Orsted Onshore Ireland Midco Limited

Proposed Oatfield Wind Farm

Air Quality Assessment

Project No: 445412-01(02)

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RSK GENERAL NOTES

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Title: Oatfield Wind Farm - Air Quality Assessment

Client: Orsted Limited

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Abbreviations

AADT	Annual Average Daily Traffic
AQS	Air Quality Standard
CAFE	Clean Air for Europe
CEMP	Construction Environmental Management Plan
CH_4	Methane
CO_2	Carbon Dioxide
CO	Carbon Monoxide
DEFRA	Department for Environment, Food and Rural Affairs
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EC	European Commission
EPA	Environmental Protection Agency
EPUK	Environmental Protection UK
EU	European Union
GRC	Grid Connection Route
HGV	Heavy Good Vehicle
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
LGV	Light Good Vehicle
NAQS	National Air Quality Strategy
NECD	National Emissions Ceiling Directive
NH_3	Ammonia
NMVOC	Non-methane volatile organic compounds
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPPF	National Planning Policy Framework
NRMM	Non-road mobile machinery
O_3	Ozone
$PM_{2.5}$	Particulate matter of size fraction approximating to <2.5µm diameter
PM_{10}	Particulate matter of size fraction approximating to <10µm diameter
RSK	RSK Environment Limited
SO_2	Sulphur dioxide
TDR	Turbine Delivery Route
VOC	Volatile Organic Compounds
WHO	World Health Organisation

CONTENTS

1 INTRODUCTION

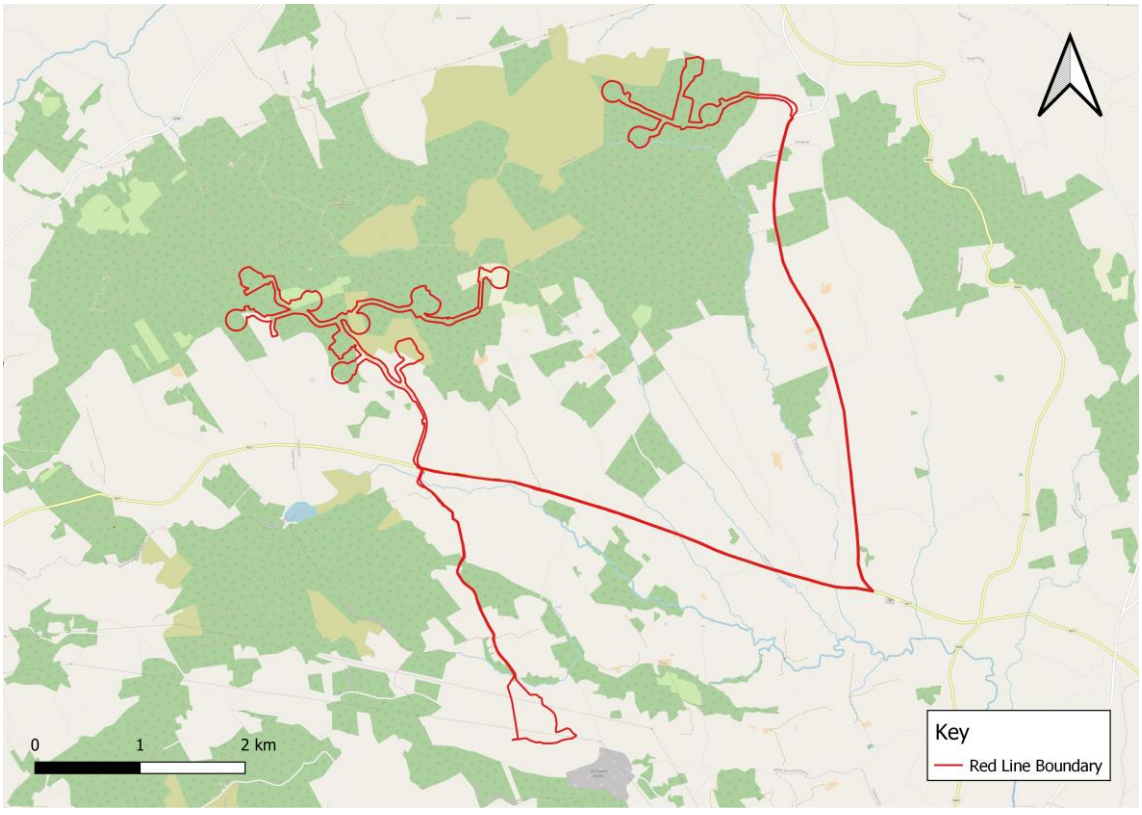
1.1 Background

RSK Environment Ltd (RSK) was commissioned to undertake an assessment of the potential air quality impacts associated with the proposed wind farm at Oatfield. Figure 1.1 below shows the red line boundary.

The Proposed Development comprises eleven three-blade wind turbines together with associated infrastructure, security fencing, associated cable route and landscaping.

This report presents the findings of an assessment of existing/baseline air quality conditions, potential air quality impacts during the construction, operational and decommissioning phases of the Proposed Development.

Figure 1.1: Red Line Boundary



2 LEGISLATION, PLANNING POLICY & GUIDANCE

2.1 Key Legislation

2.1.1 Air Quality Standards

The Air Quality Framework Directive (1996) established a framework under which the European Commission (EC) could set limit or target values for specified pollutants. The directive identified several pollutants for which limit or target values have been, or will be set in, subsequent 'daughter directives'. The framework and daughter directives were consolidated by Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe, which retains the existing air quality standards and introduces new objectives for fine particulates ($PM_{2.5}$).

The air quality standards (AQSs) in Europe are set in EU directives, the Clean Air for Europe (CAFE) Directive was published in 2008. The CAFE directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011.

The relevant standards for Europe to protect human health are summarised in Table 2.1 below.

Table 2.1 Air Quality Standards relevant to the Proposed Development

Substance	Averaging period	Exceedances allowed per year	Ground level concentration limit (µg/m^3)
Nitrogen dioxide (NO_2)	1 calendar year	-	40
	1 hour	18	200
Fine particles (PM_{10})	1 calendar year	-	40
	24 hours	35	50
Fine particles ($PM_{2.5}$)	1 calendar year	-	Stage 1: 25 Stage 2: 20

Note: The Stage 1 limit value came into force on 1st January 2015, and the Stage 2 limit value came into force on 1st January 2020.

Local Air Quality Management Review and Assessment Technical Guidance published by the Department for Environment, Food and Rural Affairs (Defra) advises that an exceedance of the 1 hour mean NO_2 objective is unlikely to occur where the annual mean concentration is below 60µg/m^3, where road transport is the main source of pollution. This concentration has been used to screen whether the hourly mean objective is likely to be achieved.

2.1.2 Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. European Commission Directive 2001/81/EC and the National Emissions Ceiling Directive (NECD), prescribes the same emissions limits

as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of four transboundary pollutants, nitrogen oxides (NO_x), sulphur dioxide (SO_2), volatile organic compounds (VOCs) and ammonia (NH_3), has been in place since April 2005. The data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_x. COM (2013) 920 Final is the "proposal for a Directive on the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC", which will apply the 2010 NECD limits until 2020 and establish some new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_x, non-methane volatile organic compounds (NMVOC), NH_3, and methane (CH_4). Irelands reduction targets are shown in Table 2.2 below.

Table 2.2 The reduction targets for Ireland, shown as a percentage reduction from 2005 levels, for four transboundary pollutants (SO_2, NO_x, VOCs, NH_3) and $PM_{2.5}$

Pollutant	Percentage reduction below 2005 level	
	2020-2029	2030
SO_2	65%	85%
NO_x	49%	69%
VOC	25%	32%
NH_3	1%	5%
$PM_{2.5}$	18%	41%

2.1.3 Clean Air Strategy

The Ireland's first Clean Sir Strategy was published in April 2023. This strategy identifies and promotes the integrated measures across government to reduce air pollution and promote cleaner ambient air. The strategy commits Ireland to achieving the new WHO (World Health Organisation) guidelines values for air quality by 2040, with progress to be measured against interim targets by 2026 and 2030.

2.2 Best Practice Guidance

2.2.1 Guidance on the Assessment of Dust from Demolition and Construction

The Institute of Air Quality Management (IAQM) published a guidance document (IAQM, 2023) on the assessment of construction phase impacts (herein the 'IAQM construction dust guidance'). The guidance was produced to provide advice to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

2.2.2 Local Air Quality Management Technical Guidance

The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their air quality review and assessment

work. This guidance, referred to in this document as the Local Air Quality Management Technical Guidance (Defra, 2022) ('LAQM TG.22').

2.2.3 Land-Use Planning & Development Control: Planning for Air Quality

Environmental Protection UK's (EPUK) and the IAQM jointly published a revised version of the guidance note 'Land-Use Planning & Development Control: Planning for Air Quality' in 2017 (herein the 'EPUK-IAQM guidance') to facilitate consideration of air quality within local development control processes. It provides a framework for air quality considerations, promoting a consistent approach to the treatment of air quality issues within development control decisions.

The guidance includes methods for undertaking an air quality assessment and an approach for assessing the significance of effects. The guidance note is widely accepted as an appropriate reference method for this purpose.

2.2.4 LA105 of the Design Manual for Roads and Bridges (DMRB)

LA 105 of the Design Manual for Roads and Bridges (DMRB) was published by Highways England in November 2019 and sets out the requirements for assessing and reporting the effects of highway projects on air quality. The DMRB, on which the Transport Infrastructure Ireland (TII) guidance (TII, 2014) was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the air quality assessment.

3 ASSESSMENT SCOPE

3.1 Overall Approach

The approach taken for assessing the potential air quality impacts of the Proposed Development may be summarised as follows:

- Baseline characterisation of local air quality;
- Qualitative impact assessment of the construction and decommissioning phase of the development using the 2023 IAQM guidance;
- Qualitative assessment of the operational phase of the development, with reference to the 2019 LA105 DMRB guidance; and
- Recommendation of mitigation measures, where appropriate, to ensure any adverse effects on air quality are minimised.

3.2 Baseline Characterisation

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources.

A desk-based study has been undertaken including a review of monitoring data available from Environmental Protection Agency (EPA) website.

3.3 Construction and Decommissioning Phase Assessment

3.3.1 Construction and Decommissioning Dust and Particulate Matter

Construction and decommissioning works for the Proposed Development have the potential to lead to the release of fugitive dust and particulate matter. An assessment of the likely significant effects of construction and decommissioning phases dust and particulate matter at sensitive receptors has therefore been undertaken following the IAQM's construction dust guidance.

Three separate dust impacts were considered:

- Disamenity due to dust soiling;
- The risk of health effects due to an increase in exposure to PM_{10}; and
- Harm to ecological receptors.

In order to assess the potential impacts of construction and decommissioning, activities are divided into three types:

- Earthworks;
- Construction; and

- Trackout[1].

The risk of dust and PM_{10} arising to cause disamenity and/or health or ecological impacts was based on an assessment of likely emissions magnitude and the sensitivity of the surrounding environment. The risk category may be different for each of the three 'construction' activities.

Appendix A sets out the construction dust assessment methodology in detail as per IAQM construction dust guidance. Once the level of risk has been determined, then site specific mitigation proportionate to the level of risk can be identified (as detailed in Section 6).

The National Parks and Wildlife Services website was used to identify statutory ecological receptors near the Proposed Development site area.

3.3.2 Emissions to Air from Construction and Decommissioning Traffic and Plant

Exhaust emissions from construction and decommissioning phase vehicles and plant may have an impact on local air quality adjacent to the routes used by these vehicles to access the Proposed Development site and in the vicinity of the Proposed Development site itself. A qualitative impact assessment against the LA105 DMRB guidance screening criteria has been undertaken to assess the impacts on air quality due to construction and decommissioning phase traffic.

3.4 Operational Phase Impact Assessment

3.4.1 Emissions to Air from Operational Phase Traffic

LA 105 of the Design Manual for Roads and Bridges (DMRB) was published by Highways England in November 2019 and sets out the requirements for assessing and reporting the effects of highway projects on air quality. The DMRB, on which the Transport Infrastructure Ireland (TII) guidance (TII, 2022) was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the air quality assessment:

- Road alignment change of 5m or more;
- Daily traffic flow changes of 1,000 Annual Average Daily Traffic (AADT) or more;
- Heavy Duty Vehicle (HDV) flow changes of 200 AADT or more;
- Daily average speed change by 10 kph or more; and
- Peak hour speed change by 20 kph or more.

The TII guidance (TII, 2022) also states that a detailed modelling assessment will be required if:

- Existing air quality exceeds 90% of the air quality standard; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junction or hills with gradients > 2.5%).

[1] Trackout is defined as the transport of dust and dirt from the construction / demolition sites onto public road network, where it may be deposited and then re-suspended by vehicles using the network.

For routes which pass within 2km of a designated area of conservation (Irish or European), TII requires consultation with an Ecologist. However, in practice the potential for impact to an ecological site is highest within 200m of the proposed scheme.

A qualitative screening level assessment against the screening criteria above has been undertaken to assess the impacts on air quality due to operational phase traffic.

4 BASELINE AIR QUALITY CHARACTERISATION

Existing or baseline air quality refers to the concentrations of relevant substances that are already present in ambient air. These substances are emitted by various sources, including road traffic, industrial, domestic, agricultural and natural sources. Baseline air quality data employed in this study were obtained from the EPA website.

4.1 Baseline Air Quality

The principal air quality pollutants relevant to this assessment are considered to be NO_2, PM_{10} and $PM_{2.5}$, generally regarded as the three most significant air pollutants released by vehicular combustion processes, or subsequently generated by vehicle emissions in the atmosphere through chemical reactions (IAQM, 2023). These pollutants are generally considered to have the greatest potential to result in human health impacts and are the substances of most concern in terms of existing levels in the area, as discussed below.

A desk-based study has been undertaken using data obtained from the EPA website. The Ennis, Co. Clare monitoring site (Station 25) is the nearest air quality monitoring station to the development site, which is located approximately 22km to the northwest (this site monitors SO_2, PM_{10} and $PM_{2.5}$ only). The next nearest one is Ennistymon, Co. Clare monitoring site (TNO3947), which is approximately 45km to the northwest of the development site (this site monitors PM_{10} and $PM_{2.5}$ only). The PM_{10} and $PM_{2.5}$ monitoring data recorded at these two stations are presented in Table 4.1.

Table4.1: Annual Mean Measured Pollutant Concentrations

Monitoring site	2022 Annual mean concentrations (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Ennis, Co. Clare (Station 25)	-	20.3	16.0
Ennistymon, Co. Clare monitoring site (TNO3947)	-	10.3	7.7
Air Quality Standard (AQS)	**40**	**40**	**20**

Source: http://airquality.ie

No exceedances of the relevant air quality standards (AQSs) were recorded at these sites. Therefore, exceedances of the relevant AQSs at the site is not expected. Overall, air quality is considered to be good in the local area.

The National Parks and Wildlife Services website (https://www.npws.ie/) indicates that there are no designated ecologically sensitive designated sites within 50m of the site boundary, grid connection route (GCR), turbine delivery route (TDR) or potential routes

along which trackout could arise. Therefore, impacts of ecological receptors are not considered applicable and have not been considered further.

4.2 Future Air Quality

According to the EPA's Air Quality in Ireland Report 2022, air quality in Ireland is generally good. Ireland met all the EU legal limit values for selected pollutants, including NO_2, PM_{10}, $PM_{2.5}$ and ozone, measured in 2022.

Air quality across the study area in the absence of the Proposed Development is anticipated to remain largely unchanged from the levels in the current baseline conditions.

5 ASSESSMENT OF IMPACTS

5.1 Construction Phase

Atmospheric emissions from construction activities will depend on a combination of the potential for emissions (the type of activity and prevailing conditions) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- fugitive dust emissions from site activities; and
- exhaust emissions from site plant, equipment and vehicles.

5.1.1 Fugitive Dust Emissions

Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture content, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

The construction activities anticipated as part of the Proposed Development that are often the most significant potential sources of fugitive dust emissions are:

- Earthworks comprising of levelling, construction of foundations, haulage, tipping, stockpiling, landscaping and tree removal;
- Construction of Proposed Development and hard landscaped areas; and
- Trackout, involving the movement of vehicles over surfaces where muddy materials have been transferred off-site (for example, on to public highways).

5.1.1.1 Potential Dust Emissions Magnitude

With reference to the IAQM construction dust guidance outlined in Appendix A, the estimation of dust emissions magnitude (before mitigation) for earthworks, construction and trackout activities are presented in Tables 5.1. No demolition will be undertaken as part of this application, therefore, potential air quality impacts from demolition work has been scoped out from this assessment.

Table 5.1: Summary of Dust Emissions Magnitude (Before mitigation)

Activity	IAQM Criteria	Dust Emission Magnitude
Demolition	No demolition will take place.	N/A
Earthworks	Total site area where earthworks may occur is >110,000 m^2. The site is located on top of Sandstone. The number of heavy earth-moving vehicles active at any one time will be 5-10. The height of stockpiles on site will be 4-6 m.	Medium-Large

Activity	IAQM Criteria	Dust Emission Magnitude
Construction	Total building volume is estimated to be 0 m^3. On-site concrete batching and sandblasting are not proposed. Construction materials are expected to be potentially dusty.	Small-Medium
Trackout	Number of heavy vehicles per day out of the site is estimated to be <20. The sites surface will consist of gravel roads. Estimated that vehicles may travel on unpaved roads >100m in length.	Medium

5.1.1.2 Sensitivity of the Area

As per the IAQM construction dust guidance, the sensitivity of the area takes into account a number of factors, including:

- The specific sensitivities of receptors in the area;
- The proximity and number of those receptors;
- For the human health assessment, the local background annual mean PM_{10} concentration; and
- Site specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

Consideration is given to human and ecological receptors from the impact of the construction site boundary and routes along which HGVs may facilitate trackout.

Figures 5.1 to 5.4 show maps indicating the buffers, for identifying the sensitivity of the area. Table 5.2 presents the determined sensitivity of the area. Construction activities are relevant up to 250m from the Proposed Development site boundary, GCR and TDR whereas trackout activities are only considered relevant up to 50m of the trackout route, as per the IAQM construction dust guidance.

Human receptors were identified within 250m of the Proposed Development site boundary, GCR and TDR and within 50m of the trackout route by making reference to online publicly available satellite imagery. No designated ecologically sensitive designated sites have been identified within 50m of the site boundary, GCR, TDR or anticipated trackout route, therefore following the IAQM construction dust guidance ecological receptors have been screened out of the assessment and are not considered further.

Figure 5.1: Red Line Boundary Buffer Map

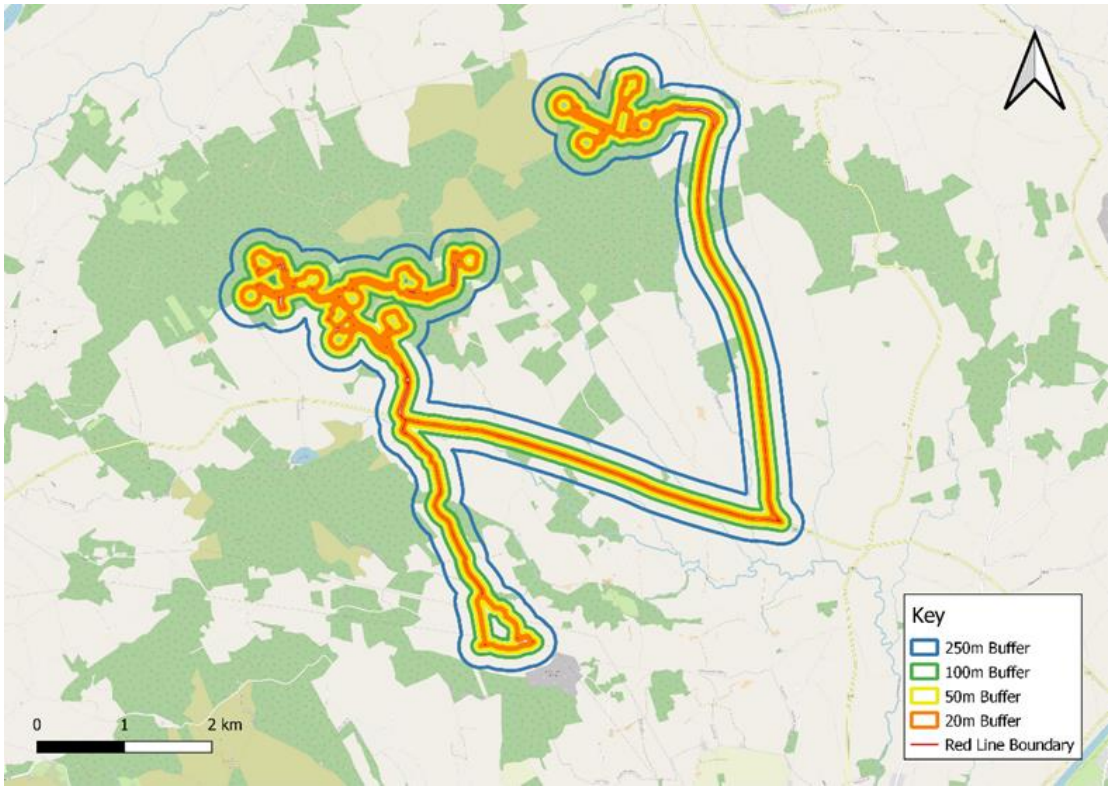


Figure 5.2: Turbine Delivery Route Buffer Map

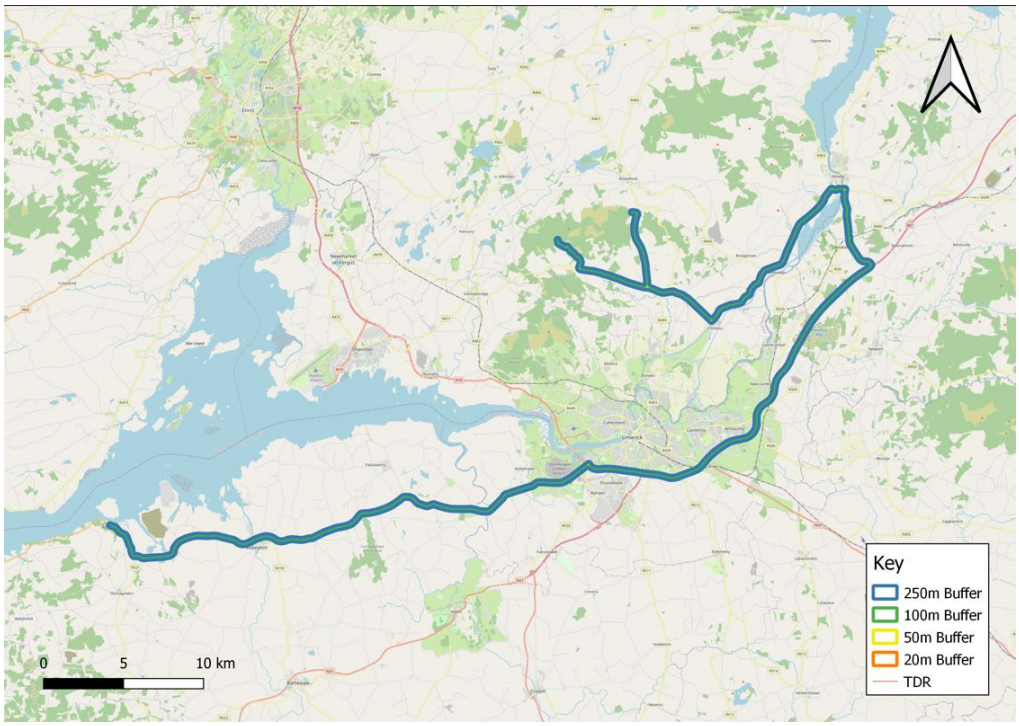


Figure 5.3: Trackout Activities Buffer Map (Access to Eastern Proposed Development)

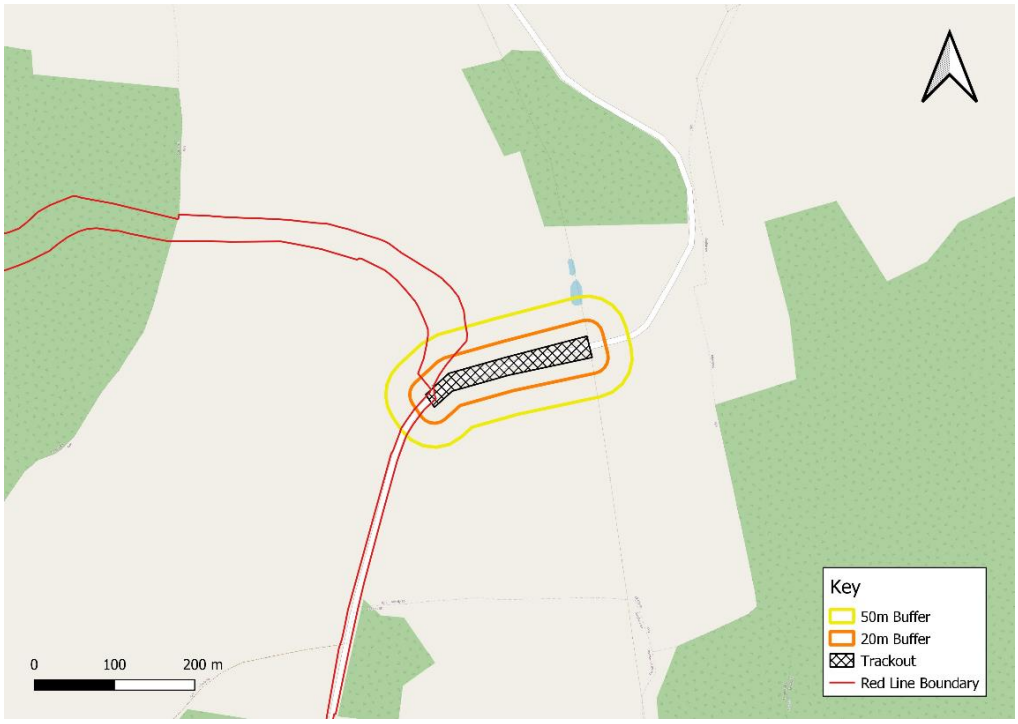


Figure 5.4: Trackout Activities Buffer Map (Access to Western Proposed Development)

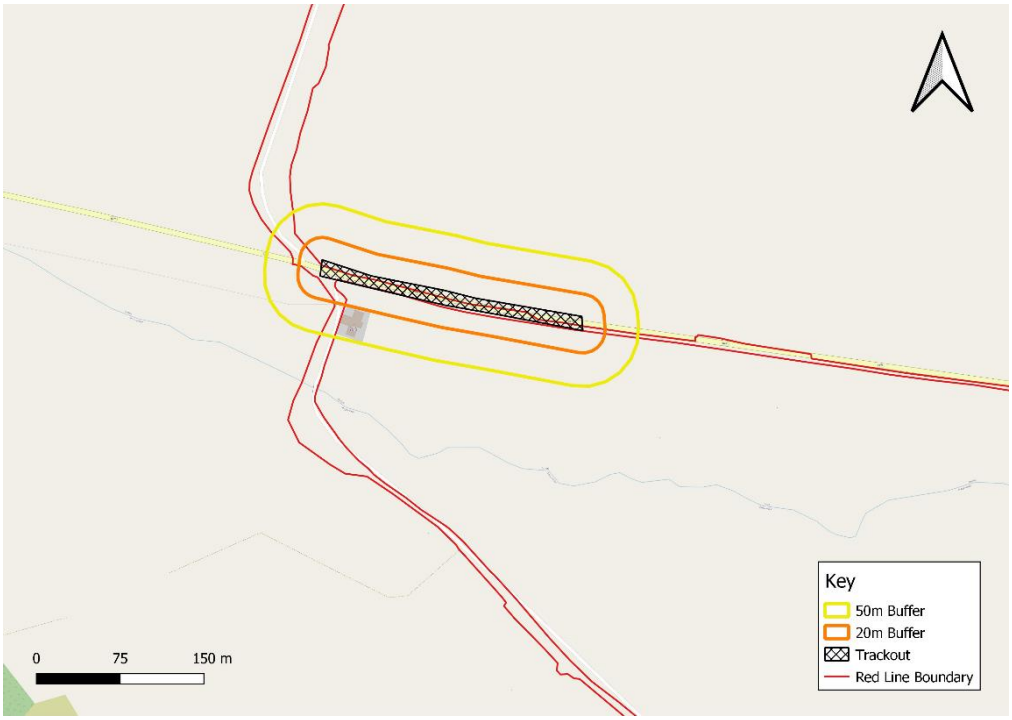


Table 5.2: Sensitivity of the area

Potential Impact		Sensitivity of the surrounding area			
		Demolition	Earthworks	Construction	Trackout
Dust soiling	Receptor sensitivity	N/A	High	High	High
	Number of receptors		10-100	10-100	1-10
	Distance from the source		<20m	<20m	<20m
	Sensitivity of the area		**High**	**High**	**Medium**
Human health	Receptor sensitivity		High	High	High
	Annual mean PM_{10} concentration		<24 µg/m^3	<24 µg/m^3	<24 µg/m^3
	Number of receptors		10-100	10-100	1-10
	Distance from the source		<20m	<20m	<20m
	Sensitivity of the area		**Low**	**Low**	**Low**
Ecological	Receptor sensitivity	N/A			

5.1.1.3 Risk of Impacts

The dust emission magnitude is combined with the sensitivity of the area to determine the risk of impacts of construction activities before mitigation; these are evaluated based on risk categories of each activity in Appendix A. The risk of dust impacts from construction activities is identified in Table 5.3.

Site specific mitigation measures to reduce construction phase impacts are defined based on this assessment in Section 6.

Table 5.3: Summary of the Dust Risk from Construction Activities

Potential Impact	Dust Risk Impact			
	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Medium-High Risk	Low-Medium Risk	Low Risk
Human health	N/A	Low Risk	Negligible-Low Risk	Low Risk
Ecological	N/A			

5.1.2 Exhaust Emissions from Plant and Vehicles

The operation of vehicles and equipment powered by internal combustion engines results in the emission of exhaust gases containing the pollutants NO_x, PM_{10}, volatile

organic compounds (VOCs) and carbon monoxide (CO). The quantities emitted depend on factors such as engine type, service history, pattern of usage and fuel composition.

Construction traffic will comprise haulage/construction vehicles and vehicles used for workers' trips to and from the application site. The greatest impact on air quality due to emission from construction phase vehicles will be in areas adjacent to the application site access and nearby road network.

During the construction phase, the Proposed Development has been estimated to generate an average of 44 construction vehicle movements per day and a maximum of 76 construction vehicle movements per day, with 62% of heavy good vehicles (HGVs). The predicted HGV and light good vehicle (LGV) generation do not exceed the DMRB screening criteria and therefore it is considered that further assessment of the construction phase traffic emissions is not required. The short-term increase in vehicle emissions during the construction phase is considered to be not significant.

The operation of construction site equipment and machinery will result in emissions to atmosphere of exhaust gases, but with suitable controls and site management such emissions are considered short-term and not significant (as per LAQM.TG.22).

5.2 Operational Phase

The assessment of baseline air quality in the region of the Proposed Development has shown that current levels of key pollutants are lower than their limit values. Due to the nature of the Proposed Development, the principal operational phase air quality impact is likely to be associated with traffic emissions as a result of any changes in traffic flows or flow composition that the Proposed Development may bring. The vehicle trip generation for the Proposed Development once operational is anticipated to be minimal as both the wind farm and substation will be operated remotely.

The Proposed Development is not expected to generate traffic exceeding the DMRB screening criteria once operational and therefore it is considered that further assessment of the operational phase traffic emissions is not required. The increased road traffic emissions resulting from the Proposed Development is not expected to have a significant effect on air quality during the operational phase.

Furthermore, considering the electricity to be generated by the wind farm, which is a clean, sustainable source of energy, the Proposed Development will help reduce the energy requirements from fossil fuels, which emit harmful air emissions, such as carbon dioxide, nitrogen dioxide, sulphur dioxide and particulate matters.

5.3 Decommissioning Phase

The decommissioning phase will involve the removal of the proposed wind turbines and associated infrastructure from the site. Vehicles and generators associated with the removal of the panels have the potential to cause a temporary adverse impact on local air quality in the short term. The traffic impact associated with the decommissioning phase will be significantly less than the construction phase. The Proposed Development is not expected to generate traffic exceeding the DMRB screening criteria during the decommissioning phase and therefore it is considered that further assessment of the decommissioning phase traffic is not required.

Based on the temporary nature of the decommissioning activities and low background pollutant concentrations in the vicinity of the site, it is considered unlikely that the effect of dust and particulate matter emissions and exhaust emissions from plant and vehicles during decommissioning phase will result in a significant effect on local air quality. It should be noted that measures implemented during the construction phase are also relevant for the decommissioning phase. Therefore, the Proposed Development is not expected to have a significant effect on local air quality during the decommissioning phase.

6 MITIGATION MEASURES

6.1 Mitigation Measures

6.1.1 Construction Phase

6.1.1.1 Fugitive Dust Emissions

The dust emitting activities outlined in Section 5.1 can be effectively controlled by appropriate dust control measures (described below) and any adverse effects can be greatly reduced or eliminated.

Prior to commencement of construction activities, a Construction Environmental Management Plan (CEMP)) for the construction phase will be prepared and agreed with the local authority to ensure that the potential for adverse environmental effects on local receptors is minimised. The CEMP will include measures for controlling dust and general pollution from site construction operations. Controls will be applied throughout the construction period to ensure that emissions are mitigated.

The dust risk categories identified have been used to define appropriate, site-specific mitigation methods. Site-specific mitigation measures are divided into general measures, applicable to all sites and measures specific to earthworks, construction and trackout. Depending on the level of risk assigned to each site, different mitigation is assigned. The method of assigning mitigation measures as detailed in the IAQM construction dust guidance has been used.

In this case, the 'low risk', 'medium risk' and 'high risk' site mitigation measures have been applied, as determined by the dust risk assessment. For those mitigation measures that are general, the highest risk assessed has been applied. Two categories of mitigation measure are described in the IAQM construction dust guidance – 'highly recommended' and 'desirable', which are indicated according to the dust risk level identified in Table 5.3. Desirable measures are presented in *italics*.

The mitigation measures described below will be used to control potential fugitive emissions from the construction project. Therefore, the measures listed below, whether cited as 'highly recommended' or 'desirable' in the IAQM construction dust guidance, will be applied on / in the vicinity of the site.

Communications

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of people 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

- Further develop and implement a Construction Environmental Management Plan, which include measures to control other emissions, approved by the local authority.

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 if requested.
- Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site and the action taken to resolve the situation in the logbook.
- Hold regular liaison meetings with other high risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

Monitoring

- Undertake regular on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and windowsills within 100m of site boundary, with cleaning to be provided if necessary.
- Carry out regular site inspections to monitor compliance with the dust management plan, record inspection results, and make an inspection log available to the local authority if requested.
- 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 PM_{10} continuous monitoring locations with the local authority.

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.
- Erect solid screens or barriers around dusty activities or the site boundary.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive 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.
- Cover, seed or fence stockpiles to prevent wind whipping.

Operating Vehicles/Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.

- Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced site access tracks and work areas.
- Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable
- Impose and signpost a maximum-speed-limit of 24 kmph on surfaced and 16 kmph 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).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Construction Operations

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

Specific to Earthworks

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

Specific to Construction

- *Avoid scabbling (roughening of concrete surfaces) if possible.*
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.
- *Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.*
- *For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust.*

Specific to Trackout

- *Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site.*
- *Avoid any dry sweeping of large areas.*
- *Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.*
- *Record all inspections of haul routes and any subsequent action in a site logbook.*
- *Implement a wheel washing system.*

6.1.1.2 Exhaust Emissions from Plants and Vehicles

The traffic effects of the Proposed Development during the construction phase will be limited to a relatively short period and will be along traffic routes employed by haulage/construction vehicles and workers. Any effects on air quality will be temporary i.e. during the construction period only, and can be suitably controlled by the employment of mitigation measures (described above) appropriate to the development project, including a construction logistics plan, and are therefore unlikely to materially impact on local air quality.

Any emissions from non-road mobile machinery (NRMM) can be reduced by ensuring that any plant used on-site comply with the NO_x, particulate matter and carbon monoxide emissions standards specified in the Regulation (EU) 2016/1628 (as amended) of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC as a minimum, where they have net power of between 37kW and 560kW. The emissions standards vary depending on the net power the engine produces. The Construction Environmental Management Plan will include these emissions controls.

6.1.2 Operational Phase

The Proposed Development is not anticipated to have a significant impact on local air quality during the operational phase and the effect is considered to be not significant. Therefore, no specific operational phase mitigation measure is considered to be required.

6.1.3 Decommissioning Phase

Any effects on air quality will be temporary during the decommissioning phase. Mitigation measures suggested as above for construction phase are also relevant for the decommissioning phase to control potential fugitive emissions from the decommissioning works and exhaust emissions from plants and vehicles.

7 RESIDUAL EFFECTS AND CUMULATIVE EFFECTS

7.1 Residual Effects

7.1.1 Construction Phase

All construction effects were assessed to be not significant provided that appropriate dust control and construction phase mitigation measures are applied as listed in the mitigation measures section. Residual effects are therefore also not significant with suitable mitigation measures in place.

7.1.2 Operational Phase

The Proposed Development is not anticipated to have a significant impact on local air quality, and the residual impacts of the development on air quality whilst it is in operation are considered to be not significant.

7.1.3 Decommissioning Phase

Any effects on air quality will be temporary during the decommissioning phase. The measures implemented during the construction phase are also relevant for the decommissioning phase. With the implementation of the proposed mitigation measures listed in the mitigation section, the residual effects are considered to be temporary and not significant.

7.2 Cumulative Effects

Twelve sites have been included within the cumulative assessment, which are Carrownagowan Wind Farm, Castlewaller Wind Farm, Fahybeg Onshore Wind Farm, Knockshanvo Wind Farm, Ballyclar Wind Farm, Boolynagleragh Lissycasey Wind Farm, Boolynagleragh-Boolybrien, Knockatunna and Rathcroney Wind Farm, Parteen Turbine, Vision Care Turbine, Lackareagh Wind Farm and two name unknow wind farms owned by Tipperary CC.

7.2.1 Construction Phase

The phasing/commencement of any other permitted developments in the locality could potentially result in the scenario where a number of other construction sites are in operation at the same time as the Proposed Development. The IAQM construction phase methodology states that beyond 250m from a site boundary, the risk of impact from activities carried out on-site during the construction phase can be considered to be negligible. There are no committed developments and planned, permitted or operational wind farms within 250m of the proposed wind farm apart from the Knockshanvo Wind Farm. It is understood that a small section of the Carrownagowan Wind Farm GCR will intersect with the IPP cabling for the Proposed Development. All permitted developments are expected to agree and follow site specific Construction Environmental Management Plans or Dust Management Plans and Construction Traffic

Management Plans that will adequately control emissions from construction. Therefore, with appropriate mitigation measures in place, the construction phase cumulative effect is considered to be not significant.

7.2.2 Operational Phase

As stated in Section 5.2, traffic volumes to the site during the operational phase will be low. As per construction phase impacts, any other permitted developments are expected to follow best practice mitigation measures to minimise emissions to air. Therefore, exceedance of the relevant AQSs is considered unlikely and cumulative operational phase effects are considered not significant.

7.2.3 Decommissioning Phase

As per construction phase impacts, all permitted developments are expected to agree and follow site specific decommissioning plans, to be agreed with the local authority, that will adequately control emissions from decommissioning. Therefore, with appropriate mitigation measures in place, the decommissioning phase cumulative effect is considered to be not significant.

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APPENDIX A
CONSTRUCTION DUST ASSESSMENT METHODOLOGY

This appendix contains the construction dust assessment methodology used in the assessment.

To assess the potential impacts, construction activities are divided into demolition, earthworks, construction and trackout. The descriptors included in this section are based upon the IAQM construction dust guidance. The assessment follows the steps recommended in the guidance.

Step 1: Screen the requirement for assessment

The first step is to screen out the requirement for a construction dust assessment, this is usually a somewhat conservative level of screening. An assessment is usually required where there is:

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

Step 2A: Defining the Potential Dust Emission Magnitude

Demolition

The dust emission magnitude category for demolition is varied for each site in terms of timing, building type, duration and scale. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total building volume >75,000m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >12m above ground level;
- **Medium**: Total building volume 12,000m^3 – 75,000m^3, potentially dusty construction material, demolition activities 6m – 12m above ground level; and
- **Small**: Total building volume <12,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <6m above ground, demolition during wetter months.

Earthworks

The dust emission magnitude category for earthworks is varied for each site in terms of timing, geology, topography and duration. Examples of the potential dust emission classes are provided in the guidance as follows:

- **Large**: Total site area >110,000m^2, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >6m in height;

- **Medium**: Total site area 18,000 – 110,000m^2, moderately dusty soil type (e.g. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 4 – 6m in height; and
- **Small**: Total site area < 18,000m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height.

Construction

The dust emission magnitude category for construction is varied for each site in terms of timing, building type, duration, and scale. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: Total building volume >75,000m^3, on site concrete batching, sandblasting;
- **Medium**: Total building volume 12,000 – 75,000m^3, potentially dusty construction material (e.g. concrete), on site concrete batching; and
- **Small**: Total building volume <12,000m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

Trackout

Factors which determine the dust emission magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Examples of the potential dust emissions classes are provided in the guidance as follows:

- **Large**: >50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- **Medium**: 20 – 50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and
- **Small**: <20 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50m.

Step 2B: Defining the Sensitivity of the Area

The sensitivity of the area is defined for dust soiling, human health and ecosystems. The sensitivity of the area takes into account the following factors:

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

Table A1 has been used to define the sensitivity of different types of receptors to dust soiling, health effects and ecological effects.

Table A1: Sensitivity of the Area Surrounding the Site

Sensitivity of Area	Dust Soiling	Human Receptors	Ecological Receptors
High	• Users can reasonably expect a enjoyment of a high level of amenity. • The appearance, aesthetics or value of their property would be diminished by soiling. • The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land. • Examples include dwellings, museums and other culturally important collections, medium and long term car parks and car showrooms.	• 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) • 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 with an international or national designation *and* the designated features may be affected by dust soiling. • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List For Great Britain. • Examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• 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. • The appearance, aesthetics or value of their property could be diminished by soiling. • 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. • Examples include parks and places of work.	• 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). • 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 there is a particularly important plant species, where its dust sensitivity is uncertain or unknown. • Locations with a national designation where the features may be affected by dust deposition. • Example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• The enjoyment of amenity would not reasonably be expected. • Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling. • 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. • Examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.	• Locations where human exposure is transient. • Indicative examples include public footpaths, playing fields, parks and shopping streets.	• Locations with a local designation where the features may be affected by dust deposition. • Example is a local Nature Reserve with dust sensitive features.

Based on the sensitivities assigned of the different types of receptors surrounding the site and numbers of receptors within certain distances of the site, a sensitivity classification for the area can be defined for each. Tables A2 to A4 indicate the method used to determine the sensitivity of the area for dust soiling, human health and ecological impacts, respectively.

For trackout, as per the IAQM construction dust guidance, it is only considered necessary to consider trackout impacts up to 50m from the edge of the road.

Table A2: Sensitivity of the area to dust soiling effects on people and property

Receptor Sensitivity	Number of Receptors	Distances from the Source (m)			
		<20	<50	<100	<350
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

Table A3: Sensitivity of the area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	Number of Receptors	Distances from the Source (m)				
			<20	<50	<100	<200	<350
High	>32μg/m^3	>100	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32μg/m^3	>100	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28μg/m^3	>100	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 μg/m^3	>100	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	>32μg/m^3	>10	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	28-32μg/m^3	>10	Medium	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	24-28μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
	<24 μg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low	Low

Table A4: Sensitivity of the area to Ecological Impacts

Receptor Sensitivity	Distances from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C: Defining the Risk of Impacts

The final step is to use both the dust emission magnitude classification with the sensitivity of the area, to determine a potential risk of impacts for each construction activity, before the application of mitigation. Tables A5 to A7 indicate the method used to assign the level of risk for each construction activity.

Table A5: Risk of Dust Impacts from Demolition

Sensitivity of Area	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

Table A6: Risk of Dust Impacts from Earthworks/Construction

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

Table A7: Risk of Dust Impacts from Trackout

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