the week on all roads, Great Britain: 2023.
Meteorological Data	2023 hourly meteorological data from Culdrose Airport.
Latitude	51.2º
Surface Roughness	A value of 0.5 for Parkland/Open Suburbia was used to represent the dispersion site. A value of 0.3 for Agricultural Areas (max) was used to represent the meteorological measurement site.
Minimum Monin-Obukhov Length	A value of 30 for Mixed Urban/Industrial was used to represent the dispersion site. A value of 10 for Small Towns was used to represent the meteorological measurement site.
Traffic Data	Provided by the Applicant's transport consultant, Ramboll, and outlined in Table A15.2.11 and Table A15.2.12.
Terrain	N/A. The terrain in the study area does not have slopes of more than 10 %, and therefore terrain effects were not included within the model.
Emission Factor Toolkit (EFT)	Version 12.0. Road type: England (urban)
NO_x to NO_2 Conversion	NO_x to NO_2 calculator version 8.1. Traffic Mix: All UK traffic.

Table A15.2.10: ADMS-Roads Setup and Processing	
	Local Authority: Cornwall Council.
Background Maps	2021 reference year background maps.

Traffic Data

The traffic data modelled in each scenario of the assessment is summarised in Table A15.2.11 and Table A15.2.12.

Table A15.2.11: Modelled Road Inputs

Road ID	Width (m)	Speed (kph)	Gradient (%)
Avenue_Rd_01	7.0	32.0	3.5
Avenue_Rd_02	8.5	32.0	3.5
Avenue_Rd_03	5.5	32.0	7.0
Avenue_Rd_04	6.0	25.0	7.0
Bar_Rd_A_01	6.1	25.0	N/A
Bar_Rd_A_02	6.1	32.0	4.6
Bar_Rd_A_03	7.2	32.0	N/A
Bar_Rd_A_04	7.3	32.0	N/A
Bar_Rd_A_05	6.5	32.0	N/A
Bar_Rd_A_06	5.0	32.0	N/A
Bar_Rd_A_07	9.5	32.0	N/A
Bar_Rd_B_01	8.1	32.0	N/A
Bar_Rd_B_02	8.1	25.0	N/A
Melvill_Rd_01	7.2	25.0	3.7
Melvill_Rd_02	7.2	48.0	3.7
Melvill_Rd_03	5.5	48.0	3.7
Melvill_Rd_04	7.3	48.0	3.7
Melvill_Rd_05	6.0	48.0	1.0
Tinners_Wlk_01	11.5	25.0	N/A
Tinners_Wlk_02	9.5	25.0	N/A
Tinners_Wlk_03	8.0	25.0	N/A

Table A15.2.12: Baseline and Development Traffic Data

Road ID	2023 Baseline		2026 Do Minimum		2026 Do Something	
	AADT	AADT	AADT	HDV	AADT	HDV
Avenue_Rd_01	3415	191	3526	192	3526	192
Avenue_Rd_02	3415	191	3526	192	3526	192
Avenue_Rd_03	3415	191	3526	192	3526	192

Table A15.2.12: Baseline and Development Traffic Data

Avenue_Rd_04	3415	191	3526	192	3526	192
Bar_Rd_A_01	1768	260	1821	261	1821	261
Bar_Rd_A_02	1768	260	1821	261	1821	261
Bar_Rd_A_03	1768	260	1821	261	1821	261
Bar_Rd_A_04	1768	260	1821	261	1821	261
Bar_Rd_A_05	1768	260	1821	261	1821	261
Bar_Rd_A_06	1768	260	1821	261	1821	261
Bar_Rd_A_07	1768	260	1821	261	1821	261
Bar_Rd_B_01	3511	158	3624	158	3890	327
Bar_Rd_B_02	3511	158	3624	158	3890	327
Melvill_Rd_01	4118	470	4243	472	4509	641
Melvill_Rd_02	4118	470	4243	472	4509	641
Melvill_Rd_03	4118	470	4243	472	4509	641
Melvill_Rd_04	4118	470	4243	472	4509	641
Melvill_Rd_05	4118	470	4243	472	4509	641
Tinners_Wlk_01	2213	131	2284	131	2550	300
Tinners_Wlk_02	2213	131	2284	131	2550	300
Tinners_Wlk_03	2213	131	2284	131	2550	300

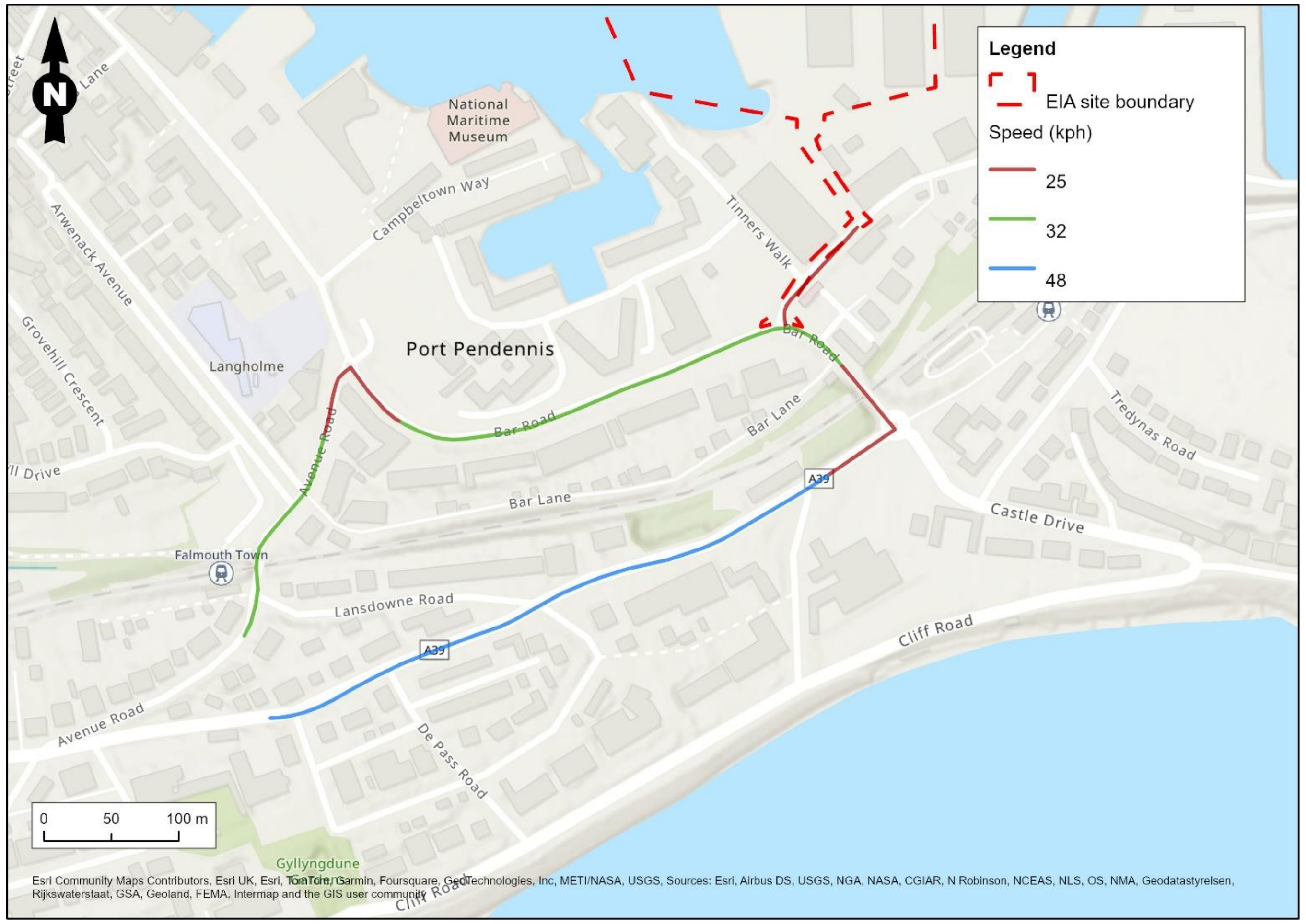

Figure A15.2.1: Modelled Road Network and Road Link Speed for Demolition and Construction Scenarios

Model Verification

The accuracy of the modelled road concentrations could not be verified against local monitoring data as there is none available in Falmouth. A verification factor was derived from a review of similar modelling studies undertaken in the 12-months prior to this assessment.

Table A15.2.13 presents the details of NO_x adjustment factors derived for the verification of recent, similar roads modelling projects.

Table A15.2.13: Prior Roads Modelling Project Verification Factors

Date	Local Authority	Primary Adjustment Factor	Secondary Adjustment Factor	Verification Year
Dec-23	Isle of Wight Council	1.9181	1.0245	2019
Jan-24	Thurrock Council	1.1001	1.0093	2019
Feb-24	Royal Borough of Greenwich	2.5000	1.0379	2022
Feb-24	London borough of Hammersmith and Fulham, Royal Borough of Kensington and Chelsea	2.0938	1.0007	2022
May-24	Westminster City Council	1.4491	1.0086	2019
Jun-24	New Forest District Council	1.4379	1.0054	2022
Jul-24	Worcester City Council	1.7119	0.9380	2022

Table A15.2.13: Prior Roads Modelling Project Verification Factors

Date	Local Authority	Primary Adjustment Factor	Secondary Adjustment Factor	Verification Year
Sep-24	South Bucks	1.2097	1.0408	2023

The adjustment factors presented in Table A15.2.13 show that ADMS-Roads models typically underpredict NO_x concentrations.

The average primary adjustment factor of those presented in Table A15.2.13 is 1.6776. The highest primary verification factor presented (2.5000) has been used to adjust model output for this assessment as well as the corresponding secondary verification factor (1.0379); using the highest adjustment factor provides a conservative approach to adjusting modelled concentrations and minimising underprediction.

The adjustment factors applied for NO_2 have also been applied to PM_{10} and $PM_{2.5}$ results as there are not typically suitable automatic monitoring sites available to undertake the verification process specifically for PM.

Odour Assessment

The criteria used to define the source odour potential, the pathway effectiveness and receptor sensitivity are defined in Table A15.2.14.

Table A15.2.14: Examples of Risk Factors for Odour Source, Pathways and Receptor Sensitivity

Source Odour Potential	Pathway Effectiveness	Receptor Sensitivity
Factors affecting the source odour potential include: The magnitude of the odour release (taking into account odour control measures) How inherently odorous the compounds are The unpleasantness of the odour	Factors affecting the odour flux to the receptor are: Distance from source to receptor The frequency (%) of winds from the source to receptor (or, qualitatively, the direction of receptors from source with respect to prevailing wind) The effectiveness of any mitigation/control in reducing flux to the receptor The effectiveness of dispersion/dilution in reducing the odour flux to the receptor Topography and terrain	For the sensitivity of people to odour, 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:
Large Source Odour Potential Magnitude – larger Permitted processes of odorous nature or large STWs; materials usage hundreds of thousands of tonnes/m^3 per year; area sources of thousands of m^3. The compounds involved are very odorous (e.g. mercaptans), having very low Odour Detection Thresholds where known. Unpleasantness – processes classed as 'most offensive', or where compounds/odours having unpleasant to very unpleasant hedonic score. Mitigation/control – open air operation with no containment, reliance solely on good management techniques and best practice.	Highly Effective Pathway for Odour Flux to Receptor Distance – receptor is adjacent to the source/site, distance well below any official 'set back' distances. Direction – high frequency (%) of winds from source to receptor (or qualitatively, receptor downwind of source with respect to prevailing wind). Effectiveness of dispersion/dilution – open processes with low-level releases, e.g. lagoons, uncovered effluent treatment plant, landfilling of putrescible wastes.	High sensitivity receptor Surrounding land where Users can reasonably expect enjoyment of a high level of amenity; and The people would reasonably be expected to be present here continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. Examples may include residential dwellings, hospitals, schools/education and tourist/cultural.
Medium Source Odour Potential Magnitude – smaller Permitted processes or small STWs; material usage thousands of tonnes/m^3 per year, area sources of hundreds of m^3. The compounds involved are moderately odorous. Unpleasantness – processes classed as 'moderately offensive', or odours having a neutral to offensive hedonic score. Mitigation/control – some mitigation measures in place, but significant residual odour.	Moderately Effective Pathway for Odour Flux to Receptor Distance – receptor is local to the source. Where mitigation relies on dispersion/dilution – releases are elevated but compromised by building effects.	Medium sensitivity receptor Surrounding land where Users would expect to enjoy a reasonable level of amenity, but wouldn't reasonably expect to enjoy the same level of amenity as in their home, or People wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land. Examples may include places of work, commercial/retail premises and playing/recreation fields.
Small Source Odour Potential Magnitude – falls below Part B threshold; materials usage hundreds of tonnes/m^3 per year, area sources of tens m^3. The compounds included are only mildly odorous, having relatively high odour detection thresholds. Unpleasantness – processes classified as less offensive; or compounds/odours having neutral to very pleasant hedonic score. Mitigation/control – effective, tangible mitigation measures in place leading to little or no residual odour.	Ineffective Pathway for Odour Flux to Receptor Distance – receptor is remote from the source, distance exceeds any official set-back distance. Direction – low frequency (%) of winds from source to receptor (or qualitatively, receptors upwind of source with respect to prevailing wind). Where mitigation relies on dispersion/dilution – release are from high level (i.e. stacks or roof vents +3 m above ridge height) and are not compromised by surrounding buildings	Low sensitivity receptor Surrounding land where: The enjoyment of amenity would not reasonably be expected, or There is transient exposure, where the people would reasonably be expected to be present for only limited periods of time as part of the normal pattern of use of the land. Examples may include industrial, farms, footpaths and roads.

The odour source strength and pathway effectiveness are combined to define the risk of odour exposure, as shown in Table A15.2.15.

Table A15.2.15: Risk of Odour Exposure

Pathway Effectiveness	Source Odour Strength		
	Small	**Medium**	**Large**
Highly Effective	Low Risk	Medium Risk	High Risk
Moderately Effective	Negligible Risk	Low Risk	Medium Risk
Ineffective	Negligible Risk	Negligible Risk	Low Risk

The risk of odour exposure is then combined with the receptor sensitivity to determine the effect at individual receptors or groups of receptors, as shown in Table A15.2.16.

Table A15.2.16: Magnitude of Odour Effect

Risk of Odour Exposure	**Receptor Sensitivity**		
	Low	**Medium**	**High**
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

Technical Appendix 15.3: Results

Odour

Source Potential

The odour source potential of the dredged sediment depends on the presence of odorous organic compounds. The sediment composition data shows a range of pollutants present, including PAHs, PCBs and other VOCs. Olfactometry has not been performed on the contaminated sediment that will need to be disposed of on-land and there are few studies available which provide information on odour release rate from dredging which will vary by location. From Table A15.2.12 it is estimated that the odour source potential is medium as the dredging will involve thousands of m^3 of material per day of moderately odorous materials.

Pathway Effectiveness

The pathway effectiveness depends on the proportion of the time that the wind blows from the source to the receptor as well as the degree of containment of the source and the distance to the receptor. Figure A15.3.1 shows the wind rose from Culdrose for the period 2019 to 2023.

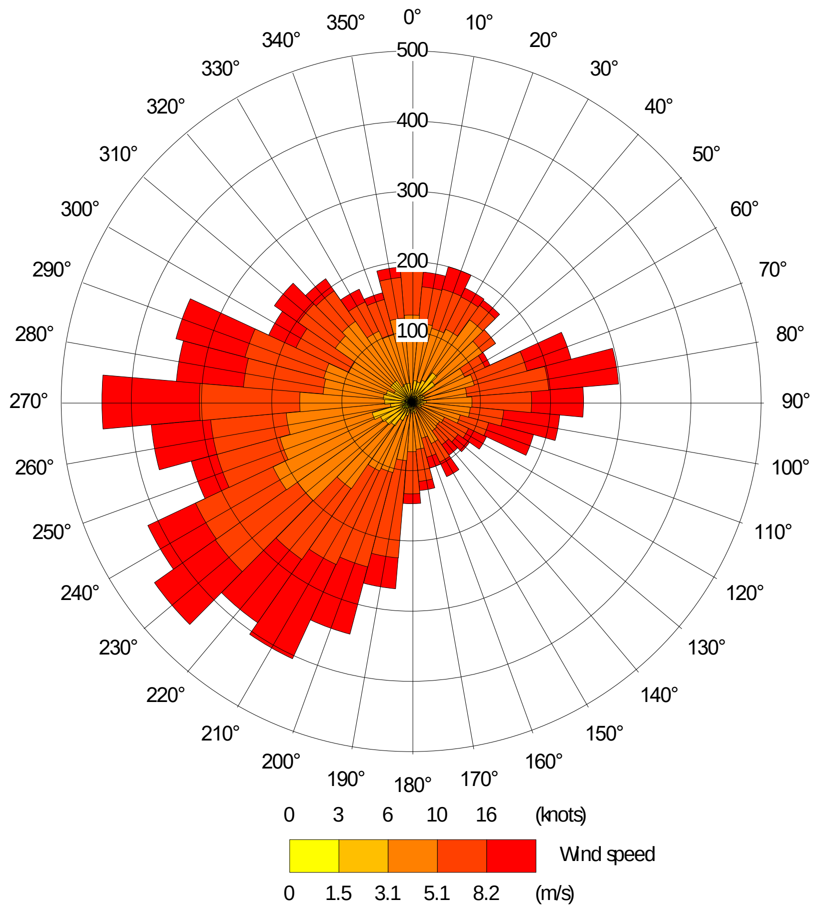

Figure A15.3.1: Culdrose Wind Rose 2019-2023

The prevailing wind direction is from west/south-west with relatively few winds from the north and north-east. Table A15.3.1 shows the breakdown by wind direction.

Table A15.3.1: Wind Direction by 10-degree Sectors

Quadrant	Wind Direction (from, °)	Percentage of Time (%)
N-E	10	2.0
	20	1.9
	30	2.0
	40	2.3
	50	2.6
	60	2.9
	70	3.9
	80	3.9
	90	2.6
E-S	100	1.7
	110	1.5
	120	0.9
	130	0.7
	140	0.8
	150	1.1
	160	1.3
	170	1.3
	180	2.0
S-W	190	4.8
	200	3.7
	210	3.6
	220	4.5
	230	6.3
	240	5.6
	250	5.3
	260	4.2
	270	3.7
W-N	280	2.9
	290	2.6
	300	2.3
	310	2.5
	320	2.4
	330	2.0
	340	1.9
	350	2.0
	360	2.5

For the dredging operations the sediment will be brought to the surface in a closed bucket and deposited within the dredging vessel in an open topped hold. Odour generation will be intermittent depending on the time taken to bring another load to the surface. The dredging process will be undertaken on a flood tide only (from 1.75 hours before low water to 1.75 hours before high water).

An analysis has been undertaken of the frequency that the wind will blow from the two dredging areas (1 - Western Wharf/Northern Wharf/North of Queens Wharf/Surface skim area and 2 - South of Queens Wharf/North of Duchy Wharf) towards different receptor locations, as well as the range of separation distance from the source to the receptors.

The pathway effectiveness has then been judged based on these factors; the further the area away and the lower the frequency that the winds blow towards the receptor location then the lower the effectiveness. The pathway effectiveness has been determined for two scenarios; firstly, the dredging operations involving bringing the sediment to the surface and placing it into the dredging vessel, and secondly, potential storage of the dredged material on a vessel or on the quayside.

The analysis for the dredging operations is shown in Tables A15.3.2 and A15.3.3.

Table A15.3.2: Assessment of Pathway Effectiveness for Dredging Operations

Dredging Area	Receptor Area	Distance to Dredging Area (m)	Wind Sectors (°)	Wind Frequency (%)	Pathway Effectiveness
1	Pendennis Rise	325-780	340-40	14.6	Moderate
1	Railway Cottages	370-820	350-40	12.7	Moderate
1	Challenger Quay	380-850	0-50	10.8	Ineffective to moderate
1	St Smithwick Way	400-900	0-50	10.8	Ineffective to moderate
1	Trelawny House	450-930	0-40	8.2	Ineffective
1	Discovery Quay and moorings	410-830	0-50	8.8	Ineffective
2	Pendennis Rise	340-690	330-360	8.4	Moderate
2	Railway Cottages	350-660	340-10	8.4	Moderate
2	Challenger Quay	195-580	10-40	6.2	Moderate
2	St Smithwick Way	300-660	0-30	5.9	Moderate
2	Trelawny House	340-700	0-30	5.9	Ineffective to moderate
2	Discovery Quay and moorings	170-550	30-80	13.7	Moderate to high

Based on the receptor sensitivity and pathway effectiveness, the risk of odour exposure and therefore the odour effect at the receptors from the dredging operations has been determined.

Table A15.3.3: Assessment of Odour Exposure and Likely Odour Effect for Dredging Operations

Dredging Area	Receptor Area	Receptor Sensitivity	Pathway Effectiveness	Odour Exposure	Likely Odour Effect
1	Pendennis Rise	High	Moderate	Low	Slight adverse
1	Railway Cottages	High	Moderate	Low	Slight adverse
1	Challenger Quay	High	Ineffective to moderate	Negligible to low	Negligible to slight adverse
1	St Smithwick Way	High	Ineffective to moderate	Negligible to low	Negligible to slight adverse
1	Trelawny House	High	Ineffective	Negligible	Negligible
1	Discovery Quay and moorings	Medium	Ineffective	Negligible	Negligible
2	Pendennis Rise	High	Moderate	Low	Slight adverse
2	Railway Cottages	High	Moderate	Low	Slight adverse
2	Challenger Quay	High	Moderate	Low	Slight adverse
2	St Smithwick Way	High	Moderate	Low	Slight adverse
2	Trelawny House	High	Ineffective to moderate	Negligible to low	Negligible to slight adverse
2	Discovery Quay and moorings	Medium	Moderate to high	Low to medium	Negligible to slight adverse

The odour effect from the dredging is between negligible to slight adverse depending on where the dredging operations occur in relation to the location of the receptors and their sensitivity to odour effects. The overall effect is therefore not significant for the dredging operations.

If the dredging rate exceeds the rate at which material can be removed from site by HGV, there will be a requirement for temporary stockpiling of dredge material before it can be removed from site.

Stockpiling could either occur in a vessel moored adjacent to one of the existing wharfs, the location of the mooring being dependent on which area was being dredged, or stored on the quayside to the south of Duchy wharf. The latter option would involve placing the dredged material in a contained area to prevent leaching of contaminated water back into the sea. In both cases odour could be released during the transfer of the sediment to the storage area and when it was removed from the storage area, but during storage the area would be covered if the material was odorous thereby preventing odour release. The odour release would be intermittent and essentially the same, i.e. from a barge moored on one of the wharfs or from a storage area on the Duchy Wharf quayside during sediment transfer operations.

For storage on a vessel a range of distances have been assessed as the vessel could be moored on any of the wharfs in the docks including Queens Wharf, where-as for storage on the Duchy Wharf quayside a single distance has been used approximately at the centre of the wharf. In terms of wind direction from the storage area, the highest frequency range has been shown for the vessel storage whereas there would be only one location for quayside storage.

The assessment of the storage of the sediment in Tables A15.3.4 and A15.3.5.

Table A15.3.4: Assessment of Pathway Effectiveness for Sediment Storage

Storage Location	Receptor Area	Distance to Storage Location (m)	Wind Sectors (°)	Wind Frequency (%)	Pathway Effectiveness
Vessel	Pendennis Rise	380-720	340-360	4.0	Ineffective
Vessel	Railway Cottages	335-710	360-10	2.5	Ineffective
Vessel	Challenger Quay	245-635	20-30	1.9	Ineffective to moderate
Vessel	St Smithwick Way	325-705	10-20	2.0	Ineffective
Vessel	Trelawny House	360-740	10-20	2.0	Ineffective

Table A15.3.4: Assessment of Pathway Effectiveness for Sediment Storage

Storage Location	Receptor Area	Distance to Storage Location (m)	Wind Sectors (°)	Wind Frequency (%)	Pathway Effectiveness
Vessel	Discovery Quay and moorings	250-630	50-60	2.6	Ineffective to moderate
Quayside	Pendennis Rise	350	340-360	4.0	Ineffective
Quayside	Railway Cottages	300	360-10	2.5	Ineffective
Quayside	Challenger Quay	215	20-30	2.0	Ineffective to moderate
Quayside	St Smithwick Way	280	10-20	2.0	Ineffective to moderate
Quayside	Trelawny House	320	10-20	2.0	Ineffective
Quayside	Discovery Quay and moorings	230	50-60	2.6	Ineffective to moderate

Based on the receptor sensitivity and pathway effectiveness, the risk of odour exposure and therefore the odour effect at the receptors from the storage operations has been determined.

Table A15.3.5: Assessment of Odour Exposure and Likely Odour Effect for Dredging Operations

Storage Location	Receptor Area	Receptor Sensitivity	Pathway Effectiveness	Odour Exposure	Likely Odour Effect
Vessel	Pendennis Rise	High	Ineffective	Low	Negligible
Vessel	Railway Cottages	High	Ineffective	Low	Negligible
Vessel	Challenger Quay	High	Ineffective to moderate	Negligible to low	Negligible to slight adverse
Vessel	St Smithwick Way	High	Ineffective	Negligible to low	Negligible
Vessel	Trelawny House	High	Ineffective	Negligible	Negligible
Vessel	Discovery Quay and moorings	Medium	Ineffective to moderate	Negligible	Negligible
Quayside	Pendennis Rise	High	Ineffective	Low	Negligible
Quayside	Railway Cottages	High	Ineffective	Low	Negligible
Quayside	Challenger Quay	High	Ineffective to moderate	Low	Negligible to slight adverse
Quayside	St Smithwick Way	High	Ineffective to moderate	Low	Negligible to slight adverse
Quayside	Trelawny House	High	Ineffective	Negligible to low	Negligible
Quayside	Discovery Quay and moorings	Medium	Ineffective to moderate	Low to medium	Negligible

The pathway effectiveness for the storage operations is the same as or lower than for the dredging operations. Whilst the storage is potentially closer to receptors, there is a narrower range of wind directions that can affect the receptors as the storage will effectively be stationary.

The odour effect from the storage operations is between negligible to slight adverse depending on where the storage occurs in relation to the location of the receptors and their sensitivity to odour effects. The overall effect is therefore not significant for storage of the sediment.