Chapter 13 Air Quality & Climate

13.1 Introduction

This chapter assesses the likely air quality and climate impacts, if any, associated with the proposed Dursey Island Cable Car and Visitor Centre. The proposed development also includes upgrades to the approach road, the R572, from the junction with the R575 to the cable car. These upgrades will include the construction of 10 no. new passing bays and 1 no. visibility splay, and completion of a number of other localised improvements to improve forward visibility. A full description of the proposed development can be found in Chapter 4 of Volume 2 of this EIAR – Description of the Proposed Development.

13.2 Methodology

13.2.1 Background Information

Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies 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 (see Table 13.1 and Appendix 13.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate European Union (EU) Directive 2008/50/EC, which has set limit values for NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see Table 13.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions (see Appendix 13.1).

Table 13.1 Ambient Air Quality Standards

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	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
		Critical level for protection of vegetation	30 μg/m^3 NO + NO_2
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
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m^3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)

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

Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 13.1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards 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. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to 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. Recommendations from the Department of the Environment, Health & Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m^2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002 (UNFCCC, 1997; UNFCCC, 1999). For the purposes of the EU burden sharing agreement under Article 4 of the Doha Amendment to the Kyoto Protocol, in December 2012, Ireland agreed to limit the net growth of the six Greenhouse Gases (GHGs) under the Kyoto Protocol to 20% below the 2005 level over the period 2013 to 2020 (UNFCCC, 2012).

The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP24) took place in Katowice, Poland from the 4th to the 14th December 2018 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The Paris Agreement was agreed by over 200 nations and has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions.

The EU, in October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member

States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

Gothenburg Protocol

In 1999, Ireland signed the Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution. The initial objective of the Protocol was to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2004; 2007). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (EEA, 2012). Directive (EU) 2016/2284 "*On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC*" was published in December 2016. The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020 emission targets are 25 kt for SO_2 (65% on 2005 levels), 65 kt for NO_X (49% reduction on 2005 levels), 43 kt for VOCs (25% reduction on 2005 levels), 108 kt for NH_3 (1% reduction on 2005 levels) and 10 kt for $PM_{2.5}$ (18% reduction on 2005 levels). In relation to 2030, Ireland's emission targets are 85% below 2005 levels for SO_2, 69% reduction for NO_x, 32% reduction for VOCs, 5% reduction for NH_3 and 41% reduction for $PM_{2.5}$.

13.2.2 Construction Phase

The Institute of Air Quality Management in the UK (IAQM) guidelines (2014) outline an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale & 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 magnitude of the dust impacts in the absence of mitigation measures.

13.2.3 Operational Phase

The air quality assessment is carried out following procedures described in publications by the EPA (2015, 2017) and using the methodology outlined in the guidance documents published by the UK DEFRA (2018; 2016). The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA (2018). The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of possible key pollutants was carried out and the likely location of air pollution "*hot-spots*" identified. An examination of recent EPA and Local Authority data in Ireland (EPA, 2019) has indicated that SO_2, smoke and CO are unlikely to be exceeded in the majority of locations within Ireland and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis did indicate potential issues in regards to nitrogen dioxide (NO_2), PM_{10} and $PM_{2.5}$ at busy junctions in urban centres (EPA, 2019). Benzene, although previously reported at quite high levels in urban centres, has recently been measured at several city centre locations to be well below the EU limit value (EPA, 2018). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (EPA 2018; 2019). The key pollutants reviewed in the assessments are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

The assessment methodology involves air dispersion modelling using the UK DMRB Screening Model (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (Version 6.1, October 2017) (UK DEFRA, 2017), and following guidance issued by the TII (2011), UK Highways Agency (2007), UK DEFRA (2018; 2016; UK DETR 1998) and the EPA (2017, 2015).

The TII guidance (2011) states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK DMRB guidance (UK Highways Agency, 2007), on which the TII guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

The proposed development will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria discussed above. Therefore, no road links impacted by the proposed development satisfy the above criteria and a quantitative assessment of the impact of traffic emissions on ambient air quality and climate is not necessary.

Ecological Sites

For routes that pass within 2km of a designated area of conservation (either Irish or European designation) the TII guidelines (2011) require consultation with an Ecologist. However, in practice, the potential for impact to an ecological site is highest within 200m of the proposed development and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of* National *Road Scheme*s (2009) and *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities* (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

Beara Peninsula SPA, Garinish Point pNHA and Kenmare River SAC are all located within 200m of the R572 which will be directly impacted by the proposed development. As such an assessment of the impact with regard to nitrogen oxide (NO_x) concentrations and nitrogen deposition was conducted. Dispersion modelling and prediction was carried out at typical traffic speeds for the affected parts of the road which will be nearest the designated sites. Ambient NO_x concentrations were predicted for the worst-case year (design year 2038) along a transect of up to 200m within the SPA, pNHA and SAC. The road contribution to dry deposition of nitrogen along the transect was also calculated using the methodology outlined in Appendix 9 of the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011).

13.3 Baseline Environment

13.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is 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). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Valentia observatory, which is located approximately 37km north of the site. Valentia Observatory met data has been examined to identify the prevailing wind direction and average wind speeds (Met Éireann, 2019). For data collated over the period 1981 – 2010, the predominant wind direction is southwesterly with an average wind speed over the period of 5 m/s.

13.3.2 Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "*Air Quality In Ireland 2017 – Indicators of Air Quality*" (EPA, 2018). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2019).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2018). 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 and assessment, the proposed development is within Zone D (EPA, 2018). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

NO_2 monitoring was carried out at two rural Zone D locations in Emo and Kilkitt in recent years, and in two urban areas in Enniscorthy and Castlebar (EPA,2018). The NO_2 annual averages in 2017 for both rural sites, Emo and Killkitt, were 3 µg/m^3 and 2 µg/m^3, respectively; with the results for Castlebar averaging 7 µg/m^3. Hence long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. The maximum 1-hour limit value of 200 µg/m^3 (measured as a 99.8th percentile i.e. 18 exceedances are allowed per year) was not exceeded in any year. The average results at rural Zone D locations over the last five years suggests an upper average of no more than 4 µg/m^3 as a background concentration (Table 13.2). Based on the above information, a conservative estimate of the current background NO_2 concentration for the region of the development is 6 µg/m^3.

Long term NO_X monitoring has been carried out at a four Zone D locations in recent years: Castlebar, Enniscorthy, Kilkitt and Emo. Annual mean concentrations of NO_X at the monitoring sites over the period 2013 – 2017 ranged from 2 µg/m^3 for a purely rural area to 25 µg/m^3 for an urbanised area (see Table 13.3). The area of the proposed development is predominantly rural in nature, therefore, an appropriate conservative estimate for the current background NO_X concentration in the region of the proposed development is 8 µg/m^3.

Table 13.2 Trends In Zone D Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period Notes 1, 2	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean NO_2 (µg/m^3)	11	8	8	9	7
	99.8th %ile 1-hr NO_2 (µg/m^3)	65.7	71.2	-	65.6	59.8
Kilkitt	Annual Mean NO_2 (µg/m^3)	4	3	2	3	2
	99.8th %ile 1-hr NO_2 (µg/m^3)	46.3	26.9	-	26.1	17.0
Emo	Annual Mean NO_2 (µg/m^3)	4	3	3	4	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	26.8	25.5	-	35.5	27.5
Enniscorthy	Annual Mean NO_2 (µg/m^3)	-	13	9	10	-
	99.8th %ile 1-hr NO_2 (µg/m^3)	-	-	-	72.5	-

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 1-hour limit value - 200 µg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 13.3 Trends In Zone D Air Quality - Nitrogen Oxide (NO_X)

Station	Averaging Period Note 1	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean (µg/m^3)	16	12	11	13	11
Kilkitt	Annual Mean (µg/m^3)	5	3	2	4	3

Station	Averaging Period Note 1	Year				
		2013	2014	2015	2016	2017
Emo	Annual Mean (µg/m^3)	5	5	3	6	4
Enniscorthy	Annual Mean (µg/m^3)	-	25	9	17	-

Note 1 Annual average limit value - 30 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Long-term PM_{10} measurements carried out at the rural Zone D location in Kilkitt in 2017 gave an average level of 8 µg/m^3 (EPA, 2018). Long-term PM_{10} monitoring was carried out at the urban Zone D locations of Castlebar, Enniscorthy and Claremorris in recent years. The average annual mean concentration measured at Castlebar and Claremorris in 2017 was 11 µg/m^3 (see Table 13.4). The average results over the last five years at the rural Zone D location of Kilkitt suggests an upper average of no more than 11 µg/m^3 as a background concentration. Based on the above information a conservative estimate of the current background PM_{10} concentration for the region of the development is 11 µg/m^3.

Table 13.4 Trends In Zone D Air Quality - PM_{10}

Station	Averaging Period Notes 1, 2	Year				
		2013	2014	2015	2016	2017
Castlebar	Annual Mean PM_{10} (µg/m^3)	15	12	13	12	11
	24-hr Mean > 50 µg/m^3 (days)	7	2	2	1	1
Kilkitt	Annual Mean PM_{10} (µg/m^3)	11	9	9	8	8
	24-hr Mean > 50 µg/m^3 (days)	3	2	1	0	0
Claremorris	Annual Mean PM_{10} (µg/m^3)	13	10	10	10	11
	24-hr Mean > 50 µg/m^3 (days)	3	0	0	0	1
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	-	22	18	17	-
	24-hr Mean > 50 µg/m^3 (days)	-	6	9	7	-

Note 1 Annual average limit value - 40 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Note 2 24-hour limit value - 50 µg/m^3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

The results of $PM_{2.5}$ monitoring at Claremorris for the period 2013 - 2017 indicated an average $PM_{2.5}/PM_{10}$ ratio ranging from 0.50 – 0.62. Based on this information, a conservative ratio of 0.65 was used to generate a background $PM_{2.5}$ concentration for the region of the development of 7 µg/m^3.

In terms of benzene, monitoring data for the Zone D location of Shannon Town is not available since 2012. As an alternative, data from the Zone C location of Kilkenny for the period 2014 – 2017 showed an upper average concentration of no more than 0.2 µg/m^3, which is significantly below the 5 µg/m^3 limit value. Based on this monitoring data a conservative estimate of the current background concentration in the region of the development is 0.2 µg/m^3.

With regard to CO, annual averages at the Zone D location of Enniscorthy for the 2014 - 2016 period are low, peaking at 0.6 mg/m^3 or 6% of the limit value of 10 mg/m^3 (EPA, 2018). More recent data for Zone D locations is not available. Data for the Zone C monitoring station in Portlaoise gave an annual mean concentration of

0.2 mg/m^3 in 2017. Based on this EPA data, a conservative estimate of the current background CO concentration in the region of the development is 0.6 mg/m^3.

Background concentrations for the Design Year of 2038 have been calculated for the ecological assessment. These have used current estimated background concentrations and the year on year reduction factors provided by Transport Infrastructure Ireland in the *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (2011) and the UK Department for Environment, Food and Rural Affairs LAQM.TG(16) (2018).

13.3.3 Sensitivity of the Receiving Environment

In line with the IAQM guidance document (2014) prior to assessing the impact of dust from a proposed development 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. 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. Commercial properties and places of work are regarded as medium sensitivity while low sensitivity receptors are places where people are present for short periods or do not expect a high level of amenity.

In terms of receptor sensitivity to dust soiling, there are no sensitive receptors within 20m of the proposed works and less than 10 sensitive receptors within 50m of the proposed works. Based on the IAQM criteria outlined in Table 13.5, the worst case sensitivity of the area to dust soiling is considered to be **low**.

Table 13.5 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

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type and the number of receptors affected within various distance bands from the construction works. A conservative estimate of the current annual mean PM_{10} concentration in the vicinity of the proposed development is estimated to be 11 µg/m^3 and there are no sensitivite receptors located less than 20m from the proposed works and less than 10 sensitive receptors located less than 50m from the proposed works. Based on the IAQM criteria outlined in Table 13.6, the worst case sensitivity of the area to human health is considered to be **low**.

Table 13.6 Sensitivity of the Area to Human Health Impacts

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

The IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to ecological impacts from dust. The criteria take into consideration whether the receiving environment is classified as a Special Area of Conservation (SAC), a Special Protected Area (SPA), a Natural Heritage Area (NHA) or a proposed Natural Heritage Area (pNHA) as dictated by the EU Habitats Directive or whether the site is a local nature reserve or home to a sensitive plant or animal species. As the construction will occur directly adjacent to or in close proximity to the Garinish Point pNHA, Bearish Peninsula SPA, Kenmare River SAC and Dursey Island pNHA., the worst-case sensitivity of the area to ecological impacts is considered to be high.

13.4 Predicted Impacts

13.4.1 Do Nothing Scenario

The 'do nothing scenario' includes retention of the existing cableway and associated infrastructure, without the proposed development works. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

13.4.2 Construction Phase

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. 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.

It is important to note that the potential impacts associated with the construction phase of the proposed development are short-term in nature. In addition, works on site will be carried out in a phased manner which will further reduce the potential for significant dust emissions. When the dust minimisation measures detailed in Appendix 13.2 of this report are implemented, fugitive emissions of dust from the site will not be significant and will pose no nuisance at nearby receptors.

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

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

In order to determine the level of dust mitigation required during the proposed demolition, earthworks, construction and trackout activities, the potential dust emission magnitude for each category in turn needs to be taken into account, along with the already established sensitivity of the area.

Demolition

Demolition will primarily involve the removal of buildings or structures currently on the site in a potentially dusty manner. This may also involve dust generation at heights. Dust emission magnitude from demolition can be classified as small, medium and large and are described below.

- **Large**: 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;
- **Medium**: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- **Small**: Total building volume less than 20,000 m^3.

Lead was detected in paint samples from the existing pylons and anchors. Appropriate mitigation measures will be implemented during the demolition phase of the development to ensure that potential adverse air quality impacts from this source are minimised. There are minimal demolition works required for the proposed development. Therefore, the demolition works can be classified as small. As the overall sensitivity of the area to dust soiling and human health impacts is low, there is a **negligible risk** associated with the proposed demolition activities according to IAQM guidance (2014) (see Table 13.7). As the overall sensitivity of the area to ecological impacts is high, there is an overall **medium risk** of ecological impacts as a result of the proposed demolition activities (see Table 13.7).

Table 13.7 Risk of Dust Impacts - Demolition

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

Earthworks

Earthworks typically involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. Dust emission magnitude from earthworks can be classified as small, medium and large and are described below.

- **Large:** 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;
- **Medium:** 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; and
- **Small:** 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.

Under the IAQM guidance (2014) the proposed earthworks can be classified as small. This results in an overall **negligible risk** of temporary dust soiling and temporary human health impacts as a result of earthworks activities (see Table 13.8). As the overall sensitivity of the area to ecological impacts is high there is an overall **low risk** of ecological impacts as a result of the proposed earthworks activities (see Table 13.8).

Table 13.8 Risk of Dust Impacts - Earthworks

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

Construction

Dust emission magnitude from construction can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;
- **Medium:** Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching;
- **Small:** Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The dust emission magnitude from construction associated with the proposed development works can be classified as medium as a worst-case according to the IAQM guidance (2014) as the construction will involve pouring of concrete. Therefore, there is an overall **low risk** of temporary dust soiling and human health impacts as a result of the proposed construction activities (Table 13.9). As the overall sensitivity of the area to ecological impacts is high there is an overall **medium risk** of ecological impacts as a result of the proposed construction activities (see Table 13.9).

Table 13.9 Risk of Dust Impacts – Construction

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

Trackout

Factors which determine the dust emission magnitude associated with trackout are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

- **Large:** > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;
- **Medium:** 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m;
- **Small:** < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

Dust emission magnitude from trackout can be classified as small under IAQM guidance as there are likely to be less than 10 outward HGV movements per day. This results in an overall **negligible risk** of temporary dust soiling impacts and temporary human health impacts as a result of the proposed trackout activities. As the overall sensitivity of the area to ecological impacts is high there is an overall **low risk** of ecological impacts as a result of the proposed trackout (see Table 13.10).

Table 13.10 Risk of Dust Impacts – Trackout

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

Summary of Dust Emission Risk

The risk of dust impacts as a result of the proposed development are summarised in Table 13.11 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

Overall, in order to ensure that no dust nuisance occurs during the demolition, earthworks, construction and trackout activities, a range of dust mitigation measures associated with a **medium risk** of dust impacts must be implemented. When the dust mitigation measures detailed in Appendix 13.2 are implemented, fugitive emissions of dust from the site will be insignificant and pose no nuisance at nearby receptors. In addition all works will be phased which will further reduce the potential for significant dust emissions and dust related impacts.

Table 13.11 Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible	Negligible	Low Risk	Negligible
Human Health	Negligible	Negligible	Low Risk	Negligible
Ecological Impacts	Medium Risk	Low Risk	Medium Risk	Low Risk

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. However, based on the scale and nature of construction for the proposed development and the short-term nature of the construction phase, the impact on the climate is considered to be short-term and imperceptible.

Human Health

Best practice mitigation measures associated with a low risk of temporary human health impacts are proposed for the construction phase of the proposed development. These will focus on the pro-active control of dust and other air pollutants to minimise generation of fugitive emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be short-term and imperceptible with respect to human health.

13.4.3 Operational Phase

Air Quality

There is the potential for a number of emissions to the atmosphere during the operational phase of the development. In particular, the traffic-related air emissions may generate quantities of air pollutants such as NO_2, CO, benzene and PM_{10}. However, impacts from these emissions have been screened out using the UK DMRB guidance (2016), on which the TII guidance was based (see Section 13.2.3).

The proposed development will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria outlined in Section 13.2.3. Therefore, no road links impacted by the proposed development satisfy the criteria for quantitative assessment and an assessment of the impact of traffic emissions on ambient air quality and climate is not necessary. It can therefore be determined that the impact to air quality from traffic emissions during the operational stage of the development will be long-term and imperceptible.

Air Quality Impact on Designated Sites

The impact of NO_X (i.e. NO and NO_2) emissions resulting from the traffic along the R572 associated with the proposed development at the Beara Peninsula SPA, Garinish Island pNHA and Kenmare River SAC was assessed. Ambient NO_X concentrations were predicted for the worst-case year (design year 2038) along a transect of up to 200m from the R572 and are given in Table 13.12. The road contribution to dry deposition along the transect is also given and was calculated using the methodology of TII (TII, 2011).

The predicted annual average NO_X level (including background) at the worst-case location in the designated sites, adjacent to the proposed development is well below the limit value of 30 μg/m^3 for both the "Do Nothing" and "Do Something" scenarios. Do Nothing NO_X concentrations are 26% of this limit (including background concentrations); with the proposed development in place NO_X concentrations only increase by 0.02 μg/m^3, reaching 26% of the limit (including background levels).

The road contribution to the NO_2 dry deposition rate along the 200m transect within the designated sites is also detailed in Table 13.12. The maximum increase in the NO_2 dry deposition rate is 0.001 Kg(N)/ha/yr. This reaches only 0.01% of the critical load for coastal habitats of 10 - 20 Kg(N)/ha/yr.

Therefore, the impact of the proposed development in terms NO_x impacts on sensitive ecosystems is long-term, neutral and imperceptible.

Table 13.12 Assessment of NO_X Concentrations and NO_2 Dry Deposition Impact in nearby Designated Sites in 2038

Distance to Roads (m) Note 1	NO_X Conc. (µg/m^3)			NO_2 Dry Deposition Rate Impact
	Do Nothing	Do Something	Increase	Kg N ha^{-1} yr-^{1}
3m	7.82	7.84	0.01	0.001
13m	7.78	7.80	0.01	0.001
23m	7.74	7.75	0.01	0.000
33m	7.71	7.71	0.01	0.000
43m	7.68	7.69	0.01	0.000
53m	7.67	7.67	0.00	0.000
63m	7.65	7.66	0.00	0.000
73m	7.64	7.64	0.00	0.000
83m	7.63	7.63	0.00	0.000
93m	7.63	7.63	0.00	0.000
103m	7.62	7.62	0.00	0.000
113m	7.62	7.62	0.00	0.000
123m	7.61	7.61	0.00	0.000
133m	7.61	7.61	0.00	0.000
143m	7.61	7.61	0.00	0.000
153m	7.61	7.61	0.00	0.000
163m	7.61	7.61	0.00	0.000
173m	7.61	7.61	0.00	0.000
183m	7.60	7.61	0.00	0.000
193m	7.60	7.60	0.00	0.000
200m	7.60	7.60	0.00	0.000

Note 1 Distances given are to centreline of R572

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the operational phase of the development. Road traffic and space heating of buildings may give rise to CO_2 and N_2O emissions. However, as the projected changes in traffic volumes on the road links impacted by the development are below the criteria requiring a quantitative air and climate modelling assessment, it can therefore be determined that the impact to climate from traffic emissions during the operational stage will be long term and imperceptible.

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, as the traffic generated by the proposed development is below the thresholds requiring a quantitative assessment, it can be determined that the impact to human health during the operational stage is long-term and imperceptible.

13.5 Mitigation Measures

13.5.1 Construction Phase

Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the dust management plan. The key aspects of controlling dust are listed below. Full details of the dust management plan can be found in Appendix 13.2.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
- A High Efficiency Particulate Air (HEPA)-filter vacuum shall be employed to clean up debris resulting from the removal (accidental or otherwise) of paints on the structures in question;

- Where paint removal is required, a wet-based method shall be applied;
- Any paint debris shall be disposed of in accordance with the Waste Management Act; and
- All personnel engaged in the removal of (or otherwise working on or near) structures which have been determined to be coated with lead-containing paint shall wear appropriate protective clothing.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will be imperceptible.

Nevertheless, some site-specific mitigation measures can be implemented during the construction phase of the proposed development to ensure emissions are minimised. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

13.5.2 Operational Phase

Air Quality & Climate

No additional mitigation measures are required during the operational phase of the proposed development, which is expected to have an imperceptible impact on ambient air quality and climate.

13.6 Monitoring

13.6.1 Construction Phase

There is no monitoring recommended for the construction stage of the proposed development, except what is required on the part of the Site Environmental Manager (SEM) to ensure the implementation of the prescribed mitigation measures. It is considered that, provided the mitigation measured outlined in Section 13.5 and Appendix 13.2 are implemented, dust related impacts as a result of the proposed development will be short-term and imperceptible (i.e. insignificant).

13.6.2 Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

13.7 Difficulties Encountered

There were no difficulties encountered while carrying out this assessment, which may have impacted the outcome.

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Appendix 13.1 Ambient Air Quality Standards

Cork County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

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APPENDIX 13.1
Ambient Air Quality Standards

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent decades the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ was to establish a target value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2010) and a limit value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 $\mu g/m^3$ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 $\mu g/m^3$). Where the AEI is currently greater than 22 $\mu g/m^3$ all appropriate measures should be employed to reduce this level to 18 $\mu g/m^3$ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 $\mu g/m^3$ was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_X (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_X such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NO_X limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway;
- 5 km from the nearest major industrial installation;
- 20 km from a major urban conurbation.

As a guideline, a monitoring station should be indicative of approximately 1000 km^2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation (WHO). The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

Appendix 13.2 Dust Minimisation Plan

Cork County Council
Comhairle Contae Chorcaí

Fáilte Ireland
National Tourism Development Authority

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APPENDIX 13.2
Dust Minimisation Plan

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM 2014, BRE 2003, Scottish Office 1996 and UK ODPM 2002). and the USA (USEPA 1997).

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance As the prevailing wind in the region of the site is predominantly south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (BRE 2003, UK ODPM 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must engage a Site Environmental Manager (SEM) to monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- 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;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- 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;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Route

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%(UK ODPM 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing/earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust. The following procedures shall be implemented at the site:

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions. The following measures shall be employed to minimise fugitive dust formation from storage piles:

- Overburden material shall be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM 2002);
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.