BALLINA FLOOD RELIEF SCHEME

Environmental Impact Assessment Report
Chapter 13: Air Quality

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Prepared by:

RPS

Prepared for:

Mayo County Council

Dublin | Cork | Galway | Sligo | Kilkenny
rpsgroup.com

RPS Group Limited, registered in Ireland No. 91911
RPS Consulting Engineers Limited, registered in Ireland No. 161581
RPS Engineering Services Limited, registered in Ireland No. 99795
The Registered office of each of the above companies is West Pier Business Campus, Dun Laoghaire, Co. Dublin, A96 N6T7

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Acronyms

Acronym	Meaning
AADT	Annual Average Daily Traffic
CAFÉ	Clean Air For Europe
CO	Carbon Monoxide
EPA	Environmental Protection Agency
EU	EU European Union
HDV	Heavy Duty Vehicles
IAQM	Institute of Air Quality Management
LDV	Light Duty Vehicles
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
PM_{10}	Particular matter of an aerodynamic diameter of equal or less than 10 micrometre
$PM_{2.5}$	Particular matter of an aerodynamic diameter of equal or less than 2.5 micrometre
pNHA	proposed Natural Heritage Area
SAC	Special Area of Conservation
SPA	Special Protection Area
TII	Transport Infrastructure Ireland
WHO	World Health Organisation

13 AIR QUALITY

13.1 Introduction

This chapter assesses the likely significant effects on air quality associated with the proposed Ballina Flood Relief Scheme. A full description of the development is available in **Chapter 5: Project Description**.

13.2 Methodology

13.2.1 Legislation, Policy and Guidance

This chapter has been prepared having regard to the following guidelines:

- Guidance on the Assessment of Dust from Demolition and Construction Version 1.1 (Institute of Air Quality Management (IAQM, 2014)
- PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects (TII, 2022)

13.2.2 Zone of Influence

Impacts to air quality during the construction phase of the Proposed Scheme will primarily be as a result of construction dust emissions. According to the Institute of Air Quality Management guidance (IAQM, 2014) dust emissions from site activities have the potential to impact people and property up to 350 m from the source. As a result, a Zone of Influence (ZoI) of 350 m for construction phase air quality impacts has been used in this assessment. Due to the nature of the Proposed Scheme, operational impacts to air quality are not envisaged and as such, no ZoI has been set for the operational phase.

13.2.3 Sources of Information to Inform the Assessment

The following sources were used to inform the air quality assessment:

- Environmental Protection Agency (EPA) annual air quality monitoring reports – *Air Quality in Ireland 2022* (EPA, 2023) and previous reports 2018 – 2021.
- Met Eireann historical 30-year average (1991 – 2020) meteorological data for Belmullet, Co. Mayo (Met Eireann, 2023)
- Met Eireann meteorological data (2018 – 2022) for Knock Airport, Co. Mayo (Met Eireann, 2023)
- Google Satellite mapping (Google, 2023)

13.2.4 Key Parameters for Assessment

During the construction phase construction dust emissions have the potential to impact air quality. Dust emissions will primarily occur as a result of site preparation works, earthworks and the movement of trucks on site and exiting the site (trackout). There is also the potential for engine emissions from site vehicles and machinery to impact air quality. Construction phase impacts will be short-term in duration.

Due to the nature of the Proposed Scheme, there are unlikely to be any emissions to atmosphere during the operational phase. There may be some minor dust emissions and vehicle or plant emissions if maintenance work is required; however, these will be temporary and highly infrequent in nature. It is not predicted that maintenance dust emissions or vehicle or plant emissions will have a significant impact on air quality. Therefore, operational phase air quality impacts have been screened out of this assessment.

13.2.5 Assessment Criteria and Significance

Air quality impacts are assessed at sensitive receptors within various distances of the Proposed Scheme. The primary source of air quality impacts relevant to the Proposed Scheme are construction dust emissions,

which are assessed at sensitive receptors within 350 m of the scheme. For the purposes of this assessment, as per the IAQM guidance (2014), high sensitivity receptors are regarded as residential properties (where people are likely to spend the majority of their time), schools and hospitals. Commercial premises and places of work are regarded as medium sensitivity and places where people are present for short periods or do not expect a high level of amenity are regarded as low sensitivity. Dust impacts to sensitive ecology, specifically vegetation, are assessed up to a distance of 50m from the scheme. Impacts to air quality are assessed against compliance with the relevant air quality standards which are set for the protection of human health and the environment. These are discussed in the sections below.

13.2.5.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies, the Department of the Environment, Heritage and Local Government in Ireland and the European Parliament and Council of the European Union, have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set.

Air quality significance criteria are assessed based on compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2022, which incorporate European Commission Directive 2008/50/EC, which has set limit values for numerous pollutants with the limit values for nitrogen dioxide (NO_2), and Particulate Matter (PM_{10}, and $PM_{2.5}$) being relevant to this assessment. PM_{10} includes particles with a size fraction of 10 microns and lower while $PM_{2.5}$ includes particles with a size fraction 2.5 microns and lower. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and includes ambient limit values relating to $PM_{2.5}$. The applicable limit values for NO_2, PM_{10}, and $PM_{2.5}$ are set out in **Table 13-1**.

Table 13-1: EU Ambient Air Quality Standards

Pollutant	Regulation[Note1]	Limit Type	Value
Nitrogen Dioxide (NO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

Note 1: EU 2008/50/EC – Clean Air For Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC.

In April 2023, the Government of Ireland published the Clean Air Strategy for Ireland (Government of Ireland, 2023), which provides a high-level strategic policy framework needed to reduce air pollution. The strategy commits Ireland to achieving the 2021 WHO Air Quality Guidelines Interim Target 3 (IT3) by 2026, the IT4 targets by 2030 and the final targets by 2040 (shown in **Table 13-2**).

The strategy notes that a significant number of EPA monitoring stations observed air pollution levels in 2021 above the WHO targets; 80% of these stations would fail to meet the final $PM_{2.5}$ target of 5 µg/m^3. The strategy also acknowledges that "*meeting the WHO targets will be challenging and will require legislative and societal change, especially with regard to both $PM_{2.5}$ and NO_2*". Ireland will revise its air quality legislation in

line with the proposed EU revisions to the CAFE Directive, which will set interim 2030 air quality standards and align the EU more closely with the WHO targets. At present, the applicable standards for assessing impacts to air quality are those outlined in **Table 13-1**.

Table 13-2: WHO Air Quality Guidelines

Pollutant	Regulation	Limit Type	IT3 (2026) (µg/m^3)	IT4 (2030) (µg/m^3)	Final Target (2040) (µg/m^3)
NO_2	WHO Air Quality Guidelines	24-hour limit for protection of human health	50	50	25
		Annual limit for protection of human health	30	20	10
PM (as PM_{10})		24-hour limit for protection of human health	75	50	45
		Annual limit for protection of human health	30	20	15
PM (as $PM_{2.5}$)		24-hour limit for protection of human health	37.5	25	15
		Annual limit for protection of human health	15	10	5

13.2.5.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust, which are less than 10 microns, and the EU ambient air quality standards outlined in **Section 13.2.5.1** have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

However, guidelines for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/m^2/day averaged over a one-year period at any receptors outside the site boundary. The TA-Luft standard has been applied for the purpose of this assessment based on recommendations from the EPA in Ireland in the document titled '*Environmental Management Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals)'* (EPA, 2006). The document recommends that the TA-Luft limit of 350 mg/m^2/day be applied to the site boundary of quarries. This limit value can be implemented with regard to dust impacts from construction of the Proposed Scheme.

13.2.6 Construction Phase Methodology

13.2.6.1 Construction Dust Assessment

The Institute of Air Quality Management in the UK (IAQM) guidance document 'Guidance on the Assessment of Dust from Demolition and Construction' (2014) outlines an assessment method for predicting the impact of dust emissions from construction activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of this development in order to predict the likely risk of dust impacts in the absence of mitigation measures and to determine the level of site-specific mitigation required. The use of UK guidance is recommended by Transport Infrastructure Ireland in their guidance document Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022).

13.2.6.1.1 Sensitivity of the Receiving Environment

In line with the IAQM guidance document '*Guidance on the Assessment of Dust from Demolition and Construction'* (2014) prior to assessing the impact of dust from a proposed scheme the sensitivity of the area must first be assessed as outlined below. Both receptor sensitivity and proximity to proposed works areas are taken into consideration. As mentioned in **Section 13.2.5**, for the purposes of this assessment, high sensitivity receptors are regarded as residential properties (where people are likely to spend the majority of their time), schools and hospitals. Commercial premises and places of work are regarded as medium sensitivity and places where people are present for short periods or do not expect a high level of amenity are regarded as low sensitivity.

The sensitivity of the area to dust soiling effects and dust-related human health effects are first considered. The criteria take into consideration the receptor sensitivity based on type (high, medium and low) and the number of receptors affected within various distance bands from the construction works. In addition, for human health effects, the current annual mean PM_{10} concentration is also considered. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the Proposed Scheme is 12 µg/m^3 (see **Section 13.3.1.2.2**). The IAQM guidance (2014) states that where there are no sensitive human receptors present within 350 m of the site, then no assessment of dust impacts is required.

The IAQM guidelines (2014) also outline the assessment criteria for determining the sensitivity of the area to dust-related ecological impacts. Dust emissions can coat vegetation leading to a reduction in the photosynthesising ability of the plant as well as other effects. The guidance states that dust impacts to vegetation can occur up to 50 m from the site and 50 m from site access roads, up to 200 m for the site entrance. The sensitivity of the area is determined based on the distance to the source, the designation of the site, (European, National or local designation) and the potential dust sensitivity of the ecologically important species present.

Table 13-3 outlines the criteria for determining the sensitivity of the area to dust soiling, **Table 13-4** details the criteria for determining the sensitivity of the area to dust-related human health effects and **Table 13-5** details the criteria for determining the sensitivity of the area to dust-related ecological effects. These criteria, reproduced from the IAQM guidance (2014), have been used in the current assessment to determine the sensitivity of each subsection of the Proposed Scheme to potential dust impacts.

Table 13-3: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 13-4: Sensitivity of the Area to Dust Related Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	< 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	< 24 µg/m^3	>10	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
Low	< 24 µg/m^3	>1	Low	Low	Low	Low	Low

Table 13-5: Sensitivity of the Area to Dust-Related Ecological Effects

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

13.2.6.1.2 Determining the Magnitude of Dust Emissions

The magnitude of each dust generating activity is combined with the overall sensitivity of the area to determine the risk of dust impacts from site activities. This allows the level of site-specific mitigation to be determined.

The major dust generating activities are divided into four types within the IAQM guidance (2014) to reflect their different potential impacts. These are:

- Demolition
- Earthworks
- Construction
- Trackout (transport of dust and dirt from the construction site onto the public road network)

The categories applicable to the Proposed Scheme are demolition, earthworks, construction and trackout. These are described below for each category as per the IAQM guidance (2014).

The criteria in **Table 13-6** taken from the IAQM guidance (2014) outline the dust emission magnitude for each of the four categories. Once the dust emission magnitude is established using the criteria in **Table 13-6** this is combined with the sensitivity of the area (see criteria in **Section 13.2.6.1.1** and assessment in **Section 13.3.1.3**) the level of risk of dust emissions for each activity is determined using the criteria in **Table 13-7**. The level of risk has been used in determining the level of mitigation that must be applied. The assessment is completed in **Section 13.4.1.1**.

Table 13-6: Categorisation of Dust Emission Magnitude (IAQM, 2014)

Dust Emission Magnitude		
Small	**Medium**	**Large**
Demolition		
• Total building volume <20,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber) • Demolition activities <10 m above ground • Demolition during wetter months	• Total building volume 20,000 - 50,000 m^3 • Potentially dusty construction material • Demolition activities 10 – 20 m above ground level	• Total building volume >50,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site crushing and screening • demolition activities >20 m above ground level

Dust Emission Magnitude		
Earthworks		
• Total site area <2.500 m^2 • Soil type with large grain size (e.g. sand) • <5 heavy earth moving vehicles active at any one time • Formation of bunds <4 m in height • Total material moved < 20,000 tonnes • Earthworks during wetter months	• Total site area 2,500 m^2 - 10,000 m^2 • Moderately dusty soil type (e.g. silt) • 5 – 10 heavy earth moving vehicles active at any one time • Formation of bunds 4 – 8 m in height • Total material moved 20,000 – 100,000 tonnes	• Total site area >10,000 m^2 • Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) • >10 heavy earth moving vehicles active at any one time • Formation of bunds >8 m in height • Total material moved >100,000 tonnes
Construction		
• Total building volume • <25,000 m^3 • Construction material with low potential for dust release (e.g. metal cladding or timber)	• Total building volume 25,000 - 100,000 m^3 • Potentially dusty construction material (e.g. concrete) • On-site concrete batching	• Total building volume • >100,000 m^3 • On-site concrete batching • Sandblasting
Trackout		
• <10 HDV (>3.5 t) outward movements in any one day • Surface material with low potential for dust release • Unpaved road length <50 m	• 10 – 50 HDV (>3.5 t) • Outward movements in any one day • Moderately dusty surface material (e.g. high clay content) • Unpaved road length 50 – 100 m	• >50 HDV (>3.5 t) outward movements in any one day • Potentially dusty surface material (e.g. high clay content) • Unpaved road length >100 m

Table 13-7: Risk of Dust Impacts (IAQM, 2014)

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High risk	Medium risk	Medium risk
Medium	High risk	Medium risk	Low risk
Low	Medium risk	Low risk	Negligible
Earthworks			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Construction			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Medium risk	Low risk
Low	Low risk	Low risk	Negligible
Trackout			
High	High risk	Medium risk	Low risk
Medium	Medium risk	Low risk	Negligible
Low	Low risk	Low risk	Negligible

13.2.6.2 Construction Phase Traffic Assessment

Construction phase traffic also has the potential to impact air quality. The TII guidance Air Quality Assessment of Specified Infrastructure Projects – PE-ENV-01106 (TII, 2022), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed scheme and should be included in the local air quality assessment. While the guidance is specific to infrastructure projects the approach can be applied to any development that causes a change in traffic.

- Annual average daily traffic (AADT) changes by 1,000 or more.
- Heavy duty vehicle (HDV) AADT changes by 200 or more.
- Daily average speed change by 10 kph or more.
- Peak hour speed change by 20 kph or more.
- A change in road alignment by 5 m or greater.

The construction stage traffic will not increase by 1,000 AADT or 200 HDV AADT and therefore does not meet the above scoping criteria. In addition, there are no proposed changes to the traffic speeds or road alignment. As a result, a detailed air assessment of construction stage traffic emissions has been scoped out from any further assessment as there is no potential for significant impacts to air quality.

13.2.7 Operational Phase Methodology

Due to the nature of the Proposed Scheme, there are no predicted emissions to atmosphere during the operational phase. Therefore, there is no potential for operational phase impacts to air quality and no assessment is required.

13.2.8 Data Limitations

There were no difficulties or limitations encountered when carrying out this assessment.

13.2.9 Consultations

Meetings and follow up consultations were arranged with stakeholders at all phases of the project. Comments and queries from stakeholders informed design and are addressed throughout this report and summarised in **Table 13-8**.

Table 13-8: List of Consultations

Consultees	Feedbacks	Location where Comments were Addressed
Transport Infrastructure Ireland (TII)	Regard to TII's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006).	The 2006 NRA guidance was superseded by the new 2022 TII guidance: PE-ENV-01106: Air Quality Assessment of Specified Infrastructure Projects. The air quality assessment has been carried out in line with the 2022 TII guidance documents which are more appropriate.

13.3 Description of the Existing Environment

The Proposed Scheme is divided into a number of subsections for assessment purposes. Due to the nature of air quality, the baseline environment cannot be specifically localised to each of these subsections as air quality is similar across a broad area. In relation to the prevailing meteorological conditions and the background air pollutant levels, these will be similar to all subsections and are not specific to each one. These have been described in detail in the below sections. In relation to the sensitivity of the surrounding

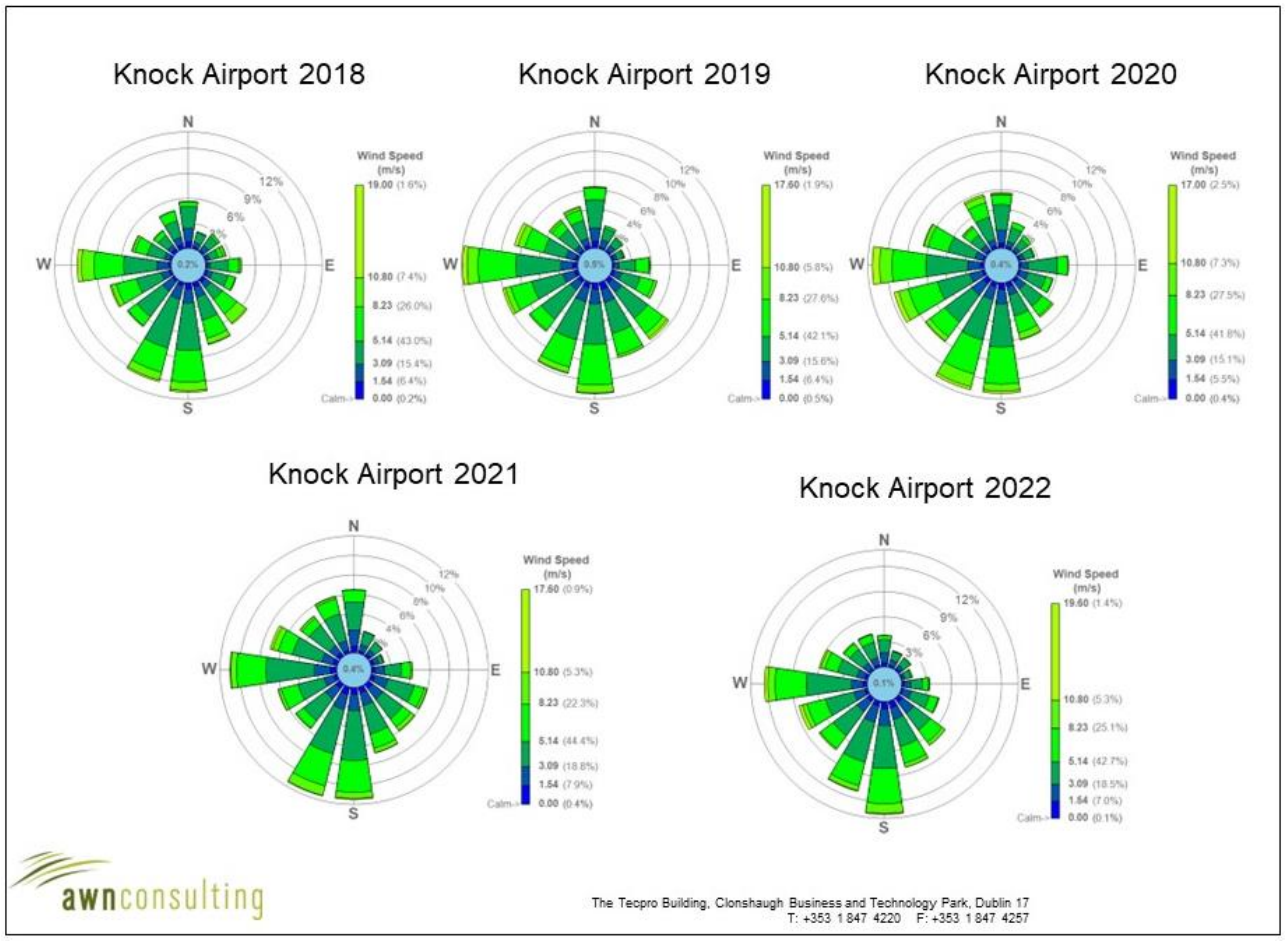
area to construction phase dust impacts, this is specific to each subsection of the scheme and has been broken down accordingly.

13.3.1 Baseline Environment

13.3.1.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e., traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants. The potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction.

The nearest representative weather station collating detailed weather records is Knock Airport, meteorological station in Co. Mayo, which is located approximately 40 km south-east of the Proposed Scheme. Knock Airport met data have been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see **Figure 13-1**). For data collated during five representative years (2018 – 2022), the predominant wind direction is westerly to southerly in direction with predominantly moderate wind speeds. In addition, dust generation is considered negligible on days where rainfall is greater than 0.2 mm. A review of historical 30-year average data (1991 – 2020) for Belmullet, Co. Mayo, the closest meteorological station with 30-year average data, indicates that on average 257 days per year have rainfall over 0.2 mm (Met Eireann, 2023) and therefore it can be determined that approximately 70% of the time dust generation will be reduced due to natural weather conditions.



Source: Met Eireann 2023

Figure 13-1: Knock Airport Windroses 2018 – 2022

13.3.1.2 Background Pollutant Concentrations

The EPA and Local Authorities have undertaken air quality monitoring programmes in recent years. The most recent EPA published annual report on air quality "Air Quality In Ireland 2022" (EPA, 2023) details the range and scope of monitoring undertaken throughout Ireland.

As part of the implementation of the Framework Directive on Air Quality (1996/62/EC), four air quality zones have been defined in Ireland for air quality management and assessment purposes as outlined within the EPA document titled 'Air Quality In Ireland 2022' (EPA, 2023). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D. In terms of air monitoring, Ballina and the area of the Proposed Scheme are categorised as Zone D (see **Figure 13-2**). Historical monitoring data from representative Zone D locations has been reviewed to provide an estimate of the background air quality in the region of the Proposed Scheme.

Figure 13-2: EPA Air Quality Monitoring Zones

13.3.1.2.1 NO_2

With regard to NO_2, continuous monitoring data from the EPA (EPA, 2023), at the Zone D monitoring locations of Castlebar, Co. Mayo, Killkitt, Co. Monaghan and Emo Court, Co. Laois show that current levels of NO_2 are below both the annual and 1-hour limit values, with annual average levels ranging from 2 – 8 µg/m^3 over the period 2018 – 2022 (see **Table 13-9**). Based on these results an estimate of the current background NO_2 concentration in the region of the Proposed Scheme is 8 µg/m^{3,} which is well below the limit value of 40 µg/m^3.

Table 13-9: Trends In Zone D Air Quality – Nitrogen Dioxide (µg/m^3)

Station	Averaging Period [Note 1]	Year				
		2018	2019	2020	2021	2022
Castlebar	Annual Mean NO_2 (µg/m^3)	8	8	6	6	8
	99.8th %ile 1-hr NO_2 (µg/m^3)	60	59	54	48	57
Kilkitt	Annual Mean NO_2 (µg/m^3)	3	5	2	2	2
	99.8th %ile 1-hr NO_2 (µg/m^3)	22	42	13	11	15
Emo Court	Annual Mean NO_2 (µg/m^3)	3	4	4	4	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	42	28	23	28	38

Note 1: Annual average limit value - 40 µg/m^3 and 1-hour limit value - 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

13.3.1.2.2 PM_{10}

Long-term PM_{10} monitoring was carried out at the Zone D locations of Castlebar, Co. Mayo, Killkitt Co. Monaghan and Claremorris, Co. Mayo. Concentrations over the 2018 – 2022 period are below both the annual and daily limit values (EPA, 2023). The average annual mean concentrations range from 7 – 16 µg/m^3 over the period 2018 – 2022 (see **Table 13-10**). In addition, there were no exceedances of the daily limit value of 50 µg/m^3 in 2022, albeit 35 exceedances are permitted per year. Based on the above information an estimated background concentration of 12 µg/m^3 has been used in this assessment, which is well below the limit value of 40 µg/m^3.

Table 13-10: Trends in Zone D Air Quality – PM_{10} (µg/m^3)

Station	Averaging Period [Notes 1, 2]	Year				
		2018	2019	2020	2021	2022
Castlebar	Annual Mean PM_{10} (µg/m^3)	11	16	14	10	11
	24-hr Mean > 50 µg/m^3 (days)	0	1	2	0	0
	90th %ile 24-hr PM_{10} (µg/m^3)	20	24	22	22	19
Killkitt	Annual Mean PM_{10} (µg/m^3)	9	7	8	8	9
	24-hr Mean > 50 µg/m^3 (days)	0	1	0	0	0
	90th %ile 24-hr PM_{10} (µg/m^3)	15	13	14	13	14
Claremorris	Annual Mean PM_{10} (µg/m^3)	12	11	10	10	8
	24-hr Mean > 50 µg/m^3 (days)	0	0	0	1	0
	90th %ile 24-hr PM_{10} (µg/m^3)	20	20	16	13	13

Note 1: Annual average limit value – 40 µg/m^3 and 24-hour limit value – 50 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 739 of 2022).

13.3.1.2.3 $PM_{2.5}$

Monitoring for $PM_{2.5}$ is not conducted at the station in Castlebar therefore data from the station in Claremorris Co. Mayo has been used. Annual mean concentrations of $PM_{2.5}$ at the Zone D background location of Claremorris over the period 2018 – 2022 (EPA, 2023) ranged from 4 – 8 µg/m^3. Based on this information a background $PM_{2.5}$ concentration of 8 µg/m^3 has been used in this assessment, which is well below the limit value of 25 µg/m^3.

13.3.1.2.4 Air Quality Index for Health

The Environmental Protection Agency (EPA) have established an Air Quality Index for Health (AQIH) which is a score from 1 to 10 which indicates the current short-term, daily/hourly air quality at various monitoring stations throughout Ireland. The data is available online and aims to provide the general public with easily

accessible information on current short-term daily/hourly air quality in their area and to provide health advice for undertaking outdoor activities for the general public and 'at-risk' groups (e.g. members of the public with lung or heart problems that can be exacerbated by poor air quality). A score of 10 indicates that the air quality is very poor and a score of 1 to 3 inclusive indicates the air quality is good (see **Figure 13-3**).

The scoring is based on 1 hour mean concentrations of NO_2 and sulphur dioxide (SO_2), on 24-hour mean concentrations of PM_{10} and $PM_{2.5}$ and on 8-hour mean concentrations of ozone (O_3).

The current air quality in the area of Ballina is categorised as 3 – Good according to the EPA website (EPA, 2024).

Band	Index	Ozone (µg/m³) 8 HOUR MEAN	Nitrogen Dioxide (µg/m³) 1 HOUR MEAN	Sulphur Dioxide (µg/m³) 1 HOUR MEAN	PM2.5 (µg/m³) 24 HOUR MEAN	PM10 (µg/m³) 24 HOUR MEAN
Good	1	0 - 33	0 - 67	0 - 29	0 - 11	0 - 16
	2	34 - 66	68 - 134	30 - 59	12 - 23	17 - 33
	3	67 - 100	135 - 200	60 - 89	24 - 35	34 - 50
Fair	4	101 - 120	201 - 267	90 - 119	36 - 41	51 - 58
	5	121 - 140	268 - 334	120 - 149	42 - 47	59 - 66
	6	141 - 160	335 - 400	150 - 179	48 - 53	67 - 75
Poor	7	161 - 187	401 - 467	180 - 236	54 - 58	76 - 83
	8	188 - 213	468 - 534	237 - 295	59 - 64	84 - 91
	9	214 - 240	535 - 600	296 - 354	65 - 70	92 - 100
Very Poor	10	241 or more	601 or more	355 or more	71 or more	101 or more

Source: https://airquality.ie/information/air-quality-index-for-health

Figure 13-3: Air Quality Index for Health

13.3.1.2.5 Summary

Based on the above information from the EPA on long-term air monitoring data for representative locations and the current Air Quality Index for Health for Ballina, the air quality in the area is generally good, with concentrations of the key pollutants generally well below the relevant limit values. However, the EPA have indicated that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$). The EPA predict that exceedances in the particulate matter limit values are likely in certain areas in future years if burning of solid fuels for residential heating continues (EPA, 2023).

13.3.1.3 Sensitivity of the Receiving Environment

The sensitivity of the surrounding area of each of the subsections of the Proposed Scheme have been determined in the following sections. This is based on the IAQM criteria in **Table 13-3**, **Table 13-4** and **Table 13-5**. The criteria take into account both human and ecological receptors within specific distances of the site. Sensitive receptors within the 350 m ZoI have been reviewed; the receptors within the closest distance band to the Proposed Scheme (0 – 20m, 21 – 50m, 51 – 100m and 101 – 350m) determine the overall worst-case sensitivity of the area with regard to the potential dust impacts as per the IAQM criteria (IAQM, 2014).

13.3.1.3.1 River Moy

In terms of receptor sensitivity to dust soiling, there are over 100 no. high sensitivity receptors within 20 m of the proposed works boundary (see **Figure 13-4**). Based on the location of the sensitive receptors and their distance from the site, the worst-case sensitivity of the area to dust soiling impacts is considered high as per the IAQM criteria outlined in **Table 13-3**. In relation to the sensitivity of the area to dust-related human health effects, this can be assessed as medium based on the criteria in **Table 13-4**.

Works will take place within a section of the River Moy Special Area of Conservation, SAC (site code 002298) and a section of the Killala Bay/Moy Estuary SAC and proposed Natural Heritage Area, pNHA (site code 000458) (see **Figure 13-4**). Due to the European designation of the site, it is considered a high sensitivity receptor according to the IAQM guidance (2014). As per the criteria in **Table 13-5**, the sensitivity of the area to dust-related ecological effects is high.

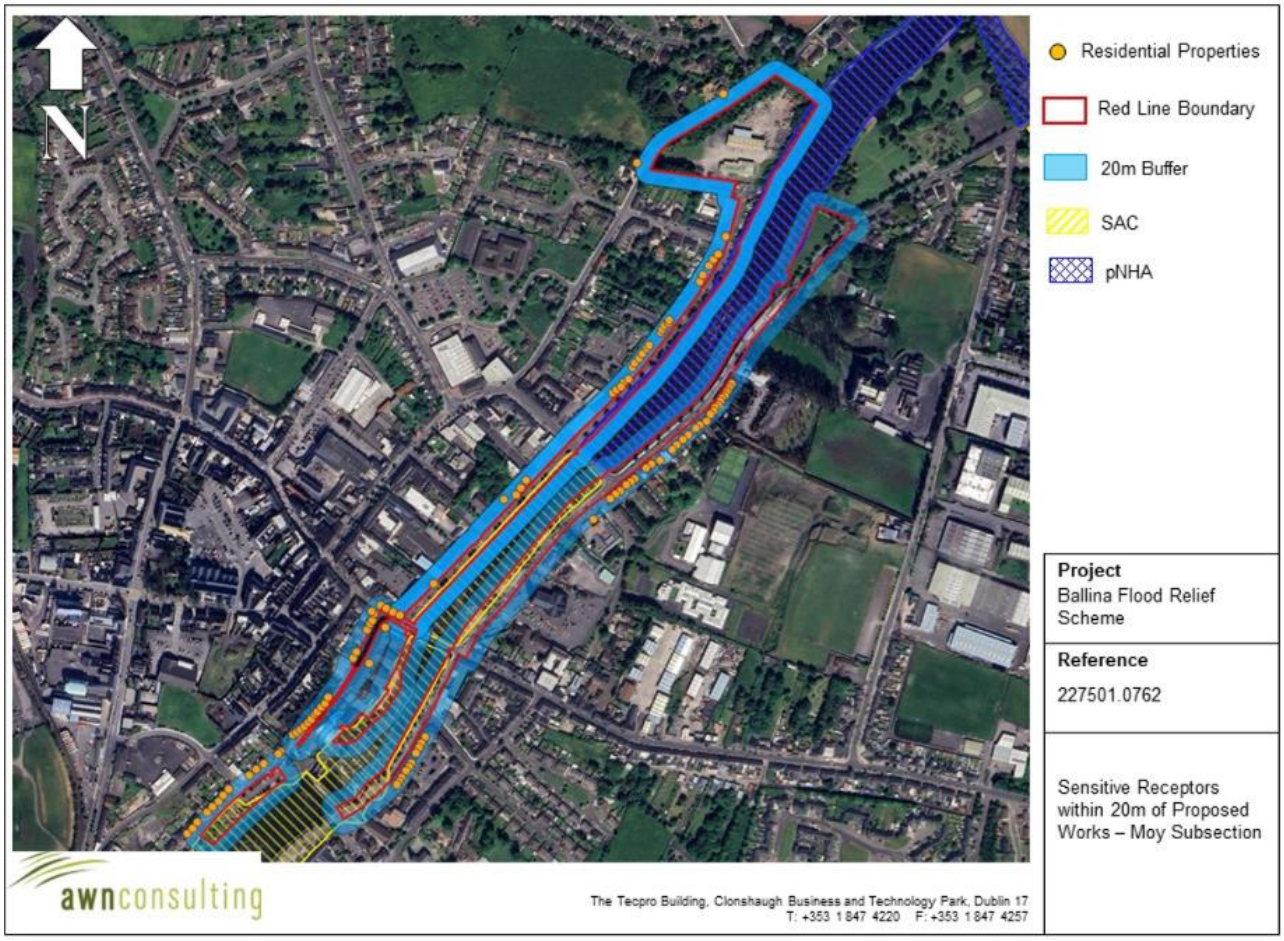


Figure 13-4: Sensitive receptors within 20m of Moy subsection

13.3.1.3.2 Quignamanger

In terms of receptor sensitivity to dust soiling, there are 25 no. high sensitivity receptors within 20 m of the proposed works boundary (see **Figure 13-5**). Based on the location of the sensitive receptors and their distance from the site, the worst-case sensitivity of the area to dust soiling impacts is considered high as per the IAQM criteria outlined in **Table 13-3**. In relation to the sensitivity of the area to dust-related human health effects, this can be assessed as low based on the criteria in **Table 13-4**.

Works will take place within a section of the Killala Bay/Moy Estuary Special Protection Area, SPA (site code 004036) and a section of the Killala Bay/Moy Estuary pNHA (site code 000458) (see **Figure 13-5**). Due to the European designation of the site, it is considered a high sensitivity receptor according to the IAQM

guidance (2023). As per the criteria in **Table 13-5**, the sensitivity of the area to dust-related ecological effects is high.

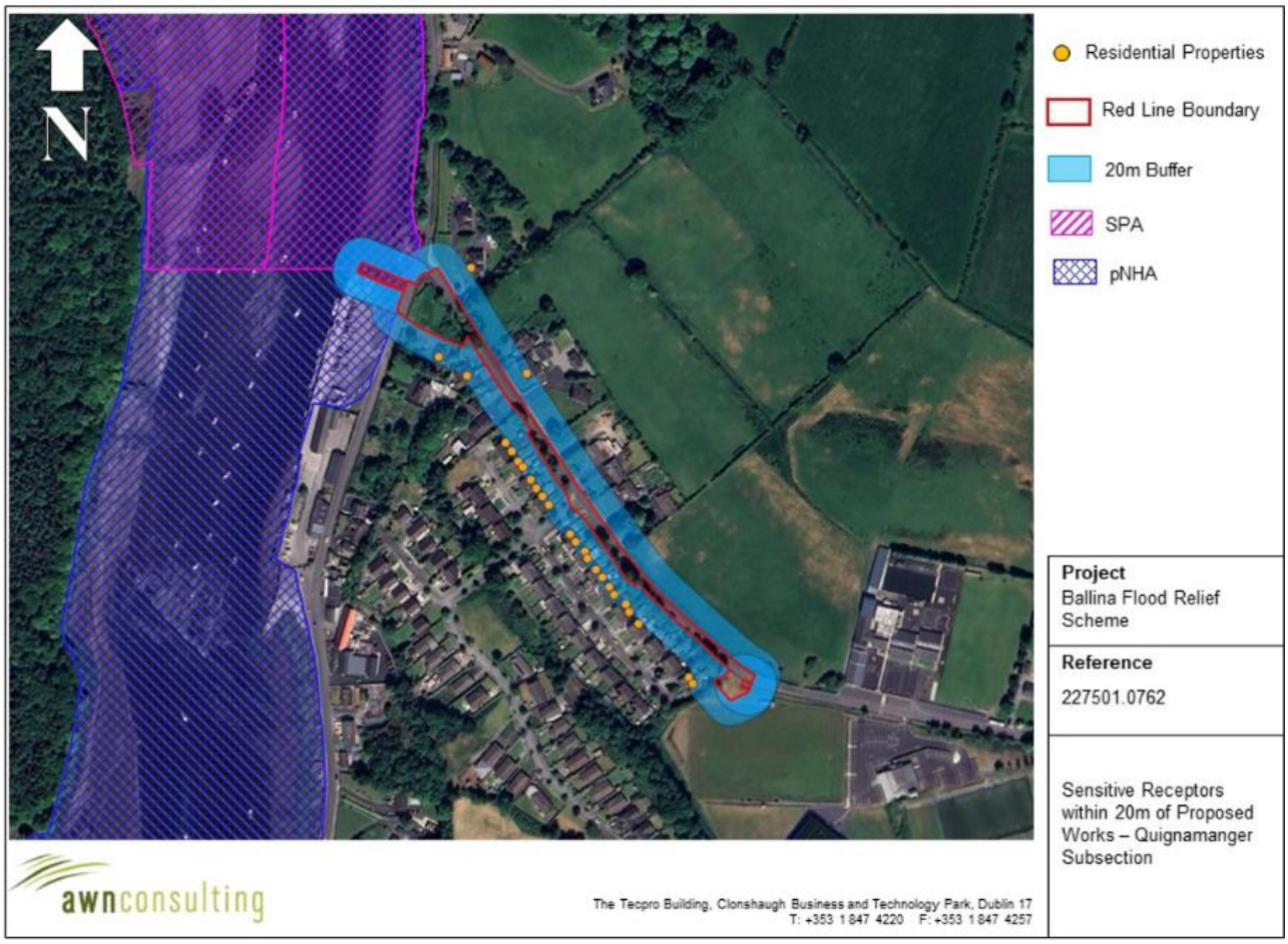


Figure 13-5: Sensitive receptors within 20m of Quignamanger subsection

13.3.1.1.3.3 Bunree / Behy Road

In terms of receptor sensitivity to dust soiling, there are 26 no. high sensitivity receptors within 20 m of the proposed works boundary (see **Figure 13-6**). Based on the location of the sensitive receptors and their distance from the site, the worst-case sensitivity of the area to dust soiling impacts is considered high as per the IAQM criteria outlined in **Table 13-3**. In relation to the sensitivity of the area to dust-related human health effects, this can be assessed as low based on the criteria in **Table 13-4**.

There are no designated sites within 50 m of the proposed Bunree / Behy Road subsection and therefore, there is no potential for dust-related ecological impacts as a result of works within this subsection of the scheme.

Figure 13-6: Sensitive receptors within 20m of Bunree / Behy Road subsection

13.3.1.3.4 Brusna (Glenree)

In terms of receptor sensitivity to dust soiling, there are 10 no. high sensitivity receptors within 20 m of the proposed works boundary (see **Figure 13-7**). Based on the location of the sensitive receptors and their distance from the site, the worst-case sensitivity of the area to dust soiling impacts is considered medium as per the IAQM criteria outlined in **Table 13-3**. In relation to the sensitivity of the area to dust-related human health effects, this can be assessed as low based on the criteria in **Table 13-4**.

Works will take place within a section of the River Moy SAC (site code 002298) (see **Figure 13-7**). Due to the European designation of the site, it is considered a high sensitivity receptor according to the IAQM guidance (2014). As per the criteria in **Table 13-5**, the sensitivity of the area to dust-related ecological effects is high.

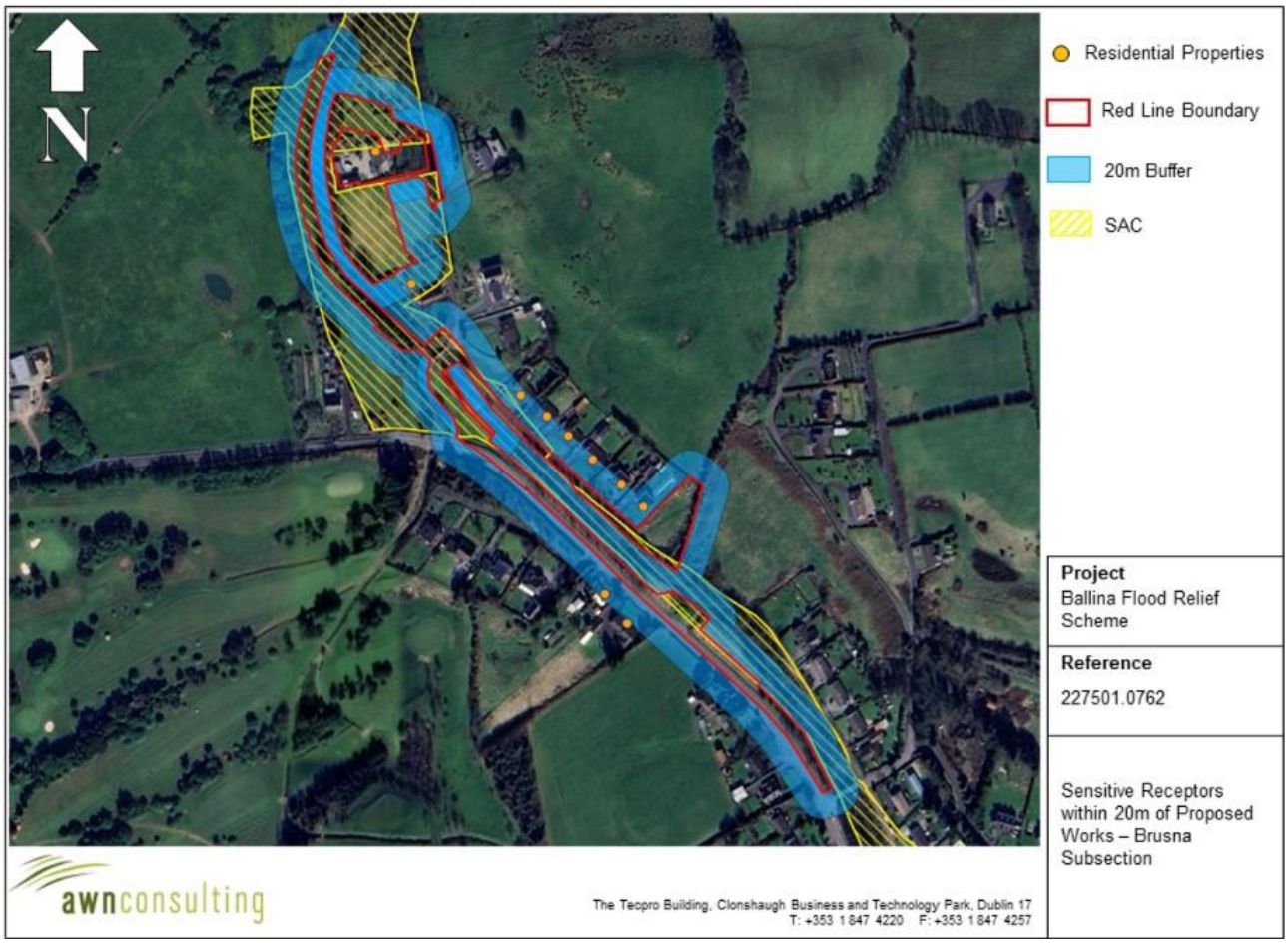


Figure 13-7: Sensitive receptors within 20m of Brusna subsection

13.3.1.3.5 Tullyegan

In terms of receptor sensitivity to dust soiling, there are 11 no. high sensitivity receptors within 20 m of the proposed works boundary (see **Figure 13-8**). Based on the location of the sensitive receptors and their distance from the site, the worst-case sensitivity of the area to dust soiling impacts is considered medium as per the IAQM criteria outlined in **Table 13-3**. In relation to the sensitivity of the area to dust-related human health effects, this can be assessed as low based on the criteria in **Table 13-4**.

There are no designated sites within 50 m of the proposed Tullyegan subsection and therefore, there is no potential for dust-related ecological impacts as a result of works within this subsection of the scheme.

Figure 13-8: Sensitive Receptors within 20m of Tullyegan Subsection

13.3.1.3.6 Site Compounds

There are five site compound locations identified for the Proposed Scheme (see **Figure 13-9**). The sensitivity of the area surrounding compounds 1, 2 and 3 have been assessed within the Moy subsection and Bunree / Behy Road subsections respectively. There are no high sensitivity receptors within 20 m of compounds 4 and 5. The sensitivity of the surrounding area in relation to dust soiling and dust-related human health effects for compounds 4 and 5 is low. There are no designated sites within 50 m of either compound 4 or 5.

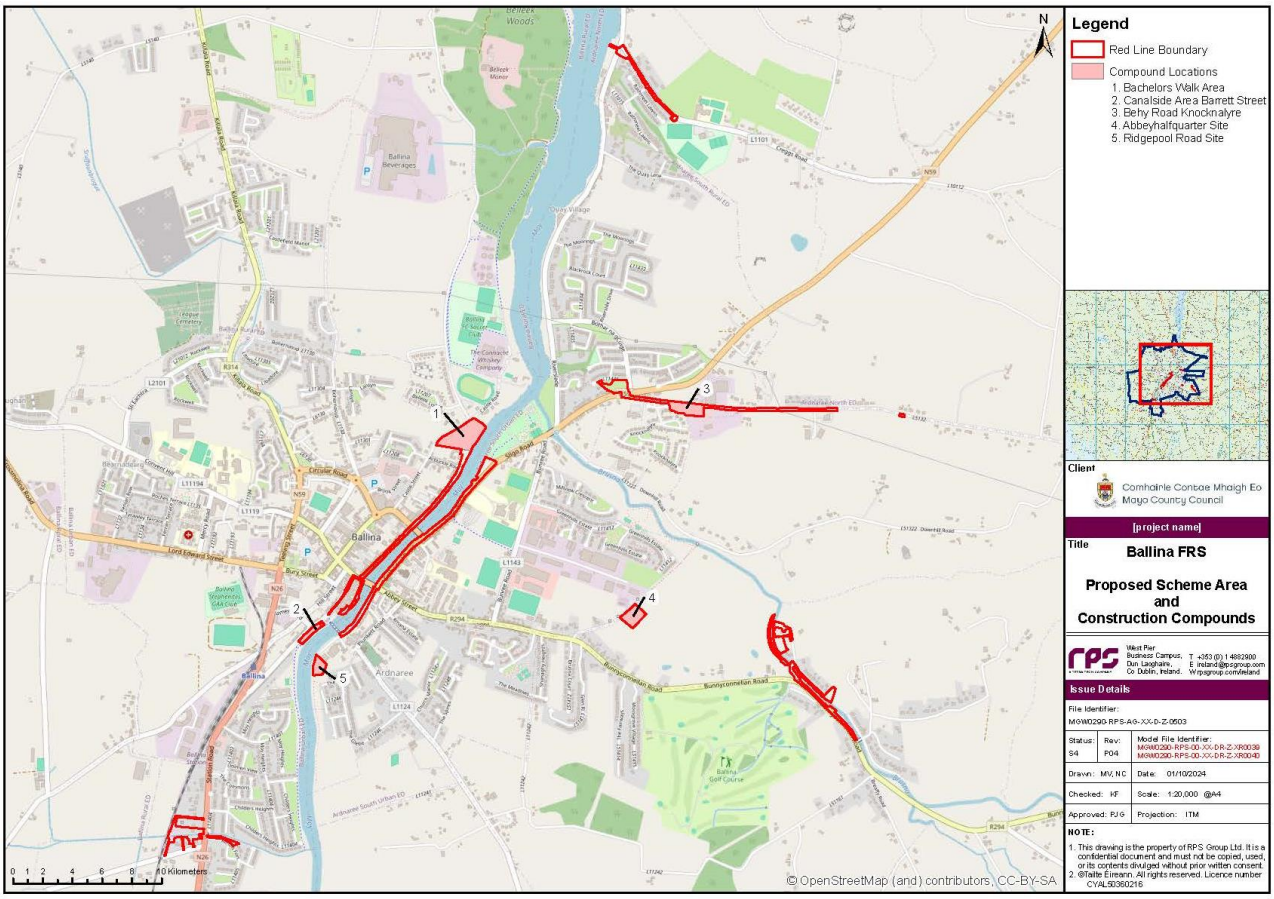


Figure 13-9: Site Compound Locations (source: RPS)

13.3.1.3.7 Summary Overview of Sensitivity of Receiving Environment

Table 13-11 details a summary of the sensitivity each of the subsections to dust effects as a result of the construction of the Proposed Scheme.

Table 13-11: Summary of Sensitivity of Receiving Environment

Subsection	Sensitivity to Potential Dust-Related Effects		
	Dust Soiling	Human Health	Ecology
Moy	High	Medium	High
Brusna (Glenree)	Medium	Low	High
Tullyegan	Medium	Low	N/A
Bunree / Behy Road	High	Low	N/A
Quignamanger	High	Low	High
Site Compound 4 & 5	Low	Low	N/A

13.3.2 Evolution of the Environment in the Absence of the Proposed Scheme

In the absence of the Proposed Scheme the air quality in the area will continue to develop in line with trends in the wider area (including influences from new developments in the surrounding area, changes in road traffic, etc.).

13.4 Description of the Likely Significant Effects

13.4.1 Construction Phase

13.4.1.1 Construction Phase Dust Assessment

The greatest potential impact on air quality during the construction phase of the Proposed Scheme is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. As per **Section 13.3.1.1**, local meteorological conditions are favourable to dust suppression the majority of the time due to high levels of rainfall.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see **Section 13.3.1.3**). The primary activities involved in the Proposed Scheme which have the potential to generate dust include removal of existing walls to allow for construction of new flood walls, construction of embankments, excavation and construction of culverts, remediation of existing quay wall, construction of pumping stations, construction of pavements and removal of pavements. Detailed construction methodologies are not known at this stage of the project and will be developed during the detailed design stage. Best estimates and indicative methodologies based on similar projects have been used where required for this assessment in the absence of site-specific information.

The majority of the required works are over relatively small areas and will result in very localised emissions of dust. The most significant works with dust generation potential are those that involve demolition, excavations, and filling. Other works are likely to have very minor dust emissions due to their small scale. Worst-case assumptions have been used as part of this assessment. As such, the dust mitigation measures proposed are those associated with a worst-case assessment and actual levels of dust which may arise from the proposed construction activities may be lower than estimated.

The impact of the Proposed Scheme in relation to construction dust impacts was assessed using the IAQM assessment criteria outlined in **Section 13.2.6.1**. The dust emission magnitude of the construction works was determined under the categories of demolition, earthworks, construction and trackout as per the criteria in **Section 13.2.6.1** and **Table 13-6**. The dust emission magnitude was combined with the sensitivity of the area as assessed in **Section 13.2.6.1.1** in order to determine the level of risk using the criteria in **Table 13-7** and the site-specific mitigation required. The following sections assess the impact of the Proposed Scheme.

13.4.1.1.1 River Moy

The works along the River Moy subsection include removal of existing walls to allow for the construction of new flood walls, repairs to existing quay walls, removal of pavements to allow for installation of flood walls, replacement of existing railings with glass walls, construction of a ramp and incorporation of public realm elements (see **Chapter 5** for further details). Works associated with Site Compound 1 have also been included within this sub-section. These activities can be assessed under the IAQM (2014) headings of Demolition, Earthworks, Construction and Trackout.

The dust emission magnitude for the proposed demolition activities, removal of pavements and removal of existing walls, can be classified as small as per the IAQM criteria (**Table 13-6**). The dust emission magnitude for the proposed earthwork activities can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction activities can be categorised as small as the building volume involved will be less than 25,000 m^3. Works will include construction of flood walls, pumping stations, and repairs to quay walls.

Detailed information on anticipated traffic movements is not available, as such, indicative daily movements have been used for the purposes of this assessment. It is estimated that up to 2 outward HGV movements will occur per hour during a typical working day. As a result, the dust emission magnitude for the proposed trackout can be classified as medium using the criteria in **Table 13-6**.

The small dust emission magnitude for the demolition, earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (high sensitivity to dust soiling and ecological effects, medium sensitivity to human health effects, see **Table 13-11**), the results are shown in **Table 13-12**. Overall, there is at most a medium risk associated with the demolition works in relation to dust soiling and potential dust-related ecological effects. There is an overall low risk associated with the earthworks and construction activities and a worst-case medium risk associated trackout activities.

Table 13-12: Dust Emission Risk – Moy Subsection

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Medium Risk	Low Risk	Low Risk	Medium Risk
Human Health	Low Risk	Low Risk	Low Risk	Low Risk
Ecology	Medium Risk	Low Risk	Low Risk	Medium Risk

13.4.1.1.2 Brusna (Glenree)

The works along the Brusna (Glenree) River subsection include construction of flood walls and embankments and scour protection (see **Chapter 5: Project Description** for further details). Works associated with Site Compound 2 have also been included within this sub-section. These activities can be assessed under the IAQM (2014) headings of Earthworks, Construction and Trackout.

As per the criteria in **Table 13-6,** the dust emission magnitude for the proposed earthwork activities can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The dust emission magnitude for the construction works can be classed as small as the works involve construction of flood walls and retaining walls.

Detailed information on anticipated traffic movements is not available, as such, indicative daily movements have been used for the purposes of this assessment. It is estimated that up to 2 outward HGV movements per hour will occur during a typical working day. As a result, the dust emission magnitude for the proposed trackout can be classified as medium.

The small dust emission magnitude for the earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (medium sensitivity to dust soiling, high sensitivity to ecological effects, low sensitivity to human health effects, see **Table 13-11**), the results are shown in **Table 13-13**. Overall, there is at most a low risk associated with the earthworks, construction and trackout activities in relation to dust soiling and potential dust-related human health and ecological effects.

Table 13-13: Dust Emission Risk – Brusna Subsection

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Low Risk
Human Health	N/A	Negligible Risk	Negligible Risk	Low Risk
Ecology	N/A	Low Risk	Low Risk	Low Risk

13.4.1.1.3 Tullyegan

The works along the Tullyegan stream subsection include construction of flood walls and an embankment (see **Chapter 5** for further details). These activities can be assessed under the IAQM (2014) headings of Earthworks, Construction and Trackout.

As per the criteria in **Table 13-6,** the dust emission magnitude for the proposed earthwork activities can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction works can be classified as small as works include construction of flood walls.

Detailed information on anticipated traffic movements is not available, as such, indicative daily movements have been used for the purposes of this assessment. It is estimated that up to 2 outward HGV movements per hour will occur during a typical working day. As a result, the dust emission magnitude for the proposed trackout can be classified as medium.

The small dust emission magnitude for the earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (medium sensitivity to dust soiling, low sensitivity to human health effects, see **Table 13-11**), the results are shown in **Table 13-14**. Overall, there is at most a low risk associated with the earthworks, construction and trackout activities in relation to dust soiling effects. There is a low risk of potential human health effects from the trackout activities, and a negligible risk associated with the earthworks and construction activities.

Table 13-14: Dust Emission Risk – Tullyegan Subsection

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Low Risk
Human Health	N/A	Negligible Risk	Negligible Risk	Low Risk
Ecology	N/A	N/A	N/A	N/A

13.4.1.1.4 Bunree / Behy Road

The works along the Bunree / Behy Road subsection include construction of new culverts and replacement of existing culverts (see **Chapter 5: Project Description** for further details). Works associated with Site Compound 3 have also been included within this sub-section. These activities can be assessed under the IAQM (2014) headings of Earthworks, Construction and Trackout.

The dust emission magnitude for the proposed earthwork activities can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction works can be classified as small as works include construction of culverts.

Detailed information on anticipated traffic movements is not available, as such, indicative daily movements have been used for the purposes of this assessment. It is estimated that up to 2 outward HGV movements per hour will occur during a typical working day. As a result, the dust emission magnitude for the proposed trackout can be classified as medium.

The small dust emission magnitude for the earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (high sensitivity to dust soiling, low sensitivity to human health effects, see **Table 13-11**), the results are shown in **Table 13-15**. Overall, there is at most a low risk associated with the earthworks and construction activities in relation to dust soiling effects and a medium risk associated with the trackout activities. There is at most a low risk for potential human health effects.

Table 13-15: Dust Emission Risk – Bunree / Behy Road Subsection

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Medium Risk
Human Health	N/A	Negligible Risk	Negligible Risk	Low Risk
Ecology	N/A	N/A	N/A	N/A

13.4.1.1.5 Quignamanger

The works along the Quignamanger subsection include replacement of existing culverts and installation of new culverts and construction of flood walls (see **Chapter 5** for further details). These activities can be assessed under the IAQM (2014) headings of Earthworks, Construction and Trackout.

The dust emission magnitude for the proposed earthwork activities can be classified as small as the total material moved (both excavations and infilling works) will be less than 20,000 tonnes. The construction works can be classified as small as works include construction of culverts and new flood walls.

Detailed information on anticipated traffic movements is not available, as such, indicative daily movements have been used for the purposes of this assessment. It is estimated that up to 2 outward HGV movements per hour will occur during a typical working day. As a result, the dust emission magnitude for the proposed trackout can be classified as medium.

The small dust emission magnitude for the earthworks and construction activities and medium magnitude for the trackout activities has been combined with the sensitivity of the area (high sensitivity to dust soiling, high sensitivity to ecological effects, low sensitivity to human health effects, see **Table 13-11**), the results are shown in **Table 13-16**. Overall, there is at most a low risk associated with the earthworks and construction activities in relation to dust soiling and potential dust-related ecological effects. There is at most a medium risk associated with the trackout activities in relation to dust soiling and potential dust-related ecological effects There is at most a low risk for potential human health effects in relation to the trackout activities; there is a negligible risk to dust impacts on human health from the earthworks and construction activities.

Table 13-16: Dust Emission Risk – Quignamanger Subsection

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	Low Risk	Medium Risk
Human Health	N/A	Negligible Risk	Negligible Risk	Low Risk
Ecology	N/A	Low Risk	Low Risk	Medium Risk

13.4.1.1.6 Site Compounds 4 & 5

The works at the site compound locations with the potential for dust emissions will include storage of potentially dusty materials and trackout from site vehicles. These activities can be assessed under the IAQM (2014) headings of Earthworks and Trackout. The small category is applicable to earthworks and the medium category is applicable to trackout for each of the compound locations.

The surrounding area of the site compounds 4 and 5 has been assessed as low sensitivity (**Table 13-11**). When combined with the small dust emission magnitude for the earthworks activities, this results in an overall low risk of dust soiling effects and a negligible risk of dust-related human health effects (see **Table 13-17**). There is a low risk of dust soiling effects and dust-related human health effects associated with the trackout activities.

Table 13-17: Dust Emission Risk – Site Compounds 4 & 5

Potential Effects	Dust Emission Risk			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	N/A	Low Risk	N/A	Low Risk
Human Health	N/A	Negligible Risk	N/A	Low Risk
Ecology	N/A	N/A	N/A	N/A

13.4.1.1.7 Summary of Potential Dust Risk & Impact Significance

Table 13-18 details a summary of the worst-case risk associated with each subsection of the Proposed Scheme. In the absence of mitigation, there is the potential for short-term, direct, negative, **imperceptible to slight, non-significant effects** to air quality as a result of construction dust emissions.

Table 13-18: Summary of Dust Emission Risk for Proposed Scheme

Subsection	Risk of Dust Effects from Construction works		
	Dust Soiling	Human Health	Ecology
Moy (incl. Site Compound 1)	Medium Risk	Low Risk	Medium Risk
Brusna (Glenree) (incl. Site Compound 2)	Low Risk	Low Risk	Low Risk
Tullyegan	Low Risk	Low Risk	N/A
Bunree / Behy Road (incl. Site Compound 3)	Medium Risk	Low Risk	N/A
Quignamanger	Medium Risk	Low Risk	Medium Risk
Site Compound 4 & 5	Low Risk	Low Risk	N/A

13.4.2 Operational Phase

Due to the nature of the Proposed Scheme, there will be no emissions to atmosphere during the operational phase. Therefore, there is no potential for effects to air quality as a result of the Proposed Scheme. The operational phase is considered neutral in terms of air quality.

13.5 Mitigation Measures

13.5.1 Construction Phase

The following dust mitigation measures are best practice measures which are applicable for all subsections of the Proposed Scheme. These measures aim to ensure that no significant nuisance occurs at nearby sensitive receptors. The mitigation measures draw on best practice guidance from Ireland (DCC, 2018), the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). These measures will be incorporated into the Construction Environmental Management Plan (CEMP) prepared by the contractor for the project. The measures are divided into different categories for different activities.

Communications

- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details.

Site Management

- During working hours, dust control methods will be monitored in addition to the daily meteorological conditions. Dry and windy conditions are favourable to dust suspension. The below mitigations must be implemented during working hours and if undertaking dust generating activities during dry and windy weather conditions additional mitigations, localised to the works area, can be put in place as appropriate.
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out.

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 (such as stockpiles, excavations, material handling areas etc). or the site boundary that are at least as high as any stockpiles on site.
- Avoid site runoff of water or mud, which when dried out can lead to dust emissions.

Operating Vehicles / Machinery and Sustainable Travel

- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.

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.

Waste Management

- Bonfires and burning of materials is prohibited.

Measures Specific to Demolition

- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.

Measures Specific to Trackout

- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.

Monitoring

- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks (visual inspections) of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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.

In addition to the abovementioned best practice measures, the following additional measures shall be implemented for the River Moy and Quignamanger subsection works as these subsections have been identified as having a medium risk of dust effects.

- Develop and implement a stakeholder communications plan that includes community engagement before works commence on site. Community engagement includes explaining the nature and duration of the works to local residents and businesses.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- 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 keep covered.
- Cover, seed or fence stockpiles to prevent wind whipping.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

- 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.
- 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.
- Hard surfaced haul routes (including public roads) must be regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.
- Access gates to be located at least 10 m from receptors where possible.

13.5.2 Operational Phase

There is no potential for air quality effects during operation, therefore no mitigation is proposed.

13.6 Residual Impacts

13.6.1 Construction Phase

Once the dust minimisation measures outlined in **Section 13.5.1** are implemented, the impact of the Proposed Scheme on air quality will be short-term, direct, negative, localised, imperceptible and not-significant.

13.6.2 Operational Phase

There are no predicted impacts to air quality as a result of the operational phase of the Proposed Scheme.

13.7 Monitoring

The monitoring measures set out in this section are applicable across the Proposed Scheme and all individual subsections of the scheme.

13.7.1 Construction Phase

- During working hours, dust control methods will be monitored in addition to the prevailing meteorological conditions.
- Undertake daily on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results in the site inspection log. This should include regular dust soiling checks (by visual inspection) of surfaces such as street furniture, cars and windowsills within 100 m of site boundary, with cleaning to be provided if necessary.
- 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.

13.7.2 Operational Phase

There is no monitoring recommended for the operational phase of the Proposed Scheme as there are no potential effects to air quality.

13.8 Interactions and Cumulative Effects

Inter-relationships are the impacts and associated effects of different aspects of the Proposed Scheme on the same receptor. The potential for cumulative effects has been considered for the construction and operation of the Proposed Scheme cumulatively with other projects. Please see **Chapter 20 Interactions and Cumulative Effects** for further details on the potential interactions and cumulative effects for Air Quality.

13.9 Schedule of Environmental Commitments

Chapter 22 Schedule of Environmental Commitments collates all the mitigation and monitoring commitments recommended in this chapter.

13.10 Chapter References

BRE, 2003. *Controlling Particles, Vapours & Noise Pollution from Construction Sites,* s.l.: Building Research Establishment .

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