9.0 AIR QUALITY AND CLIMATE

9.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) presents an assessment of the potential effects that may occur on the receiving environment (in particular dust and climate) as a result of the proposed soil recovery facility (the 'Proposed Development') at Kilmartin, Coynes Cross, Newcastle, Co. Wicklow. The Application Site ('the Site)' is shown in Figure 9-1 below (as defined therein by the 'application boundary').

The choice of team members for each study has been informed by the experience of the relevant lead specialist in their area of technical interest. The air quality assessment has been prepared by Sophie Winters (BSc (Hons.)) and Rachel Lansley (BSc, MSc). Sophie is an Affiliate member of the Institute for Environmental Management and Assessment (IEMA) and has more than 4 years' experience in air quality assessment. Rachel is a Chartered Scientist (CSci), a Member of the Institution of Environmental Sciences (IES), and a Member of the Institute of Air Quality Management (IAQM) and has more than 15 years' experience in air quality and climate assessment.

A detailed description of the Site and the activities that are to be undertaken can be found in Chapter 3.0: Project Description of this EIAR. A summary of the project description can be found in Section 9.3 below.

9.1.1 BACKGROUND

The land comprising the subject of this EIAR extend to 17.08 ha and is made up of agricultural land with discontinuous hedgerow, occupying a deep valley running north to south with steep sides to the east and west. The Site is currently used for sheep grazing and some small arable crop farming in the northern section. The presence of the steep sided valley, and periodically wet waterlogged ground at the base of the valley, limits the land's agricultural potential. Consequently, the land use is mainly confined to sheep grazing. The lands adjacent to the Site are largely used for agricultural purposes, with coniferous forestry located to the south, and some residential dwellings to the north.

The void space has been estimated at approximately 1,200,000 m^3 and this would represent approximately 2,160,000 tonnes at an estimated rate of 1.8 tonnes per 1m^3 of clays and soils. The facility will routinely accept up to 100 loads per day. Based on a maximum 20 tonnes per load this indicates that the Site will routinely receive up to 550,000 tonnes per year giving a minimum possible life for the operation of the soil recovery facility of approximately 3.93 years (on the basis that the soil recovery facility will operate 5.5 days per week and 50 weeks per year). There is the possibility that the facility may exceptionally accept up to 150 loads per day during busy periods in the construction industry and that this amount of material will not be imported on a regular basis. It is likely that the number of accepted loads will be less than 100 each day.

9.1.2 SCOPE & METHODOLOGY

This chapter presents an assessment of the potential air quality and climate effects associated with the Proposed Development. The effects have been assessed in the context of relevant national, regional and local air quality policies.

A qualitative assessment of dust impacts from the operation of the soil recovery facility has been undertaken in line with Institute of Air Quality Management (IAQM); Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016. The detailed assessment is included in Appendix 9A.

Under the current programme, it is expected that the duration of operation of the soil recovery facility may last for between approximately 4 -10 years depending on availability of clean soil and stone to complete the Proposed Development. A restoration and aftercare phase for the Proposed Development has been considered along with the phasing of activities which is described in Chapter 3.0: Project Description.

For the purpose of clarity, this assessment uses the term 'works phase' to describe the period of time comprising the following construction activities:

- Enabling works to provide facilities required for the operation of the soil recovery facility (I.e., entrance upgrades, establishment of office and welfare facilities, etc); and
- The operation of the soil recovery facility (i.e. acceptance of clean soil and stone to Site and its subsequent emplacement within the fill area).

A restoration phase, broadly following the work phase (with some temporal overlap), will comprise the shaping on the final landform in the fill level, restoration of stored topsoil, seeding (where necessary), and planting with subsequent aftercare and maintenance.

It is considered that the worse-case scenario would occurs within the works phase. As the site facilities (e.g. buildings and other structures) to be developed on the Site will be temporary in nature (e.g. portacabins, weighbridge), no assessment of enabling activities (works phase) is required, and this is screened out of the assessment.

A traffic screening for effects from operational road traffic emissions has been undertaken in accordance with the UK National Highways Design manual for Roads and Bridges (DMRB), 2019.

9.1.3 SOURCES OF EMISSIONS TO AIR

9.1.3.1 Particulates

The main potential impacts on ambient air quality associated with the proposed activities are associated with the generation and deposition of dust from the void filling operations.

Potential dust emissions associated with Proposed Development are:

- Haulage of materials to the Site, where the weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all affect the amount of dust emitted:
- Transport of materials within the Site on haul routes via truck;
- Unloading of materials via tipping trucks;
- Temporary stockpiling of materials within the Site;
- Movement of material (backfilling material and recycled aggregates for haul road formation) from temporary stockpiles to the active tipping face by tracked bulldozer; and
- Wind blow from material stockpiles and unsurfaced internal haul roads.

9.1.3.2 Traffic Emissions

The projected normal operating daily traffic movements associated with the operations of the soil recovery facility are approximately 200 HDV (trucks >3.5 tonnes) movements (movements each way

included in the calculations) relating to the normal operations import of 100 loads per day. As it is proposed for the soil recovery facility to operates for 5.5 days a week (assumed to be 6 for conservatism) for 50 weeks a year, the calculated normal operation AADT would be approximately 164 AADT for HDVs.

Occasionally, under abnormal scenarios (during periods of peak supply) the maximum loads may increase to 150 loads/ 300 movements which would equate to 247 AADT, but this would not be normal operation for the soil recovery facility and would not be undertaken over sustained periods. There is currently no AADT data for LDVs but based on the site design of 6 parking bays for employees and visitors, there would likely be a maximum of approximately 24 movements per day, equating to 20 AADT allowing for 2 return journeys for each car.

The UK National Highways Design manual for Roads and Bridges (DMRB), 2019 states an LDV screening criteria of a change of 1000 AADT, and a HDV screening criteria of a change of 200 AADT with air quality assessments being based on the most likely forecast traffic flows. Considering that the normal operating traffic flows are below the screening criteria, a detailed assessment is not required and emissions from vehicles are screened out as **Not Significant**.

9.1.3.3 Odour

As the soil and stones being placed / recovered at the Site are not biodegradable and will not emit odorous gases, the Prosed Development will not give rise to odour nuisance. Therefore, odour is not considered any further in this assessment and is screened out as **Not Significant.**

In the unlikely event that any biodegradable waste is identified among imported materials, it shall be immediately removed to the waste quarantine area pending removal off-site to a licenced waste disposal or recovery facility.

9.2 LEGISLATIVE AND POLICY CONTEXT

9.2.1 EUROPEAN AIR QUALITY DIRECTIVES

The European Union (EU) Directive on Ambient Air Quality Assessment and Management came into force in September 1996 (96/62/EC) and defines the policy framework for 12 air pollutants known to have harmful effects on human health and the environment. Air quality limit values (ambient pollutant concentrations not to be exceeded after a given date) for the pollutants are set through a series of Daughter Directives. The first Daughter Directive (1999/30/EC) sets limit values for NO_2 and PM_{10} (amongst other pollutants) in ambient air.

Following the Daughter Directives, EU Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe (CAFE) came into force in June 2008, consolidating the existing air quality legislation, making provision for Member States to postpone attainment deadlines and allowing exemption from the obligation to limit values for certain pollutants, subject to strict conditions and assessment by the European Commission. Directive 2008/50/EC was transposed into Irish legislation in 2011 through The Air Quality Standards Regulations 2011. The Directive merged the four daughter directives and EU Council decision into a single directive on air quality. The new Directive also introduced a new limit value for PM2.5 but does not change the existing air quality standards.

9.2.2 NATIONAL AIR QUALITY LEGISLATION

The Air Pollution Act (1987) is the primary legislation relating to air quality in Ireland and provides the means for local authorities to take the measures that they deem necessary to control air pollution.

The Air Quality Standards Regulations (2011) transpose the Directive on ambient air quality (2008/50/EC) into Irish law. These regulations establish limit values and thresholds for various pollutants in ambient air.

The Environmental Protection Agency (EPA) monitor the levels of various pollutants against the standards set out in EU and Irish legislation. The EPA are the competent authority for annual reporting to the Minister for the Environment, Heritage and Local Government and the European Commission.

9.2.3 OTHER RELEVANT LEGISLATION

Legislative references considered specifically for the assessment of air quality from extraction and waste disposal activities, and relevant statutory instruments in a planning context include:

- European Communities (Environmental Impact Assessment Regulations) 1989 (S.I. No. 349 of 1989);
- Section 177F of the Planning & Development Act 2000 as amended;
- Directive 2014/52/EU of the European Parliament and of the Council, (amending Directive 2011/92/EU);
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, S.I. 296 of 2018; and
- Planning and Development Regulations 2001 (as amended).

9.2.4 RELEVANT GUIDANCE

This assessment has been undertaken with guidance from the 'Guidelines on the information to be contained in Environmental Impact Assessment Reports', published by the EPA in May 2022; 'Environmental Impact Assessment of projects, guidance on the preparation of the Environmental Impact Assessment Report' published by the European Commission in 2017.

Other guidance documents considered in this assessment include:

- IAQM; Guidance on the Assessment of Mineral Dust Impacts for Planning, 2016;
- IAQM; Guidance on the assessment of dust from demolition and construction, 2014;
- UK Highways Agency, Design manual for Roads and bridges (DMRB), 2019;
- EPA; Guideline Document entitled Environmental Management in the Extractive Industries, 2006;
- EPUK & IAQM; Land-Use Planning and Development Control: Planning for Air Quality, 2017;
- Irish Concrete Federation – Environmental Code 2nd Edition, October 2005;
- Environmental Management in the Extractive Industry, EPA 2006;
- Quarries and Ancillary Activities – Guidelines for Planning Authorities – DOEHLG, April 2004;
- Process Guidance Note 3/16 (12) – Secretary of State's Guidance for Mobile Crushing and Screening, DEFRA (UK), September 2012;
- Process Guidance Note 3/8 (12) – Secretary of State's Guidance for Quarry Processes, DEFRA (UK), September 2012;

- Safe Quarry – Guidelines to the Safety, Health and Welfare at Work (Quarries) Regulations 2008 – Health and Safety Authority, 2020; and
- Environmental Protection Agency's Annual Air Quality in Ireland Report 2013.

9.2.5 RELEVANT PLANNING OBJECTIVES

The Wicklow County Development Plan (WCDP) (2022-2028) guides planning policy in the area and includes policies in relation to the protection of air quality from deposited dust and fine particulates. Polices included in the WCDP which are relevant to this assessment of population and human health include:

CPO 15.3 - To facilitate the development of existing and new waste prevention and recovery facilities and in particular, to facilitate the development of 'green waste' recovery sites;

CPO 15.9 - To regulate and control activities likely to give rise to emissions to air (other than those activities which are regulated by the EPA);

CPO 15.10 - To require proposals for new developments with the potential for the accidental release of chemicals or dust generation, to submit and have approved by the Local Authority construction and/or operation management plans to control such emissions;

CPO 15.11 - To require activities likely to give rise to air emissions to implement measures to control such emissions, to undertake air quality monitoring and to provide an annual air quality audit.

9.2.6 AIR QUALITY STANDARDS

Table 9-1 below shows the limit or target values, specified by the CAFE Directive 2008/50/EC, relevant to this assessment.

9.2.6.1 Gaseous Pollutants

Table 9-1 - Air Quality Standards Caption

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m^3	Basis of application Limit
SO_2	Protection of human health	1 hour	350	Not to be exceeded more than 24 times in a calendar year
		24 hours	125	Not to be exceeded more than 3 times in a calendar year
	Protection of vegetation	Calendar year	20	Annual mean
		1 Oct to 31 Mar	20	Winter mean
NO_2	Protection of human health	1 hour	200	Not to be exceeded more than 18 times in a calendar year
		Calendar year	40	Annual mean
NO_2 + NO	Protection of ecosystems	Calendar year	30	Annual mean
PM_{10}	Protection of human health	24 hours	50	Not to be exceeded more than 35 times in a calendar year
		Calendar year	40	Annual mean
$PM_{2.5}$		Calendar year	25	Annual mean

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m^3	Basis of application Limit
Stage 1	Protection of human health			
$PM_{2.5}$ Stage 2		Calendar year	20	Annual mean

9.2.6.2 Coarse Particulates

The impact of dust is usually monitored by measuring rates of dust deposition. According to the Environmental Protection Agency (EPA) Guideline Document entitled Environmental Management in the Extractive Industries (April 2006), applicable for this EIAR, there are no Irish statutory standards relating specifically to dust deposition thresholds for inert mineral dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standards (TA Luft, 1986) specify a method of measuring dust deposition – the Bergerhoff Method (German Standard VDI 2119, 1972) – with dust nuisance.

On this basis, the EPA recommend a dust deposition limit value of 350 mg/m^2/day (Table 9-2)(when averaged over a 30-day period) be adopted at Site boundaries associated with quarrying related activities. Due to the nature of the works associated with the proposed facility, this limit value has been applied in this assessment, although it is noted that it is not proposed to carry out quarrying at the Site.

Table 9-2 - Dust Limit Values

Procedures	Monitoring Frequency	Standard
Dust Emissions	Monthly	<350 mg/m2/day; Bergerhoff Method

9.2.7 PRE-CONSULTATION

A non-statutory pre-consultation process was carried out with prescribed bodies and other parties over the period from 25 May–26 June 2023 to seek comments and observations about the Proposed Development. This process is fully documented in the Pre-Consultation Report accompanying the Strategic Infrastructure Development (SID) application submission and a summary is provided in Section 1.8 (Chapter 1: Introduction) of this EIAR. Pre-consultation opinions/comments received relating to air quality and climate have been considered in the preparation of this EIAR chapter and within the wider EIAR where relevant (e.g. Chapter 12.0 Traffic and Transport)

9.3 PROJECT DESCRIPTION

A full project description is provided in Chapter 3.0 (Project Description). A project description summary is provided below:

The Proposed Development is the establishment and operation of a soil recovery facility within a 17.08 hectare site at Kilmartin, Co. Wicklow (approximately 4 km north-east of Ashford). The soil recovery facility will import up to 2,160,000 tonnes of inert waste, primarily clean soils and stones from construction and development sites. Clean soil and stone will be used to progressively infill a steep-sided natural valley within the Site and raise ground levels to approximately 57 mOD, tying in with the surrounding landscape. The infill area covers approximately 14 hectares.

The soil recovery facility will accept up to 100 loads per day on average (maximum 150 in exceptional circumstances) with a projected operational lifespan of up to 10 years depending on market conditions within the construction sector, followed by one year for final restoration and aftercare of the lands.

The Proposed Development will require the following structures be installed and maintained for the operational life of the Soil Recovery Facility: office and welfare facilities, six parking bays for private vehicles, weighbridge and associated weighbridge cabin, one wheel wash and one spray-system wheel wash, two waste inspection bays and one bunded waste quarantine area, hardstanding area (for vehicle movement and storage), surface water drainage infrastructure from hard standing and discharge to ground (including two interceptors and two soakaways), an internal access road, internal haul roads (constructed from recycled aggregates where available), security features including security gates and fencing, and power supply. These structures will be removed from the Site at the end of life point of the soil recovery facility.

Approval will be sought for a connection to the ESB Network for the site office and welfare facilities. Diesel generators will be used to power mobile lighting, if required. Temporary lighting, if required, will be cowled to prevent light spillage.

The temporary relocation of ESB poles within the fill area will be required. This will be subject to prior agreement with ESB.

Wastewater from office and welfare facilities will be managed by a third-party provider, with no connection to foul water mains.

All truck deliveries will access the site via the N11/M11 and Coynes Cross Road, with internal queuing space provided within the Site and no parking on public roads.

The existing land entrance located on R772 will be upgraded and will be retained following the completion of the Proposed Development.

A groundwater abstraction borehole will be installed to supply water for wheel washes, dust suppression, and welfare facilities, and will be retained for monitoring after restoration.

Restoration will return the Site to grassland and hedgerow habitat, similar to its pre-development state. Approximately 140 m of fence and hedgerow opposite the entrance will be temporarily removed to improve sightlines during the life of the soil recovery facility and this will be subsequently reinstated. Native species will be used in hedgerow planting. The restored land will revert to agricultural management.

Permission is sought from An Coimisiún Pleanála for a period of up to 10 years, with an additional year for restoration. The Proposed Development will require a waste licence[1] from the Environmental Protection Agency (EPA) and aligns with national and regional policy objectives to provide adequate licensed soil recovery capacity for the Dublin and Wicklow regions.

[1] The proposed development will be carried out in accordance with a waste licence from the EPA or in accordance with by-product regulations, Article 27 of the European Communities (Waste Directive) Regulations 2011 (see Section 3.5 in Chapter 3.0: Project Description of this EIAR for further detail).

9.4 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

9.4.1 PARTICULATES

The IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (2016) has been used for assessing the impacts of deposited dust. It follows a standard source-pathway-receptor methodology.

The residual source emissions are characterised based on the scale of the operations and the Site activities and are classified as either small, medium or large. Guidance on the appropriate scale of the residual source is provided in the IAQM guidance, Appendix 4 (2016). This source characterisation includes consideration of the routine management and mitigation measures which have or will be undertaken at the Site.

The pathway from the source to the receptor is assessed considering the distance and direction of receptors to the source relative to the prevailing wind and local meteorology. The local meteorological data is also used to assess the frequency of the winds in each direction. It has been found that deposited dust does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), therefore all receptors within 500 m of the application boundary are considered. The guidance states that it is commonly accepted that the greatest impacts will occur within 100 m of the source, with the potential for travel up to 400 m.

For full consideration of the effects of the access road, in the absence of any methodology within the IAQM minerals guidance, the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2016) has been considered. This guidance states that human receptors within 50 m of the routes used by vehicles for 350 m from the Site exit point should be considered. For this reason, the Site access road will be subject to a 50 m buffer, which will then extend 350 m out onto the R772 public road in a southerly direction to account for the possibility of trackout from exiting vehicles.

The full assessment is provided in Appendix 9A of this report.

9.5 EXISTING ENVIRONMENT

9.5.1 SITE LOCATION

The Site is located in the townland area of Kilmartin, Co. Wicklow and is approximately 4 km north-east of Ashford (National Grid Reference of 327850N, 201300E).

The Site is irregular in shape and is bounded to the south and north by agricultural land with some coniferous forestry to the south. Coynes Cross road is located to the west of the Site and this connects to the R772 and M11 (via Junction 14) to the south-west of the Site. A small lane is located to the east of the Site that links the L-5064 to the R761 Coast Road. The land further to the east is agricultural land.

The Site is bounded by two small streams, one to the north and one to the south of the Site. The northern stream runs from west to east along the L-5064 road approximately 300 m north of the footprint area. The Cullenmore stream flows east approximately 45 m south of the Application boundary at its nearest (southernmost) point. These streams confluence approximately 600 m to the southeast of the Site and flow southwards into Broad Lough where they confluence with the Vartry river to form the Leitrim River and ultimately discharge to the Irish Sea at Wicklow town.

Access to the Site is via an existing entrance which is located on the Coynes Cross Road (R772).

A Site location plan is shown in Figure 9-1 below.

Figure 9-1 –Application boundary (solid red line) and study area boundary (dashed red line).

9.6 BASELINE CONDITIONS

9.6.1 STUDY AREA

It has been found that deposited dust does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), therefore all receptors within 500 m of the application boundary are conservatively considered. The guidance states that it is commonly accepted that the greatest impacts from particulates will occur within 100 m of the source, with the potential for travel up to 400 m.

For full consideration of the effects of particulates on the Site access road, in the absence of any methodology within the IAQM minerals guidance, the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2014) has been considered.

This guidance states that human receptors within 50 m of routes used by vehicles for 350 m from a site exit point should be considered for mineral dust impacts. For this reason, the Site access point on Coynes Cross Road (R772) will be subject to a 50 m buffer, which will then extend 350 m out along the R772 in the southerly direction towards the M11 to account for the possibility of trackout from exiting vehicles. The 350 m length buffer has been applied from the point at which the Site

exits onto the R772 public road in the southerly direction only as this is the route which vehicles from the Site will take. The full assessment in contained in Appendix 9A of this report.

9.6.2 RECEPTORS

Receptors identified for the purpose of the assessment of particulates/dust emissions as a result of the Proposed Development of the Site are shown below in Figure 9-2. It is noted that the medieval church (AR-10) and graveyard (AR-12) receptors identified within the Cultural Heritage chapter of this EIAR (Chapter 11.0) have been scoped out for potential particulates/dust emissions impacts due to their distance from the Site. The greatest proportion of dust deposits within 100 m of the source and does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), therefore all receptors within 500 m of the application boundary are considered. Receptors AR-10 and AR-12 lay beyond 500 m from the Site, therefore no impact would be expected here and they have been scoped out.

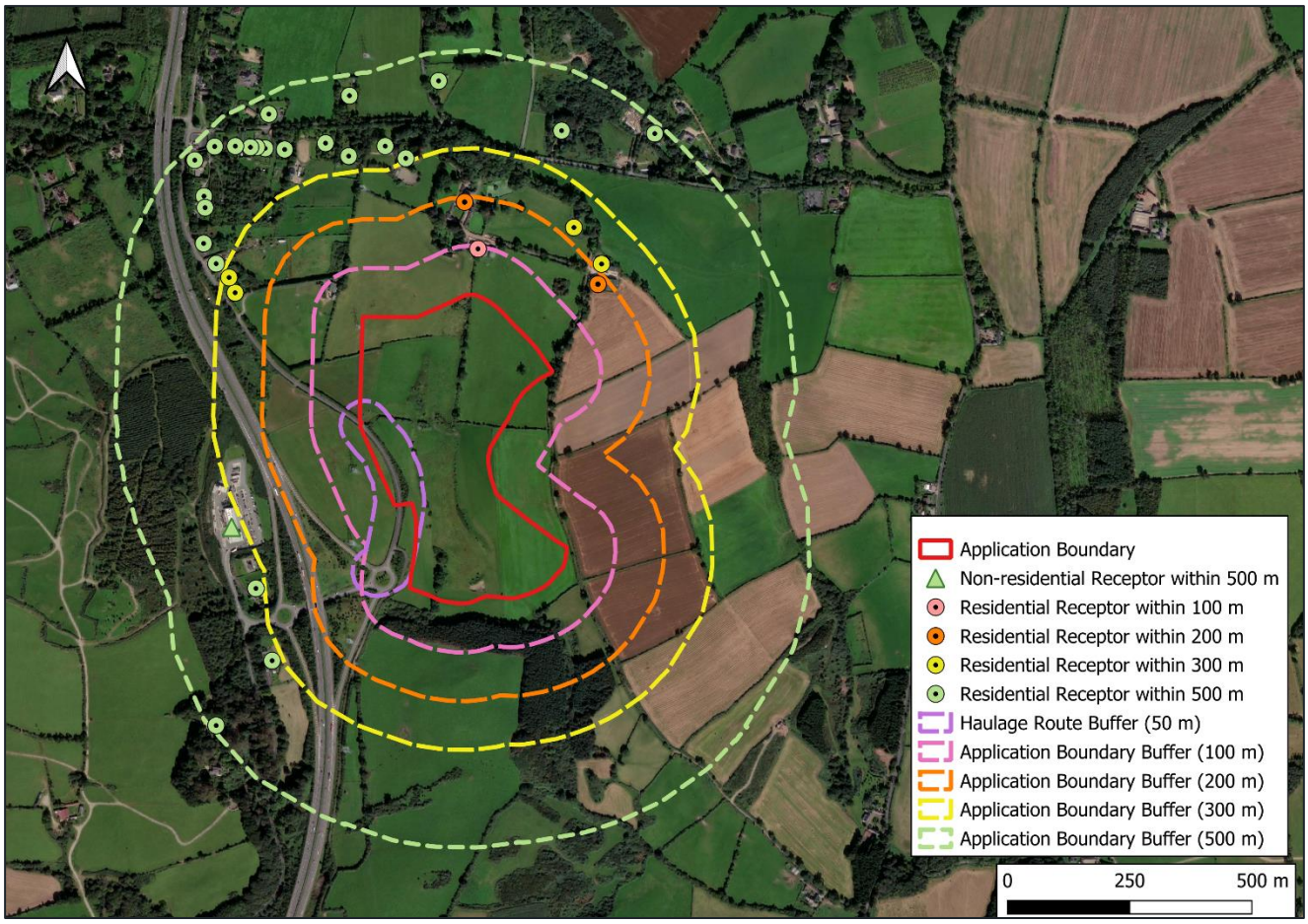

Figure 9-2 - Location of receptors within 500 m of the Site (including Planning Application Boundary) and within 50 m of the Site Access Haulage Route (extending 350 m in a southerly direction from the point of exit of at the application boundary)

9.6.3 CLIMATE AT THE SITE

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. The climate in the area of the Site is typical of the Irish climate, which is temperate maritime.

The closest and most representative Met Éireann station recording multiple meteorological parameters is located at Oak Park, Co. Carlow, approximately 60 km southwest of the Site. Data is available for this station from 2003 onwards. Monthly historical data between 2019 and 2023 have been averaged and are presented in Table 9-3

Table 9-3 - Carlow Oak Park, Co. Carlow Monthly Averaged Monthly Climate Information 2019 to 2023

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Mean Air Temperature (°C)	5.4	6.8	7.3	8.6	11.4	14.0	16.7	16.2	14.1	10.8	7.9	5.4
Maximum Air Temperature (°C)	13.1	14.1	16.6	19.4	21.5	25.0	27.2	27.0	23.5	17.6	15.9	13.3
Minimum Air Temperature (°C)	-4.6	-1.8	-1.5	-1.7	0.5	4.3	7.9	6.6	3.2	1.8	-1.1	-3.1
Mean Maximum Temperature (°C)	8.3	10.0	11.4	13.4	16.2	18.4	21.2	21.1	18.4	14.3	10.6	8.2
Mean Minimum Temperature (°C)	2.6	3.6	3.1	3.8	6.6	9.5	12.2	11.4	9.8	7.3	5.1	2.6
Precipitation (mm)	54.5	83.5	67.6	40.0	46.7	43.6	51.6	70.6	91.7	116.1	79.8	90.5
Grass Minimum Temperature (°C)	-10.8	-7.6	-7.6	-6.7	-4.6	0.1	3.3	1.7	-1.5	-2.7	-6.0	-7.9
Mean Wind Speed (knots)	7.1	10.5	8.5	6.3	6.8	6.9	6.2	6.7	6.2	7.9	7.5	7.9
Highest Gust (knots)	43.8	46.0	43.5	39.0	38.8	32.5	32.3	35.5	32.0	40.8	39.3	45.3
Source: Met Éireann - The Irish Meteorological Service												

The information presented in Table 9-3 above provides an overview of the climatic conditions at the Site. Over the time period for which data is provided, the wettest months in terms of total rainfall for the period are September, October and December. High rainfall in these months provides natural dampening for potential dust emissions. The opposite impact occurs in dry and windy months, when there is increased potential for dust to be mobilised. The month with the highest mean wind speed is February and the driest month is April.

An important meteorological parameter with regard to the dilution and dispersal of air pollutants is wind speed and direction. A full annual wind-rose for the Carlow Oak Park station is presented in Figure 9-3 for the period 01 January 2019 to 28 February 2023. The prevailing winds are from a southerly direction, with some south-easterlies and north-westerlies.

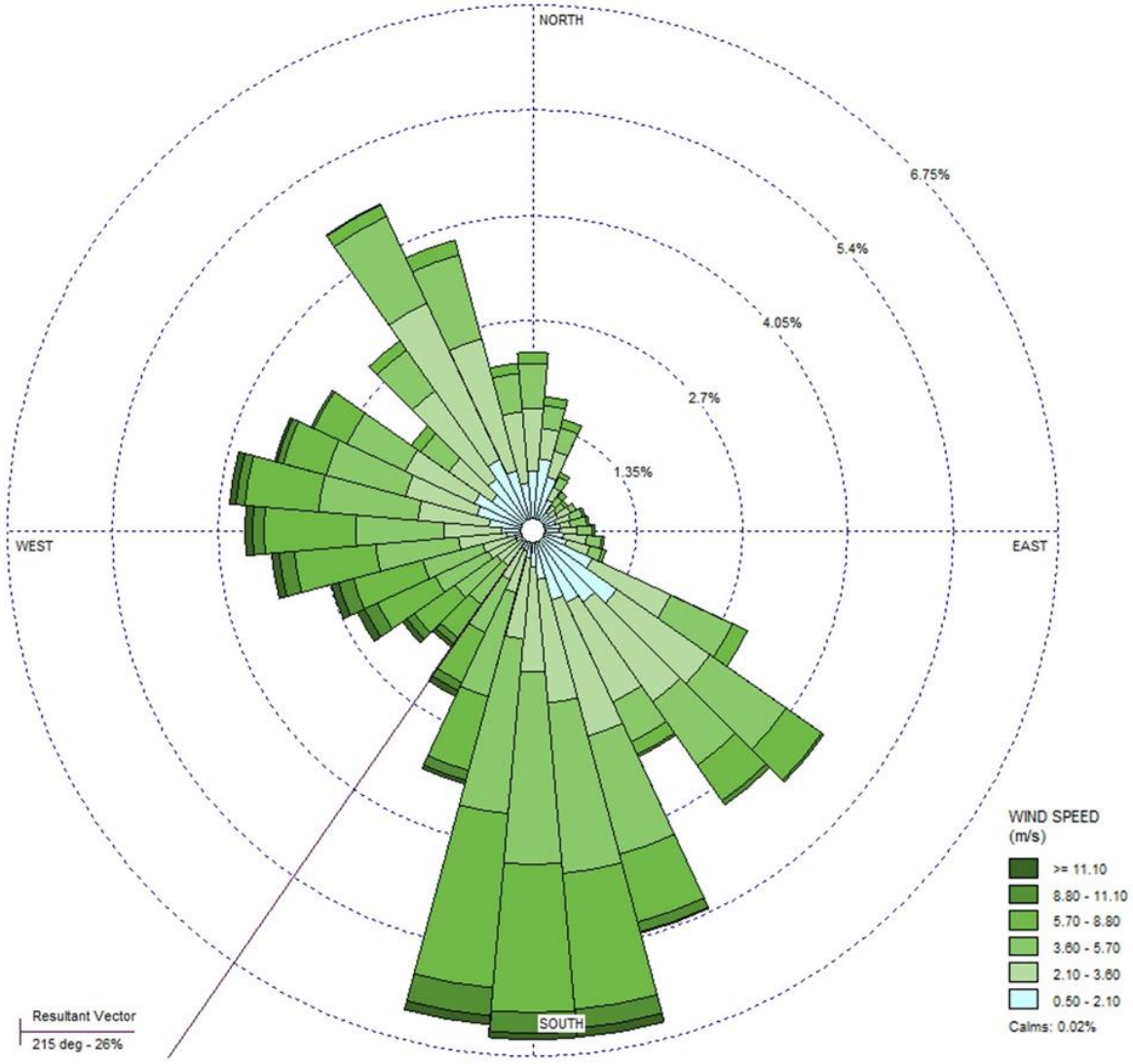

Figure 9-3 - Annual dominant wind direction at Carlow Oak Park using Hourly Wind Data (Assessment Period 1 January 2019 to 28 February 2023)

9.6.4 BACKGROUND AIR QUALITY

9.6.4.1 Primary Data – Site Monitoring Data

Dust monitoring has been undertaken over a one month period from October 2022 to November 2022, using the Bergerhoff method at 3 different monitoring locations. Descriptions of the dust monitoring locations are presented in Table 9-4 and their locations are shown in Figure 9-4

Table 9-4 - Description of Dust Monitoring Locations

Location	Description
D1	Located adjacent to the Site access point.
D2	Located offsite adjacent to the southeastern boundary of the Site.
D3	Located offsite adjacent to the northern boundary of the Site in a field.

Figure 9-4 - Plan Showing Dust Monitoring Locations

The recommended dust deposition limit value when using the Bergerhoff method is 350 mg/m^2/day, as specified in Table 9-2 of this assessment. The results the monitoring undertaken in 2022 are shown in Table 9-5.

Table 9-5 - Recorded Deposited Dust (mg/m^2/day) at Monitoring Locations during 2022

Monitoring Period	Monitoring Location		
	D1	D2	D3
17/10/2022 – 17/11/2022	133.4	365.2	126.1

Commentary on Concentrations greater than the Limit Value

Of the monitoring results for the sampling undertaken between October 2022 and November 2022, the results from both D1 and D3 are below the limit value of 350 mg/m^2/day, and the result from location D2 is greater that the limit value, with a recorded result of 365.2 mg/m^{2}day.

The location of D2 to the southeast of the Site gives rise to a slightly greater dust concentration, which is likely attributed to organic matter from nearby hedgerows or agricultural activities. Given that there are no extraction activities currently taking place, the high background is likely attributed to the aforementioned sources.

9.6.4.2 Secondary Data – EPA Monitoring

There are 4 air quality zones in Ireland, defined for the purposes of air quality management and assessment. Highly populated areas are classified as Zone A, with sparsely populated areas as Zone D. The Site is located in a rural area, and it is therefore deemed reasonable to characterise the area as a Zone D area. A review of publicly available information identifies that the Irish EPA do not operate background air quality monitoring within Newcastle or the immediate surrounds.

In the absence of local background data, the most recent annual mean data (2021) for NO_2, NO_x, SO_2, PM_{10} and $PM_{2.5}$, and average historical data for NO_2, PM_{10} and $PM_{2.5}$ from monitoring locations in Zone D areas throughout Ireland are presented in Table 9-6 below. These locations are part of the EPA National Ambient Air Quality Monitoring Network and data is reported to Europe. The historical data is available as a Zone D average only.

Table 9-6 - Annual Mean Monitoring Data for Zone D Stations (2021: Monitoring & Assessment: Air Publications | Environmental Protection Agency (epa.ie)) and historical data: Air | Environmental Protection Agency (epa.ie)

Pollutant	Year	Monitoring Location	Concentration µg/m^3
NO_2	2021	Birr	12.8
		Carrick-on-shannon	11.2
		Castlebarr	6.3
		Edenderry	8.8
		Emo Court	3.6
		Kilkitt	2.4
	2005	Zone D	9
	Average		**7.7**
NO_x	2021	Birr	31.5
		Carrick-on-shannon	21.9
		Castlebarr	10.9
		Edenderry	12.3
		Emo Court	5.2
		Kilkitt	3.1
	Average		**14.2**
SO_2	2021	Asketon	1.6
		Cork Harbour	5.5
		Edenderry	1.8
		Kilkitt	1.7
		Letterkenny	10.2
	Average		**4.2**

PM_{10}	2021	Askeaton	8.7
		Birr	12.2
		Carrick-on-shannon	9.4
		Castlebarr	9.8
		Cavan	10.6
		Claremorris	9.5
		Cobh Carrignafoy	12
		Cobh Cork Harbour	13.4
		Edenderry	17.8
		Enniscorthy	13.7
		Kilkitt	7.8
		Longford	13.9
		Macroom	14.6
		Mallow	14.7
		Roscommon Town	10.3
		Tipperary Town	12.7
	2005	Zone D	17
	Average		**12.2**
$PM_{2.5}$	2021	Askeaton	5.7
		Birr	7.9
		Carrick-on-shannon	5.9
		Cavan	7.4
		Claremorris	8.2
		Cobh Carrignafoy	7.4
		Edenderry	17.8
		Enniscorthy	9.8
		Longford	9.4
		Macroom	10.1
		Mallow	7.9
		Roscommon Town	7.1
		Tipperary Town	8.6
	2011	Zone D	9
	Average		**8.7**

9.7 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The development proposals are described in Chapter 3.0 (Project Description) and summarised in Section 6.3. Sources of emissions to air are set out in Section 9.1.3.

9.8 POTENTIAL EFFECTS

9.8.1 PARTICULATES

9.8.1.1 Coarse Particulates

An assessment of the potential effects of deposited dust from the Proposed Development is provided in Appendix 9A of this report. This assessment has been undertaken in accordance with

the IAQM Guidance on the Assessment of Mineral Dust Impacts for Planning (2016), as described in above.

The assessment defined residual source classifications to activities on-site and used these to assign a magnitude to the dust effects likely to be experienced at identified receptors. Consideration was given to mitigation measures will be put in place with the commencement of Site activities. Based on the magnitude of dust effects and the mitigation to be employed on-site, an overall significance of the effects of dust was assigned to key sources: backfilling, transfer on haul roads, mineral processing, stockpiling and transfer on public roads. For each of these sources, the significance was defined as 'Moderate' to 'Slight' without mitigation, and 'Slight' with mitigation.

Coarse particulate residual impacts of the Site activities on air quality, microclimate and climate change are considered to be 'Slight'. During long spells of dry weather, dust emissions can potentially be more elevated, however dust nuisance from the operation is expected to be unlikely if the mitigation measures defined in Appendix 9A are implemented during the lifetime of the Site. The overall impact from the operation of the Site, in terms of dust emissions, is considered 'Slight' to the air environment.

In the longer term, on completion of the Site restoration, the concentration of airborne dust would be expected to be reduced from operational levels as the result of covering and seeding of exposed, un-vegetated soil surfaces. This will most likely constitute a minor positive impact for the local environment.

With the application of the site-specific mitigation measures, it is therefore considered that the residual effects associated with the Proposed Development will be **Not Significant**.

9.8.1.2 Fine Particulates

The IAQM recommend that if the PM_{10} background concentration is less than 17 $\mu g/m^3$ there is little risk that the process contribution (PC) from the Site would lead to an exceedance of the annual-mean objective. The background data from other equivalent Zone D areas is detailed in Section 9.6.4.2. The annual average of the historic Zone D stations is 12.2 µg/m3 which is less than 17 µg/m3. It is unlikely that the PC from the Site would lead to an exceedance of the AQS.

Fine particulate PC can be assessed using the calculation of concentration with distance from source as detailed in LAQM TG03. The guidance document also states that the likely PM_{10} contribution from fugitive dusts, stockpiles, quarries and construction is variable but up to 5 µg/m3. Therefore, the likely concentration at the receptor locations can be estimated using the calculation considering the distance from source. As PM2.5 is a sub-fraction of PM_{10}, the contribution of PM2.5 will be lower but if it is conservatively assumed that all of the PM_{10} is $PM_{2.5}$.

When combining the likely concentration at the closest receptor (1.5 µg/m3) with the average historical background value (12.2 µg/m3) for Zone D areas, the maximum annual PM_{10} predicted environmental concentration (PEC) would be 13.7 µg/m3 which is approximately 34% of the AQS, and the annual PM2.5 PEC would be 55% of the Stage 1 AQS and 69% of the Stage 2 AQS, at the closest receptor. The PEC is predicted to be below the annual AQS, with headroom. The impact from fine particle PC from the Site is considered to be 'Negligible' to 'Slight' prior to mitigation which would reduce to 'Negligible' due to the mitigation measures to be employed by the Site. Therefore, it is considered that the residual effects associated with the Proposed Development will be **Not Significant.**

9.8.2 "DO-NOTHING" SCENARIO

Without the Proposed Development, it is assumed that the baseline conditions would remain, as per the existing environment information and data presented in Section 9.3.

9.9 MITIGATION AND MONITORING

9.9.1 MITIGATION

The Proposed Development will employ a number of mitigation measures to reduce the impact of dust emissions on the surrounding area and identified sensitive receptors. These mitigation measures are as follows:

- Regular visual inspections by Site personnel to assess visual dust emissions;
- The timing of operations is optimised in relation to meteorological conditions;
- A water bowser is available on Site for dust suppression/dampening of internal haul roads and stockpiles to minimise dust blow during working hours;
- Stockpiles will only be used in poor weather conditions and will be located as close to the void as possible to take advantage of shelter from the wind, in the centre of the Site.
- Consider the use of temporary baffle mounds around active working areas
- Plant is regularly maintained;
- Incoming loads of backfilling material will be contained in covered HGVs to minimise wind blow;
- Internal haul roads are compacted or made of concrete hardstanding;
- All exiting vehicles will pass through wheel washes prior to exit onto the Coynes Cross public road; On site speed restrictions (<10 kph) are maintained in order to limit the generation of fugitive dust emissions;
- Areas of exposed soils will be kept to a minimum where practical
- Filling activities will not take place in during strong winds; and
- The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of internal paved site roads and the existing public roads, if required.

9.9.2 MONITORING

Deposited dust monitoring will be undertaken during the operation of the soil recovery facility (works phase) at appropriate locations around the application boundary in order to monitor dust emissions that may be arising from the Site activities. An EPA waste licence will be required for the facility and the frequency and locations of monitoring will be determined in accordance with the requirements set out in the licence. Monitoring will be carried as per the requirements of any waste licence issued by the EPA.

Should infilling operations of the Soil Recovery Facility be carried out in accordance with by-product regulations, Article 27 of the European Communities (Waste Directive) Regulations 2011, prior to the issue of a Waste licence from the EPA, dust monitoring requirements will be agreed with the environmental health officer/Wicklow County Council in advance of works and implemented.

9.10 CLIMATE FACTORS

This section considers climate change resilience and adaptation, i.e. how the Proposed Development may interact with a changing climate and whether this interaction could result in significant environmental effects.

The contribution of the proposed Development to climate change is also a requirement of the assessment of climate change resilience and adaptation of a proposed development. The assessment will consider the potential climate impacts during the works phase.

9.10.1 CLIMATE AT THE SITE

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. The climate in the area of the Site is typical of the Irish climate, which is temperate maritime.

9.10.2 CLIMATE CHANGE IMPACTS FOR IRELAND

Climate change is an alteration in the distribution of weather patterns in a region in which such change lasts for an extended period of time (i.e. decades or longer). Climate change refers to a change in meteorological conditions, including temperature, rain and wind that characteristically prevail in a particular region over a period of time (typically 30 years).

Directive 2014/52/EU recognises that climate change will continue to cause damage and compromise economic development, therefore it must be incorporated into the decision-making process with the climate change impacts and vulnerabilities of projects assessed.

Ireland is a party to the Paris Agreement, which is a legally binding agreement with the central aim to strengthen the global response to the threat of climate change. Ireland is also bound by nationally determined contributions designated by the EU on behalf of all Member States and commits the EU to reduce GHG emissions by at least 40% (compared to 1990 levels) by the year 2030.

The EPA has identified a number of potential impacts for Ireland from climate change. Such changes are expected to include:

- *Storm surges and waves*. Storm surge events are expected to increase in frequency, with significant increases to be observed on the western coast of the country during the winter months. Average wave heights are expected to increase on the north-west coast of the country by approximately 10%.
- *Weather extremes*. The prediction of such weather extremes is difficult to predict however; additional energy trapped in the atmosphere by greenhouse gases is likely to continue to stimulate greater atmospheric volatility in Ireland.
- *Fluvial flooding*. Although it is difficult to predict it is expected that increases in the seasonality extremes will occur with increasing run-off to catchments in winter and decreasing flows in summer. This will result in significant consequences for the management of flood defences, water supplies, waste treatment and biodiversity conservation.
- *Sea level rise*. The EPA has noted that satellite altimetry has identified a rise of around 3.5 cm per decade in the seas around Ireland, which is in line with the IPCC's global projections. Further increases in sea levels would present as a substantial increase in sea levels globally. This would have significant implications for low lying coastal regions throughout the world and in Ireland.
- *Precipitation*. Similar to other climate variables precipitation is expected to become heavier during autumn and winter months by the end of the century, while summers are likely to become substantially drier over the same period. The EPA has noted that the accuracy of model projection can be difficult to verify however rainfall in winter/autumn is projected to increase by up to 25% and decline by up to 18% in the summer period.

- *Sea temperatures*. Sea temperatures around Ireland have been shown to increase by 0.3 to 0.4ºC per decade. Changes of this magnitude will have a significant effect on maritime ecosystems and economies through effects on commercial fish species.

The most applicable climate variable and hazards for the Site, as identified by the EPA, include weather extremes, fluvial flooding and precipitation. Climate change factors such as ocean acidification, sea-level rise and storm surges and waves have been scoped out of this climate assessment, due to the location of the Site.

Factors in relation to the EIAR study areas have also been incorporated into the evaluation below, these include, air quality, noise, landscape and visual, water and flood risk, geology and ecology and biodiversity.

The assessment considers aspects of the Site that are potentially vulnerable to the effects of climate change. Where relevant aspects have been identified, these can be mitigated through embedded mitigation, monitoring or other measures. The impact of the Site on environmental receptors sensitive to climate change has also been considered.

9.10.3 EFFECT OF CLIMATE CHANGE ON THE SITE

9.10.3.1 Air Quality

An increase in summer and winter rainfall volume and periods of higher intensity rainfall (storms) could lead to increased dust dampening and suppression. This would result in less dispersion of dust as the increased rainfall would result in particles being less available to be entrained by the air.

In the summer, higher air temperatures could result in changes to chemical reactions which occur in the atmosphere. If temperatures increase, there could be an increase in photochemical reactions in the atmosphere. This could lead to an increase in ozone concentrations in the atmosphere.

Increases in wind speed could change the dispersion patterns of pollutants.

9.10.3.2 Noise

The projected windier, wetter and warmer environment is not anticipated to result in any significant change to future noise or vibration levels arising from the operation of the Site.

9.10.3.3 Landscape and Visual

The predicted seasonal variations in rainfall i.e. wetter winters and drier summers could create unfavourable conditions for the establishment of grassland and hedges planned as part of the Site restoration, particularly during prolonged periods of drought, or where waterlogging of the ground persists. This could increase plant mortality and reduce the effectiveness of hedging around the periphery of the Site, along with potential increased on-going maintenance costs.

9.10.3.4 Water and Flood Risk

In the future, increases in winter rainfall volume and periods of higher intensity rainfall (storms) could lead to increased runoff, greater surface water flows and more incidents of flooding. In summary, current predictions suggest that flashier floods in summer and bigger floods in winter could be expected.

In the summer, higher air temperatures could lead to higher surface water temperatures leading to greater evaporation and reduced flows. Rainfall could be less and more intense leading to potential increases in erosion and suspended solid concentrations during sudden high intensity rainfall events

on dry ground. Less overall summer rainfall could also lead to lower flows in watercourses and possibly poorer quality (i.e. caused by changes in land use and the quality of runoff). Changes in surface water flow regime through the year caused by changes in rainfall distribution could alter the mobility and dilution of nutrients and contaminants (i.e. lower dilution in summer due to lower flow rates would result in higher concentrations, and lower flow rates could lead to algal blooms and lower oxygen). Lower summer flows and water levels also have the potential to result in reduced surface water resource availability.

The susceptibility of the Site to fluvial flooding has been considered in Chapter 8.0: Water. Although the Site is currently not mapped as at risk of flooding, climate change could alter the risk of flooding and flood damage, due to changes in surface water flows and flood plain storage and also due to flood risk from groundwater flooding. A 20% and 30% increase in future rainfall are both considered in Chapter 8.0: Water and the assessment concludes that the Site and wider study area are not as risk of future flooding.

9.10.3.5 Land, Geology, Soils

There are no geological or mineral heritage sites within the geology study area. Changes in rainfall, temperature and wind are not anticipated to result in any change to geological conditions that could affect the Site.

In terms of ground conditions and groundwater, higher air temperatures and windier conditions could result in higher evaporation and reduced soil saturation. Reduced soil saturation in drier and warmer summers could lead to reduced groundwater recharge in the summer, and the winter groundwater recharge period could be shortened due to autumn and winter rainfall balancing the soil moisture deficit before recharging groundwater. This may be compensated to some extent by increased winter rainfall. However, aquifers are recharged more effectively by prolonged steady rain, so changes in rainfall regimes could lead to more runoff to surface water rather than recharge to ground during higher intensity summer and winter rainfall events.

If recharge and groundwater levels were to decrease, there could be increased frequency and severity of groundwater droughts. Conversely, if groundwater recharge increases at certain times of the year there could be an increase in the frequency and severity of groundwater-related floods. If groundwater levels in contaminated ground rise due to climate change, this could lead to the mobilisation of historical contamination that was previously above groundwater level highs, which could impact baseline groundwater quality and ground quality.

Higher future temperatures and the potential reduction in the availability of surface water resources could also lead to a greater demand on groundwater resources for urban/industrial supplies and agricultural irrigation. However, improvements in water use efficiency may also take place in parallel with climate change.

9.10.3.6 Ecology and Biodiversity

Climate change presents a risk to native wildlife and to the ecosystem services provided by natural capital, for example clean water.

At a local level (i.e. the spatial extent of the assessment defined for the Site), the projected windier, wetter and warmer environment is not expected to result in any measurable positive or negative change to the baseline biodiversity features of the Site.

9.10.4 CLIMATE MITIGATION AND MONITORING

9.10.4.1 Air Quality

No additional air quality mitigation or monitoring is required as a result of potential climate change effects.

9.10.4.2 Noise

No additional noise mitigation or monitoring is required as a result of potential climate change effects.

9.10.4.3 Landscape and Visual

Consideration should be given to the inclusion of drought and water tolerant species in the perimeter planting mixes. This would minimise plant losses and maintain landscape and visual amenity.

No additional mitigation or monitoring is required as a result of climate change effects.

9.10.4.4 Water and Flood Risk

No additional water resources or flood risk mitigation or monitoring is required as a result of potential climate change effects.

9.10.4.5 Land, Geology and Soils

No additional ground conditions or groundwater mitigation or monitoring is required as a result of potential climate change effects.

9.10.4.6 Ecology and Biodiversity

No additional ecology or biodiversity mitigation or monitoring is required as a result of potential climate change effects.

9.10.5 RESIDUAL CLIMATE EFFECTS

9.10.5.1 Air Quality

There will be no change to the identified residual air quality effects as a result of potential climate change effects.

9.10.5.2 Noise

There will be no change to the identified residual noise effects as a result of potential climate change effects.

9.10.5.3 Landscape and Visual

The potential changes to the landscape or to views experienced by nearby receptors, as a result of climate change, would be fully mitigated by the mitigation measures proposed. There would be no change to the residual landscape or visual effects identified.

9.10.5.4 Water and Flood Risk

There will be no change to the identified residual water resources and flood risk effects as a result of potential climate change effects.

9.10.5.5 Land, Geology and Soils

There will be no change to the identified geology, ground conditions or groundwater effects as a result of potential climate change effects.

9.10.5.6 Ecology and Biodiversity

There will be no change to the identified residual ecology and biodiversity effects as a result of potential climate change effects.

9.10.6 GREENHOUSE GAS

There is the potential for greenhouse gases to be generated from the Proposed Development.

Primary sources of direct GHGs will likely include vehicle movements, water and energy use. There may also be indirect sources of GHG emissions related to energy purchase.

Estimated vehicle movements associated with the Site are estimated to generate approximately 2.98 Kilo tonnes carbon dioxide equivalent (Kt CO2e) per annum. This assumes diesel HDVs with an average one-way trip length of 50 km one way 10$_{0\%}$ laden and one way unladen. For LDVs the average trip length is assumed to be 30 km for an average car. The figures are expressed as annual amounts.

The assessment of GHG emissions has required assumptions to be made as some values are currently projected as they cannot be known with complete certainty at this stage. The emission factors used have been sourced from the DEFRA (2019) Greenhouse Gas Reporting Conversion Factors which are designed for emissions reporting. The most appropriate conversion factor has been selected for each activity to represent the resulting emissions as best as possible. However, there will be some discrepancies in the results – such as for car traffic data, as 'average' car conversion factors have been used. Where available, data has been sourced directly such as the projected AADT data for the works phase. Where data was not available assumptions have been made regarding traffic travel distances.

Ireland's Greenhouse Gas Emissions Projections 2021–2040 (EPA, 2022) estimate that annual emissions for 2023 and 2024 for the road transport sector will be 11,701.01 Kt CO2e and 11,728.46 Kt CO2e respectively. The estimated emissions relating to the Proposed Development traffic are less than 0.03% of the EPA projections for road transport. Based on the quantum of Greenhouse Gas emissions estimated to be generated by the Proposed Development, the impacts are deemed to be 'Negligible' and therefore **Not Significant**.

9.11 RESIDUAL EFFECTS

Residual impacts of the Proposed Development on air quality, microclimate and climate change are considered to be no more than 'Slight' and the effects are considered to be **Not Significant**.

In terms of coarse particulates (dust), during long spells of dry weather, dust emissions can potentially be more elevated, however dust nuisance from the operation is expected to be unlikely if mitigation measures defined in Appendix 9A are implemented during production and restoration. The overall impact from operation of the soil recovery facility, in terms of dust emissions, is considered 'Slight' to the air environment. In the longer term, on completion of the site restoration,

the concentration of airborne dust would expect to be reduced from operational levels[2] as the result of covering and seeding of exposed, un-vegetated soil surfaces. This will most likely constitute a minor positive impact for the local environment. Following the application of the site-specific mitigation measures set out in Appendix 9A, it is therefore considered that the residual effects associated with the Proposed Development relating to dust will be **Not Significant**.

9.12 CUMULATIVE EFFECTS

The cumulative effects associated with other permitted / under construction third-party developments have been considered in Chapter 15.0 of this EIAR . It is considered that there is **no opportunity for significant** cumulative impacts to arise.

9.13 DIFFICULTIES ENCOUNTERED

The following difficulties were encountered as part of the assessment:

- Only one- month of primary baseline air quality data was available; however this data has been supplemented with secondary and historic data to inform the assessment.
- The assessment of GHG emissions has required assumptions to be made as some values are currently projected as they cannot be known with complete certainty at this stage, although have been assumed based on professional knowledge and guidance.

9.14 REFERENCES

DOEHLG (2004) 'National Guidelines on Quarries and Ancillary Activities for Planning Authorities'. Department of the Environment, Heritage and Local Government. Available at: https://www.opr.ie/wp-content/uploads/2019/08/2004-Quarries-and-Ancillary-Activities.pdf (Accessed: 06 April 2023).

Environmental Protection Agency (2021) Air Quality in Ireland 2020. Available at: Monitoring & Assessment: Air Publications | Environmental Protection Agency (epa.ie) (Accessed: 06 April 2023).

Environmental Protection Agency (2022) Environment and You - Air: Available at: Air | Environmental Protection Agency (epa.ie), (Accessed: 06 April 2023).

Environmental Protection Agency (2006) 'Environmental management in the extractive industry (non-scheduled minerals)'. Johnstown Castle, Co. Wexford: Environmental Protection Agency.

Environmental Protection Agency (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports - Draft'. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf (Accessed: 06 April 2023).

Environmental Protection Agency (2021) GHG Emissions Projections 2020 – 2040. Available at: https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/irelands-greenhouse-gas-emissions-projections-2020-2040.php (Accessed: 06 April 2023)

[2] Refers to levels associated with the day-to-day operation of soil recovery facility within the works phase.

EPUK & IAQM (2017) ‘Land-Use Planning & Development Control: Planning for Air Quality’. Available at: http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf (Accessed: 06 April 2023).

European Commission (2017) ‘Environmental impact assessment of projects: guidance on the preparation of the environmental impact assessment report (Directive 2011/92/EU as amended by 2014/52/EU)’. LU: Publications Office. Available at: https://data.europa.eu/doi/10.2779/41362 (Accessed: 05 May 2023).

European Union (1996) ‘Council Directive 96/62/EC on Ambient Air Quality Assessment and Management’. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31996L0062&from=EN (Accessed: 06 April 2023).

European Union (1999) ‘Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air’. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0030&from=EN (Accessed: 06 April 2023).

European Union (2008) ‘Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe (CAFE)’. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0050&from=EN (Accessed: 06 April 2023).

European Union (2014) ‘Directive 2014/52/EU of the European Parliament and of the Council, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment’. Official Journal of the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN (Accessed: 06 April 2023).

Health and Safety Authority (2020) Safe Quarry - Guidelines to the Safety, Health and Welfare at Work (Quarry) Regulations 2008. Available at: https://www.hsa.ie/eng/publications_and_forms/publications/mines_and_quarries/safe_quarry_regs_2020.pdf (Accessed: 06 April 2023).

IAQM (2014) ‘Guidance on the Assessment of Dust from Demolition and Construction’. Available at: https://iaqm.co.uk/text/guidance/construction-dust-2014.pdf (Accessed: 06 April 2023).

IAQM (2016) ‘Guidance on the Assessment of Mineral Dust Impacts for Planning’. Available at: https://iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf (Accessed: 06 April 2023).

Irish Statute Book (1987) ‘Air Pollution Act’. Available at: https://www.irishstatutebook.ie/eli/1987/act/6/enacted/en/print.html (Accessed: 06 April 2023).

Irish Statute Book (1989) ‘S.I. No. 349/1989 - European Communities (Environmental Impact Assessment) Regulations’. Available at: https://www.irishstatutebook.ie/eli/1989/si/349/made/en/print (Accessed: 06 April 2023).

Irish Statute Book (2000) ‘Planning and Development Act’. Office of the Attorney General. Available at: http://www.irishstatutebook.ie/eli/2000/act/30/enacted/en/html (Accessed: 06 April 2023).

Irish Statute Book (2001) ‘S.I. No. 600/2001 - Planning and Development Regulations’. Office of the Attorney General. Available at: http://www.irishstatutebook.ie/eli/2001/si/600/made/en/print (Accessed: 06 April 2023).

Irish Statute Book (2011) ‘S.I. No. 180/2011 - Air Quality Standards Regulations’. Available at: https://www.irishstatutebook.ie/eli/2011/si/180/made/en/pdf (Accessed: 06 April 2023).

Irish Statute Book (2018) ‘S.I. No. 296 of 2018 - European Union (Planning and Development) (Environmental Impact Assessment) Regulations’. Office of the Attorney General. Available at: http://www.irishstatutebook.ie/eli/2018/si/296/made/en/print (Accessed: 06 April 2023).

Met Éireann - The Irish Meteorological Service, Monthly data available at: https://www.met.ie/climate/available-data/monthly-data

TA Luft (1972) ‘German Standard VDI 2119 – Measurement of dust fall: Bergerhoff Instrument (standard method)’. Available at: https://www.beuth.de/en/technical-rule/vdi-2119-blatt-2/1527147 (Accessed: 06 April 2023).

TA Luft (1986) ‘Technical Instructions on Air Quality Control – TA Luft in accordance with Article 48 of the Federal Emission Control Law (BGBI, I p. 721)’. Federal Ministry for Environment, Bonn 1986 and amendments. Available at: https://dieselnet.com/standards/de/taluft.php (Accessed: 06 April 2023).

Wicklow County Council (2016) Wicklow County Development Plan 2012–2028. Available at: Wicklow County Development Plan 2022–2028 (Accessed: 30 April 2023)

Appendix 9A

DUST ASSESSMENT

Proposed Kilmartin Soil Recovery Facility EIAR

APPENDIX 9A

Air Quality and Climate – Dust Assessment

DECEMBER 2025

PUBLIC

CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 BACKGROUND

This appendix supports the Air Quality and Climate chapter of the EIAR and considers the potential effects of the activities relating to the proposed soil recovery facility ('Proposed Development') at Kilmartin, Coynes Cross, Newcastle, Co. Wicklow ('the Site') on the receiving (air) environment.

The existing Site use is agricultural, with the presence of a steep sided valley limiting use to sheep grazing with a small area of arable crops in the northern section.

1.2 REPORT CONTEXT

This report forms an Appendix to the EIAR Air Quality and Climate (Chapter 9.0 of the EIAR) and should be read in conjunction with that report.

The report sets out a qualitative assessment of dust impacts (coarse particles for deposited dust and fine particles for human health) from the operation of the soil recovery facility (within the works phase), which has been undertaken in line with IAQM 'Guidance on the assessment of Mineral Dust Impacts for Planning (IAQM 2016).

2 ASSESSMENT METHODOLOGY

The following section details the IAQM methodology used for assessing the impacts of deposited dust and fine particulates from the extraction activities. It follows a standard source-pathway-receptor methodology.

The residual source emissions are characterised based on the scale of the operations and the Site activities and are classified as either small, medium or large. Guidance on the appropriate scale of the residual source is provided in the IAQM guidance, Appendix 4 (2016). This source characterisation includes consideration of the routine management and mitigation measures which will be undertaken at the Site.

The pathway from the source to the receptor is assessed considering the distance and direction of receptors to the source relative to the prevailing wind and local meteorology. The local meteorological data is also used to assess the frequency of the winds in each direction. It has been found that deposited dust does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), therefore all receptors within 500 m of the Application boundary are conservatively considered. The guidance states that it is commonly accepted that the greatest impacts will occur within 100 m of the source, with the potential for travel up to 400 m.

For full consideration of the effects of the access road, in the absence of any methodology within the IAQM minerals guidance, the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2016) has been considered. This guidance states that human receptors within 50 m of the routes used by vehicles for 350 m from the Site exit point should be considered. For this reason, the Site access road will be subject to a 50 m buffer, which will then extend 350 m out onto the R772 main road in a southerly direction to account for the possibility of trackout from exiting vehicles.

The criteria for the categorisation of the frequency of potentially dusty winds (Table 2-1) and the receptor distance from source (Table 2-2) is used to define the pathway effectiveness (Table 2-3).

The residual source emissions and the pathway effectiveness are combined to predict the Dust Impact Risk as shown in Table 2-4.

Table 2-1 - Categorisation of Potentially Dusty Winds

Pathway Effectiveness	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very Frequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 2-2 - Categorisation of Receptor Distance from Source

Category	Criteria
Distant	Receptor is between 200 m and 400 m from the dust source
Intermediate	Receptor is between 100 m and 200 m from the dust source
Close	Receptor is less than 100 m from the dust source

Table 2-3 - Pathway Effectiveness

		Frequency of Potentially Dusty Winds			
		Infrequent	**Moderately Frequent**	**Frequent**	**Very Frequent**
Receptor Distance Category	**Close**	Ineffective	Moderately Effective	Highly Effective	Highly Effective
	Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
	Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

Table 2-4 - Estimation of Dust Impact Risk

		Residual Source Emissions		
		Small	**Medium**	**Large**
Pathway Effectiveness	**Highly Effective Pathway**	Low Risk	Medium Risk	High Risk
	Moderately Effective Pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

The final step is to assess the likely magnitude of the dust effects (Table 2-5). This is determined using both the dust impact risk and the receptor sensitivity. Receptor sensitivity is classified as either low, medium or high based on the receptor type.

Table 2-5 - Descriptors for Magnitude of Dust Effects

		Receptor Sensitivity		
		Low	**Medium**	**High**
Dust Impact Risk	**High Risk**	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
	Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
	Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
	Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

3 SOURCES

The activities associated with the proposed development at the Site that are potential dust generating sources are listed below:

- Haulage of materials to the Site, where the weight of vehicles, their speed of passage and number of wheels in contact with the ground, and the nature and condition of road surfaces or haul routes all affect the amount of dust emitted:
- Transport of materials within the Site on haul routes via truck;
- Unloading of materials via tipping trucks;
- Temporary stockpiling of materials within the application site floor;
- Movement of material (filling material and recycled aggregates for haul road formation) from temporary stockpiles to the active tipping face by tracked bulldozer/ use of excavator; and
- Wind blow from material stockpiles and unsurfaced internal haul roads.

The following residual source classifications can be attributed based on the identified sources and management and assessment methodology outlined above and in Appendix 4 of the IAQM guidance (2016).

Site preparation is classified as a large magnitude source due to the size of the working area. The land subject to this EIAR extends 17.08 ha. The actual working area will be smaller, but this conservative value has been used in the assessment. Further to this, the nature of the materials being moved during the works phase (clays/soils) have a higher dust potential due to their fine particle size.

Mineral filling is classified as a large magnitude source due to the annual filling rate being up to 550,000 t/yr within a large working area and a high dust potential as the filling material (clays and soils) have a higher dust potential due to their fine particle size. In reality, the actual working area will be smaller due to the way in which the material will be deposited in transient active depositional areas but the whole void area is considered for conservatism.

Materials handling is classified as a medium magnitude source, as there will only be 2 heavy plant operational across the Site, used for excavation, loading and tipping of material from stockpiles to

the active tipping face. The filling material is handled at a moderate volume and has a high dust potential, and tipping will be occurring within the valley topographical depression.

On-site transportation is classified as a small magnitude source as there are approximately 100 one-way on-site HDV trips per day on average, making short trips from the Site entrance across concrete hardstanding, paved internal access road, and a compacted aggregate haul road to the working face and back. Material will be transported from the tipping area at the active face into position via a bulldozer or digger. The Site will a have a bunded waste quarantine area bay for inspections of incoming loads, 2 No. waste quarantine bays, and a concrete hardstanding area for HGV movements and storages. A speed limit of 10 kph will be employed on the Site.

Mineral processing is classified as a small magnitude source as there will be to up to 550,000 t/yr of material being brought onto Site already processed. The Site will undertake visual inspections of loads to ensure the correct material is on board, with tipping directly at the active face. There will be no processing plant on the Site, only weighing equipment for incoming loads.

Stockpiles (of soils and stone) and exposed surfaces are classified as a small magnitude source due to the moderate filling material import of up to 550,000 tonnes per annum, combined with the fact that stockpiles are only to be used in poor weather conditions (e.g. high winds) and for stored topsoil. Where required, stockpiled will be located within a designated stockpiling area near to the void and dampened where necessary. Under normal operating conditions, incoming HGVs will tip directly at the active face and site plant will move the material into position in the void.

Off-site transportation is classified as a medium magnitude source as there will be approximately 100 outward HDV movements per day (average), and the Site internal access road will be constructed of compacted aggregate with a concrete skirt at the access gate. Two wheel washes (self-contained unit) will be present on concrete hardstanding for trucks to pass through prior to exiting the Site.

4 ASSESSMENT

4.1 SITE PARAMETERS

The risks of potential dust emissions associated with the Site being transported off-site are largely determined by the local atmospheric conditions surrounding the Site and distance from the source to the receptor.

The conditions considered in the assessment include:

- Wind speed, to determine the likely occurrence of particles travelling beyond the Application boundary; and,
- Wind direction, to identify the areas over which particles are likely to travel.

As detailed in the main Air Quality and Climate Chapter 9.0, the closest and most representative Met Éireann station to the Site is located at Carlow Oak Park, Co. Carlow, ca. 60 km southwest of the Site. Wind speed and wind direction are measured hourly by the station and a wind-rose has been presented in Figure 4-2 covering the period 01 January 2019 to 28 February 2023.

The prevailing wind direction is from the south, with a large portion of mid wind speeds between 3.6–8.8 m/s.

The receptors identified in Table 4-1 and presented in Figure 4-1, with their associated distance and direction, are located within 500 m of the Application boundary. This is a conservative approach to the assessment as Site activities were not undertaken directly at the boundary in all directions. Residential receptors have been categorised as high sensitivity receptors.

The remaining non-residential (industrial/ commercial) receptors have been categorised as medium sensitivity receptors. The category of receptor distance is defined based on the criteria in Table 2-2 of the methodology and the frequency of dusty winds is determined based on the criteria in Table 2-1 of the methodology.

It is noted that the medieval church (AR-10) and graveyard (AR-12) receptors identified in the Cultural Heritage chapter of this EIAR (Chapter 11.0) have been scoped out for potential particulates/dust emissions impacts due to their distance from the Site. The greatest proportion of dust deposits within 100 m of the source and does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), therefore all receptors within 500 m of the Application boundary are considered. Receptors AR-10 and AR-12 lay beyond 500 m from the Site, therefore no impact would be expected here and they have been scoped out.

The receptor distance category and the frequency of dusty winds are then combined using Table 2-3 of the methodology to define the pathway effectiveness.

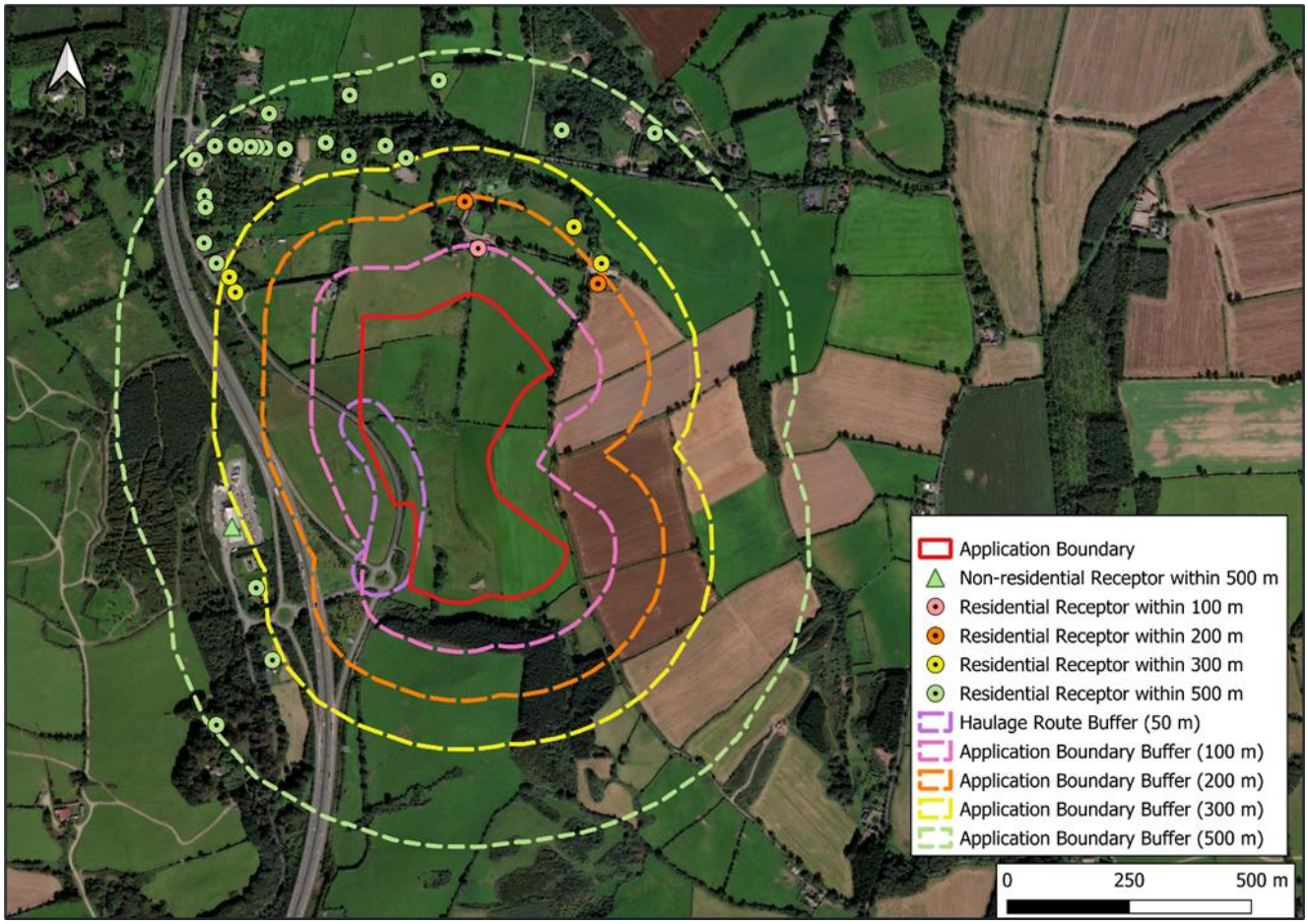

Figure 4-1 - Location of receptors within 500 m of the Application Boundary (shown by red line) and within 50 m of the Haulage Route (extending 350 m in a southerly direction from the point of exit of the Application boundary.

Table 4-1 - Receptors within 500 m of the Application boundary

Receptor Type and Distance Band from Application boundary	Number of Receptors in Group	Category of Receptor distance	Number of Receptors in Prevailing Wind Direction (N of Boundary or haul route)	Frequency of dusty winds	Pathway Effectiveness
Residential within 50 m (of haul route)	0	Close	0	Moderate	Moderate
Residential within 100 m	1	Close	1	Moderate	Moderate
Residential within 100 m - 200 m	2	Intermediate	2	Moderate	Moderate
Residential within 200 m - 300 m	3	Distant	3	Moderate	Ineffective
Residential within 300 m - 500 m	23	Distant	19	Moderate	Ineffective
Non-Residential within 300 m – 500 m	1	Distant	0	Moderate	Ineffective

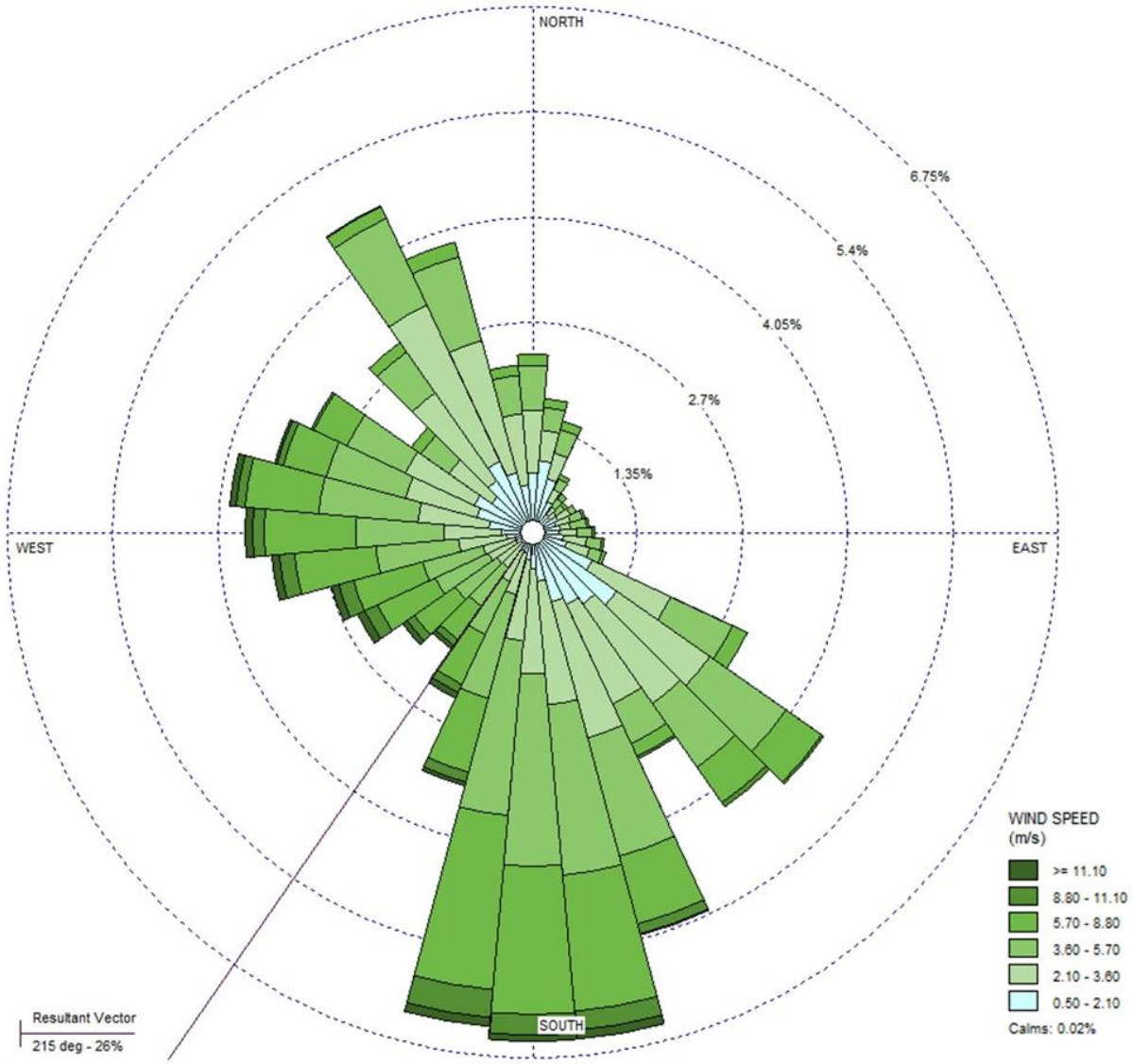

Figure 4-2 - Annual dominant wind direction at Carlow Oak Park using Hourly Wind Data (Assessment Period 1 January 2019 to 28 February 2023)

4.2 ASSESSMENT OF COARSE PARTICLES

Assessment of the dis-amenity dust associated with the continued operation of the Site is summarised for each receptor in Table 4-2. Following the IAQM guidance, the nature of the activities at the Site and the existing mitigation measures (outlined in Section 5) suggest that the magnitude of any deposited dust effects will range from ‘Moderately Adverse’ to ‘Slight Adverse’ effects.

Table 4-2 - Assessment of Dust Dis-amenity Effects at Receptors

Receptor Type and Distance Band from Application boundary	Maximum Residual Source Emissions	Pathway Effectiveness	Dust Impact Risk	Receptor Sensitivity	Magnitude of Dust Effects
Residential within 100 m	Large	Moderate	Medium Risk	High	Moderate Adverse effect
Residential within 100 m - 200 m	Large	Moderate	Medium Risk	High	Moderate Adverse effect
Residential within 200 m - 300 m	Large	Ineffective	Low risk	High	Slight Adverse effect
Residential within 300 m - 500 m	Large	Ineffective	Low risk	High	Slight Adverse effect

4.3 ASSESSMENT OF FINE PARTICLES

The IAQM recommend that if the PM_{10} background concentration is less than 17 µg/m^3 there is little risk that the process contribution (PC) from the Site would lead to an exceedance of the annual-mean objective. The background data from other equivalent Zone D areas is detailed in Section 9.6.4.2 of the EIAR chapter. The annual average of the historic Zone D stations is 12.2 µg/m^3 which is less than 17 µg/m^3. It is unlikely that the PC from the Site would lead to an exceedance of the AQS.

Fine particulate PC can be assessed using the calculation of concentration with distance from source as detailed in LAQM TG03. The guidance document also states that the likely PM_{10} contribution from fugitive dusts, stockpiles, quarries and construction is variable but up to 5 µg/m^3. Therefore, the likely concentration at the receptor locations can be estimated using the calculation considering the distance from source. As $PM_{2.5}$ is a sub-fraction of PM_{10}, the contribution of $PM_{2.5}$ will be lower but if it is conservatively assumed that all of the PM_{10} is $PM_{2.5}$.

When combining the likely concentration at the closest receptor (1.5 µg/m3) with the average historical background value (12.2 µg/m3) for Zone D areas, the maximum annual $PM1_0$ predicted environmental concentration (PEC) would be 13.7 µg/m3 which is approximately 34% of the AQS, and the annual $PM^{2.5}$ PEC would be 55% of the Stage 1 AQS and 69% of the Stage 2 AQS, at the closest receptor. The PEC is predicted to be below the annual AQS, with headroom. The impact from fine particle PC from the Site is considered to be Negligible to Slight prior to mitigation which would reduce to Negligible due to the mitigation measures to be employed by the Site.

Table 4-3 - Assessment of Fine Particulates at Closest Downwind Receptors

Receptor Type and Distance Band	Number of Receptors in Distance Band	Number of Receptors in Prevailing Wind Direction	Distance from source (m)	Relative concentration (with fallout from source)	Estimated concentration (µg/m3) at receptor band, assuming source emission of 5 µg/m3
Residential within 0 m - 100 m of source	1	1	50	30%	1.5
Residential within 100 m - 200 m	2	2	100	18%	0.9
Residential within 200 m - 300 m	3	3	200	8%	0.4

5 MITIGATION AND MONITORING

The Site will employ a number of mitigation measures to reduce the impact of dust emissions on the surrounding area and identified sensitive receptors. These mitigation measures are as follows:

- Regular visual inspections by Site personnel to assess visual dust emissions;
- The timing of operations is optimised in relation to meteorological conditions;
- A water bowser is available on Site for dust suppression/dampening of internal haul roads and stockpiles to minimise dust blow during working hours;
- Stockpiles will only be used in poor weather conditions, and will be located as close to the void as possible to take advantage of shelter from the wind, in the centre of the Site.
- Consider the use of temporary baffle mounds around active working areas;
- Plant is regularly maintained;
- Incoming loads of filling material will be contained in covered HGVs to minimise wind blow;
- Internal haul roads are compacted or made of concrete hardstanding;
- All exiting vehicles will pass through a jet-spray wheel wash prior to exit onto the Coynes Cross public road. Additionally, all vehicles will pass through a wheel wash when entering/exiting the fill area;
- On site speed restrictions (<10 kph) are maintained in order to limit the generation of fugitive dust emissions.
- Areas of exposed soils will be kept to a minimum where practical
- Filling activities will not take place in during strong winds; and
- The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of internal paved site roads and the existing public roads, if required.

Deposited dust monitoring will be undertaken during operation at appropriate locations around the Application boundary in order to monitor dust emissions that may be arising from the Site activities.

The frequency and locations of monitoring will be determined in accordance with the Environmental Permit requirements. Table 5-1 assesses the potential impacts from the operation of the Site on the local air quality both with and without the establishment of appropriate mitigation measures detailed above based on the IAQM, 2016 guidance and the application of expert judgement. The duration of these effects will occur in the medium term during the soil recovery facilities' phased operations (i.e. during stripping, extraction and restoration). Definitions of effect significance are as defined in the EPA's 2022 'Guidelines on the information to be contained in environmental impact assessment reports'.

Without mitigation measures it is considered that dust impacts from extraction activities may not affect the character of the environment but would have noticeable changes. Through the implementation of the environmental management programme, it is likely that the dust from various activities will have an effect capable of measurement but without noticeable consequences to the environment.

Table 5-1 - Ty Assessment of Impacts to Local Air Quality and Mitigation Measures Employed (based on IAQM 2016 guidance and expert judgement)

Impact	With / Without the establishment of Mitigation Measures	Type of Effect	Quality of Effects	Significance of Effects	Duration of Effects
Dust from filling	Without	Direct	Negative	Moderate	Medium Term (7-15 years)
Dust from filling	With	Direct	Negative	Slight	Medium Term (7-15 years)
Dust from transfer on haul roads	Without	Direct	Negative	Moderate	Medium Term (7-15 years)
Dust from transfer on haul roads	With	Direct	Negative	Slight	Medium Term (7-15 years)
Dust from transfer on public roads	Without	Direct	Negative	Moderate	Medium Term (7-15 years)
Dust from transfer on public roads	With	Direct	Negative	Slight	Medium Term (7-15 years)

6 RESIDUAL IMPACTS

Residual impacts of deposited dust and particulates generated during the continuation of operations at the Site on air quality are considered to be Slight. During long spells of dry weather, dust emissions can potentially be elevated, however dust nuisance from the operation is unlikely if the above mitigation measures are implemented during operation of the soil recovery facility and restoration. The overall impact from the continued operation of the Site, in terms of dust emissions and particulates, is considered 'Slight' to the air environment and Not Significant.

7 CUMULATIVE IMPACTS

Research has shown that the greatest proportion of dust predominantly deposits within the first 100 m away from the source (The Environmental Effects of Dust from Surface Mineral Workings, Volume 1 DETR, HMSO 1995) as dust has a higher deposition velocity than finer particles (i.e. PM10 and PM2.5). The finer particles of less than 10 microns aerodynamic diameter may remain airborne for longer and therefore travel larger distances, although a large proportion may still deposit within 200 m of the source.

The assessment undertaken has considered publicly available background monitoring data and incorporated this into the assessment, therefore the assessment includes a consideration for other Sites operating in the area.

The closest planning application in the vicinity of the Site relates to changes to an existing property and is approximately 550m from the site, therefore due to the distance, there is no opportunity for significant cumulative impacts to arise.

The cumulative effects associated with other permitted / under construction third-party developments have been considered in Chapter 15.0 of this EIAR . Cumulative effects are considered to be Not Significant.

8 REFERENCES

Environmental Protection UK / Institute of Air Quality Management (EPUK/IAQM, 2017) Land-Use Planning and Development Control: Planning for Air Quality,v1.2, 2017.

Institute of Air Quality Management (IAQM, 2016) Guidance on the assessment of mineral dust for Planning.

The Environmental Effects of Dust from Surface Mineral Workings, Volume 1 DETR, HMSO 1995.

Town Centre House
Dublin Road
Naas
Co Kildare

wsp.com