8 Air Quality

8.1 Introduction

This chapter presents an assessment of the effects of the proposed Site Sustainability Project, herein referred to as the proposed development, on air quality. There are a number of elements involved in the proposed development which are detailed in full in **Chapter 4** ***Description of the Proposed Development***.

8.2 Assessment Methodology

8.2.1 Criteria for Rating of Impacts

8.2.1.1 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.

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 EU Directive 2008/50/EC, which has set limit values for NO_2, lead, SO_2, PM_{10}, $PM_{2.5}$, benzene and CO, refer to **Table 8.1**.

Table 8.1: Air Quality Standards Regulations

Pollutant	Regulation	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 $NO + NO_2$
Lead	2008/50/EC	Annual limit for protection of human health	0.5 µg/m^3
Sulphur Dioxide (SO_2)	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 µg/m^3
		Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 µg/m^3
		Critical limit for the protection of ecosystems	20 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
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)
Dust Deposition	TA Luft	Annual average for nuisance dust	350 mg/(m^{2*}day)

8.2.1.2 Dust Deposition

In terms of dust impacts 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 8.1 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 (**Table 8.1**). Recommendations from the Department of the Environment, Health & Local Government (DEHLG, 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.

8.2.1.3 Heavy Metals

Ambient air quality guidelines and limits for various heavy metals have been set by the European Union, the WHO and in the TA Luft Guidelines. Council Directive 2004/107/EC has set ambient air quality limit values for Cadmium, Arsenic and Nickel which came into force in 2013. In the absence of statutory standards, ambient air quality guidelines can also be derived from occupational exposure limits (OELs). Short-term and long-term environmental assessment levels (EALs) can be derived by applying appropriate factors to the OEL. Annual average limit values for the heavy metals applicable to this assessment are listed in **Table 8.2**.

Table 8.2: Heavy Metals Ambient Air Quality Standards & Guidelines for the Protection of Human Health

Metal	Short-Term EAL (1-Hr)	Long-Term EAL (Annual)	Regulation
Cd	-	0.005 µg/m^3	WHO(3)
Cd	1.5 µg/m^3	0.005 µg/m^3	EU(1) / EAL(2)
Tl	30 µg/m^3	1.0 µg/m^3	EAL(2)
Sb	150 µg/m^3	5 µg/m^3	EAL(2)
As	15 µg/m^3	0.006 µg/m^3	EU(1) / EAL(2)
Pb	-	0.5 µg/m^3	EU(1)
Cr (except VI)	150 µg/m^3	5.0 µg/m^3	EAL(2)
Cr (VI)	3 µg/m^3	0.1 µg/m^3	EAL(2)
Co	6 µg/m^3	0.2 µg/m^3	EAL(2)

Metal	Short-Term EAL (1-Hr)	Long-Term EAL (Annual)	Regulation
Cu (fumes)	60 µg/m^3	2.0 µg/m^3	EAL(2)
Cu (dust & mists)	200 µg/m^3	10 µg/m^3	EAL(2)
Mn	1500 µg/m^3	0.15 µg/m^3	WHO(3)
Hg	-	1.0 µg/m^3	WHO(3)
Ni (inorganic)	30 µg/m^3	0.02 µg/m^3	EU(1)
V	1.0 µg/m^3	5.0 µg/m^3	EAL(2)

(1) Council Directive 2004/107/EC

(2) https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

(3) WHO (2006) Air Quality Guidelines

8.2.2 Construction Phase

The current assessment focuses on identifying the existing baseline levels of PM_{10} and $PM_{2.5}$ in the region of the proposed development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed development.

An assessment of the construction stage traffic was conducted as per the criteria in **Section 8.2.3.2** below.

8.2.3 Operational Phase

8.2.3.1 Existing Waste to Energy Process

The proposed development does not propose any significant changes to the Waste to Energy (WtE) operating processes at the facility. Although additional tonnage (up to 15,000 tpa) is proposed to be processed at the plant, this is primarily for the treatment of aqueous wastes. There is no change to the licensed parameters under Licence No. W0167-03 and the site will continue to operate within its licence requirements. As a result, the modelling inputs remain unchanged from the maximum operational conditions modelled previously for the original proposal for the Waste to Energy facility and thus, detailed modelling is not required.

This detailed modelling was originally conducted in 2009[1] and was updated in 2012[2] to account for an increased volume flow rate once the plant was operational, which corresponds to the current licensed flow rate. The modelling assessment for emissions from the WtE facility has been updated using the most recent version of the model and with the most up to date meteorological data to ensure current conditions remain in compliance with the ambient air quality limit values and licence requirements.

Modelling was carried out using the EPA approved (EPA, 2010) model AERMOD (version 19191) which is a regulatory model by the USEPA (USEPA, 2019). The air dispersion modelling input data consists of detailed information on the physical environment (including building dimensions and terrain features), design details from all emission points on-site and five full years of meteorological data (Dublin Airport 2014 – 2018). Using this input data, the model predicts ambient ground level concentrations beyond the site boundary for each hour of the modelled meteorological year. The model post-processes the data to identify the location of the maximum ambient ground level concentration in the applicable format for comparison with the relevant limit values. This maximum concentration is then added to the existing background concentration to give the maximum predicted ambient concentration. The maximum ambient concentration is then compared with the relevant ambient air quality standard for the protection of human health to assess the significance of the releases from the site. An overview of the model is outlined in **Appendix 8.1** in **Volume 3** of this EIAR.

8.2.3.2 Road Traffic

The air quality assessment for construction and operational phase road traffic has been carried out following procedures described in the publications by the EPA (EPA, 2015; 2017) and using the methodology outlined in the guidance documents published by the UK DEFRA (UK DEFRA 2016, 2018; UK DETR, 1998). The assessment of air quality was carried out using a phased approach as recommended by the UK DEFRA (UK Highways Agency, 2007). The phased approach recommends that the complexity of an air quality assessment is consistent with the risk of failing to achieve the air quality standards.

The assessment methodology involves air dispersion modelling using the UK DMRB Screening Model (UK Highways Agency, 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK DEFRA, 2019) (Version 7.1, 2019), and following guidance issued by the Transport Infrastructure Ireland (TII) (2011), UK Highways Agency (2007), UK DEFRA (2016, 2018) and the EPA (2015, 2017).

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

[1] Available for inspection under the EPA IE Licence W0167-02, http://www.epa.ie/licensing/
[2] Available for inspection under the EPA IE Licence W0167-03, http://www.epa.ie/licensing/ and SID application http://www.carranstownamendments.ie/.

- 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.

Concentrations of key pollutants are calculated at sensitive receptors that have the potential to be affected by the proposed development. For road links which are deemed to be affected by the proposed development and within 200m of the chosen sensitive receptors inputs to the air dispersion model consist of: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles, annual average traffic speeds and background concentrations. The UK DMRB guidance states that road links at a distance of greater than 200m from a sensitive receptor will not influence pollutant concentrations at the receptor. Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4.

These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards. The TII *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* (TII, 2011) detail a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any project that causes a change in traffic flows. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria have been adopted for the proposed development and are detailed in Table A8.2.1 to Table A8.2.3 of **Appendix 8.2** in **Volume 3** of this EIAR. The significance criteria are based on PM_{10} and NO_2 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m^3).

However, the criteria have also been applied to the predicted 8-hour CO, annual benzene and annual $PM_{2.5}$ concentrations for the purposes of this assessment.

8.3 Receiving Environment

8.3.1 Meteorological Data

The selection of the appropriate meteorological data has followed the guidance issued by the USEPA (2016). A primary requirement is that the data used should have a data capture of greater than 90% for all parameters. Dublin Airport meteorological station, which is located approximately 30 km south-east of the site, collects data in the correct format and has a data collection of greater than 90%. Long-term hourly observations at Dublin Airport meteorological station provide an indication of the prevailing wind conditions for the region (see **Figure 8.1** and **Appendix 8.3** in **Volume 3** of this EIAR). Results indicate that the prevailing wind direction is from south-westerly to westerly in direction over the period 2014 – 2018 (Met Eireann, 2019). The mean wind speed is approximately 5.3 m/s over the period 2005 - 2018. Calm conditions account for only a small fraction of the time in any one year peaking at 29 hours in 2018 (0.3% of the time). There are also no missing hours over the period 2014 – 2018.

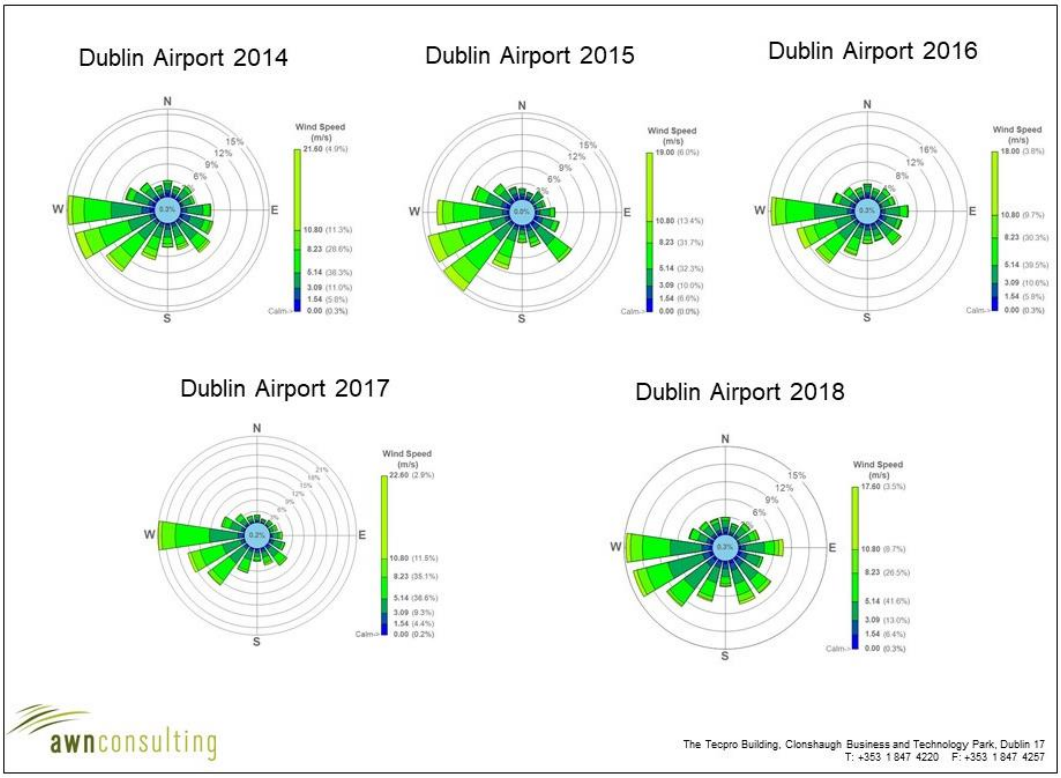

Figure 8.1 Dublin Airport Windroses 2014 – 2018

8.3.2 Baseline Air Quality

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 2018*" (EPA, 2019a). 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, 2019b).

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, 2019b). 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 site is within Zone D (EPA, 2019b), but is directly on the boundary of Zone C. This has been factored in when estimating the background concentrations. The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development.

In addition, an extensive baseline monitoring survey was undertaken on site in 2000/2001 and again in 2005 as part of previous assessments. This data has been reviewed as part of assessing the baseline conditions for the current assessment. The monitoring survey found that levels of all pollutants, NO_2, SO_2, PM_{10}/$PM_{2.5}$, HCl, HF, PCDD/PCDFs, PAHs, Hg, Cd, Tl, and heavy metals, were well below the relevant limit values for the protection of human health.

Monitoring of all licensed pollutants is conducted on a continuous, quarterly or biannual basis in line with the requirements of the licence for the facility (Licence No. W0167-03). This ensures that pollutant concentrations remain in compliance with the licence limits and do not add significantly to concentrations in the ambient environment.

8.3.2.1 NO_2

NO_2 monitoring was carried out at two rural Zone D locations in recent years, Emo and Kilkitt and in two urban areas, Enniscorthy and Castlebar (EPA, 2019a). The NO_2 annual average in 2018 for both rural sites, Emo and Kilkitt was 3 µg/m^3; with the results for Castlebar averaging 8 µg/m^3. Long-term average concentrations measured at all locations were significantly lower than the annual average limit value of 40 µg/m^3. The hourly concentration, measured as a 99.8th percentile, was within the limit value of 200 µg/m^3 at all locations over the period 2013 - 2018. The average results over the last five years at a range of Zone D locations 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 NO_2 concentration, for the region of the development in 2019 is 13 µg/m^3.

Monitoring for NO_X concentrations as carried out at a number of Zone D locations in recent years – Castlebar, Emo, Kilkitt and Enniscorthy. Over the period 2013 – 2018 concentrations ranged from 11 – 25 µg/m^3 for the two urban sites, Castlebar and Enniscorthy, while concentrations for the two rural sites, Emo and Kilkitt ranged from 2 – 6 µg/m^3. Concentrations are below the annual limit value of 30 µg/m^3 set for the protection of ecosystems. Based on the EPA data a conservative estimate of the current background NO_X concentration in the region of the development in 2019 is 25 µg/m^3.

Table 8.3: Trends in Zone D Air Quality - Nitrogen Dioxide (NO_2)

Station	Averaging Period Notes 1, 2	Year					
		2013	2014	2015	2016	2017	2018
Castlebar	Annual Mean NO_2 (µg/m^3)	11	8	8	9	7	8
	99.8th %ile 1-hr NO_2 (µg/m^3)	65.7	71.2	-	65.6	59.8	60.2
Kilkitt	Annual Mean NO_2 (µg/m^3)	4	3	2	3	2	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	46.3	26.9	-	26.1	17.0	22.3
Emo	Annual Mean NO_2 (µg/m^3)	4	3	3	4	3	3
	99.8th %ile 1-hr NO_2 (µg/m^3)	26.8	25.5	-	35.5	27.5	41.6
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).

8.3.2.2 PM_{10}

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 2018 was 11 µg/m^3 (**Table 8.4**). Long-term PM_{10} measurements carried out at the rural Zone D location in Kilkitt in 2018 gave an average level of 9 µg/m^3 (EPA, 2019a). The daily limit value, measured as a 90.4th percentile (i.e. it must not be exceeded more than 35 times per year), was within the limit value of 50 µg/m^3. The average results over the last five years at a range of Zone D locations suggests an upper average of no more than 19 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 in 2019 is 20 µg/m^3.

Table 8.4: Trends in Zone D Air Quality - PM_{10}

Station	Averaging Period Notes 1, 2	Year					
		2013	2014	2015	2016	2017	2018
Castlebar	Annual Mean PM_{10} (µg/m^3)	15	12	13	12	11	11
	90th %ile 24-hr PM_{10} (µg/m^3)	26.9	20.9	22.2	20.0	19.1	19.9
Kilkitt	Annual Mean PM_{10} (µg/m^3)	11	9	9	8	8	9
	90th %ile 24-hr PM_{10} (µg/m^3)	18.6	15.4	17.7	15.0	14.0	15.3
Claremorris	Annual Mean PM_{10} (µg/m^3)	13	10	10	10	11	12
	90th %ile 24-hr PM_{10} (µg/m^3)	21.0	15.2	16.5	17.4	17.3	19.9
Enniscorthy	Annual Mean PM_{10} (µg/m^3)	-	22	18	17	-	-
	90th %ile 24-hr PM_{10} (µg/m^3)	-	37.3	33.8	32.3	-	-

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).

8.3.2.3 $PM_{2.5}$

The results of $PM_{2.5}$ monitoring at Claremorris for the period 2013 - 2018 indicated an average $PM_{2.5}/PM_{10}$ ratio ranging from 0.50 – 0.62. Based on this information, a conservative ratio of 0.7 was used to generate a current background $PM_{2.5}$ concentration of 14 µg/m^3.

8.3.2.4 Benzene

In terms of benzene, monitoring data for the Zone D location of Shannon Town is available for the period 2011 – 2012 with an average concentration of 0.4 µg/m^3. More recent data for Zone D locations is not available, as an alternative, monitoring in the Zone C location of Kilkenny for the period 2014 – 2018 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.

8.3.2.5 Carbon Monoxide

With regard to CO, annual averages at the Zone D, location of Enniscorthy for over the 2014 – 2016 period are low, peaking at 0.6 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 2018. 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.

8.3.2.6 SO_2

Continuous SO_2 monitoring was carried out at a number of Zone D locations over the period 2013 – 2018. Concentrations ranged from 2 – 4 µg/m^3, with no exceedances of the daily limit value of 125 µg/m^3 for the protection of human health. Long term annual average results suggest an upper limit of 3 µg/m^3 as a background concentration. Based on this EPA data a conservative estimate of the annual mean background SO_2 concentration in the region of the development in 2019 is 4 µg/m^3.

SO_2 concentrations for the representative rural Zone D monitoring station at Kilkitt in 2018 were 5.7 µg/m^3 for the 99.2nd%ile of 24-hour means. The 1-hour limit value for SO_2 (measured as a 99.7th%ile) was 6.4 µg/m^3, which is significantly below the 350 µg/m^3 limit value.

8.3.2.7 Heavy Metals

Monitoring for Cadmium, Arsenic, Lead and Nickle concentrations was conducted at the Zone D locations of Castlebar and Kilkitt over the period 2013 – 2018 (EPA, 2019a). Concentrations of Cadmium ranged from 0.07 – 0.3 ng/m^3 in Castlebar. This is significantly below the limit value of 5 ng/m^3. Concentrations of Arsenic ranged from 0.08 – 0.3 ng/m^3 which is well below the limit value of 6 ng/m^3. Concentrations of lead ranged from 1.5 – 2.95 ng/m^3.

This is well below the limit value of 500 ng/m^3. Concentrations of nickel ranged from 0.13 – 0.8 ng/m^3, which is below the limit value of 20 ng/m^3.

Monitoring for mercury was conducted at the Zone D location of Mace Head over the period 2013 – 2018 (EPA, 2019a). Monitored concentrations ranged from 1.12 – 1.5 ng/m^3 over this period. Annual average concentrations are well below the limit value of 1,000 ng/m^3.

Monitored concentrations of key heavy metals were significantly below the relevant limit values for the protection of human health.

8.4 Characteristics of the Proposed Development

A detailed description of the proposed development is included in **Chapter 4 *Description of the Proposed Development*** of this EIAR. In relation to potential air quality impacts associated with the proposed development, the potential impacts are considered for both the construction and operational phases.

In relation to potential air quality impacts the main elements are listed below:

- Construction dust emissions associated with the construction of additional buildings on site
- Construction and operational phase traffic emissions
- Increase in the amount of hazardous waste accepted at the facility from the currently permitted 10,000 tonnes per annum up to a maximum of 25,000 tonnes per annum. This will result in an increase in the annual tonnage of waste accepted at the site for treatment in the WtE plant from the currently permitted 235,000 tonnes per annum to 250,000 tonnes per annum.

As already noted previously in **Section 8.2.3.1**, the proposed development does not propose any significant changes to the Waste to Energy (WtE) operating processes at the facility. Although additional tonnage (up to 15,000 tpa) is proposed to be processed at the plant, this is primarily for the treatment of aqueous wastes. There is no change to the licensed parameters under Licence No. W0167-03 and the site will continue to operate within its licence requirements.

8.5 Likely Significant Effects

8.5.1 "Do Nothing" Scenario

The "Do Nothing" scenario will involve the facility operating as it currently does without construction dust emissions and additional traffic related emissions. Under 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).

8.5.2 Construction Phase

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. The proposed development will involve the construction of a number of buildings and hardstanding areas. The construction works can be considered minor in scale and therefore there is the potential for significant dust soiling 25m from the source (TII, 2011) (**Table 8.5**). While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50m. There are a small number of sensitive receptors within 50m of the site boundary (see **Figure 8.2**). In order to minimise dust emissions during construction, a series of mitigation measures have been prepared. Provided the dust minimisation measures outlined in **Section 8.6.2** are adhered to, the effects on the air quality during the construction phase will not be significant.

There is also the potential for traffic related air emissions during the construction phase of the proposed site suitability project. The proposed development will be developed over two construction phases, Phase 1 and Phase 2. During the peak construction period for Phase 1, it is predicted that there will be an additional 186 construction vehicle movements per day. During the peak construction period for Phase 2 (which includes operational traffic for Phase 1), it is predicted that there will be an additional 222 construction vehicle movements per day. The change in AADT values is not of the magnitude to require an air quality assessment as per the DMRB screening criteria outlined in **Section 8.2.3.2**. It can therefore be determined that traffic related air quality impacts during the construction phase are short-term, negative and imperceptible.

Table 8.5: Assessment Criteria for the Impact of Dust from Construction, with Standard Mitigation in Place (TII, 2011)

Source		Potential Distance for Significant Effects (Distance from Source)		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation Effects**
Major	Large construction sites, with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites, with limited use of haul roads	25m	10m	10m

Figure 8.2 Location of Dust Sensitive Receptors Within 50m of Site

8.5.3 Operational Phase

8.5.3.1 Waste to Energy Process

The Waste to Energy Process (WtE) would be expected to be the dominant source of air emissions associated with the facility. As part of the proposed development it is proposed to increase the annual tonnage of waste accepted from 235,000 to 250,000 tonnes per annum, comprising of up to 15,000 tonnes of additional hazardous wastes. The majority of this increase is intended for the treatment of aqueous wastes which, when evaporated, is converted to water vapour in the flue gas flow. As the flue gas flow is corrected to standard, dry conditions, the total flue gas flowrate will not increase.

In any event, the facility will still be obligated to comply with its licensed emission limit values and maximum flue gas flowrate and thus the increase in waste tonnage proposed will not cause a significant impact to the ambient air quality. A detailed modelling assessment was undertaken as part of the original application for a Waste to Energy facility at the site in the air quality chapter of the 2009 EIS[3]. This assessment was based on the maximum volume flow rate and maximum emission concentrations and found that the impact on air quality would not be significant (based on continuous operation 8,760 hours per year). A revised assessment was conducted in 2012 based on an increased flow rate once the site was operational, which corresponds to the current licensed flow rate, this

[3] Available to view from EPA IE Licence application W0167-02, http://epa.ie/licensing/

assessment found that there were some insignificant variations in results when compared with the original 2009 assessment.

The full details of the air dispersion modelling input parameters and modelling methodology for this assessment are the same as the Carranstown WtE Facility EIS which was undertaken in 2009. The key changes as part of this assessment are outlined below.

- USEPA dispersion model AERMOD version updated from 07026 to 19191;
- Meteorological data for Dublin Airport updated from 2001 – 2005 to 2014 – 2018;
- Proposed building structures associated with the site suitability project added to the model.

Table 8.6 details the results of the updated modelling assessment and compares the changes with the original 2009 assessment. **Table 8.7** compares the results of the current assessment with the 20122 aboveassessment. The revised assessment shows a very minor variation in results. The facility operating under maximum conditions results in ambient concentration variations ranging from between -<0.01% to -3.6% of the ambient air quality standards when compared with the 2009 results and -<.0.01% to -5.2% of the ambient air quality standards when compared with the 2012 results. The results indicate that the facility will continue to be in compliance with its licence requirements and no significant impacts to ambient air quality are predicted.

Table 8.6: Comparison of Predicted Ambient Ground Level Concentrations Between The 2009 EIS Assessment & The Current Assessment

Compound	Background	Process Contribution (mg/m^3) 2009 Assessment	Process Contribution (mg/m^3) Current Assessment	Variation (mg/m^3)	Predicted Environmental Concentration (mg/m^3)	Limit Value (mg/m^3)	PEC as a % of the Ambient Limit	Variation as a % of the Ambient Limit
NO_2 (1-Hr)	26	27.8	20.65	-7.154	46.65	200	23.3%	-3.58%
NO_2 (Ann)	13	1.1	0.77	-0.330	13.77	40	34.4%	-0.83%
NO_X (Ann)	25	-	1.03	n/a	26.03	30	86.8%	n/a
SO_2 (1-Hr)	6.4	26.4	18.97	-7.428	25.37	350	7.2%	-2.12%
SO_2 (24-Hr)	5.7	2.8	2.08	-0.716	7.78	125	6.2%	-0.57%
PM_{10} (24-Hr)	20	0.25	0.16	-0.087	20.16	50	40.3%	-0.17%
PM_{10} (Ann)	20	0.08	0.0513	-0.029	20.05	40	50.1%	-0.07%
$PM_{2.5}$ (Ann)	14	0.08	0.0513	-0.029	14.05	25	56.2%	-0.11%
CO (8-hr)	600	-	13.91	n/a	613.9	10000	6.1%	n/a
Benzene (Ann)	0.2	0.08	0.05	-0.029	0.25	5	5.0%	-0.57%
HCl (1-hr)	0.01	5.17	3.46	-1.708	3.47	100	3.5%	-1.71%
HF (1-hr)	0.005	0.34	0.23	-0.109	0.236	3	7.9%	-3.64%
Hg (Ann)	0.0015	0.00038	0.00026	0.000	0.0018	1	0.2%	-0.0123%
Cd (Ann)	0.001	0.00039	0.00026	-0.00013	0.0013	0.005	25.1%	-2.67%
As (Ann)	0.001	0.00042	0.00028	-0.00014	0.0013	0.006	21.3%	-2.38%

Table 8.7: Comparison Of Predicted Ambient Ground Level Concentrations Between The 2012 Assessment & The Current Assessment

Compound	Background	Process Contribution (mg/m^3) 2012 Assessment	Process Contribution (mg/m^3) Current Assessment	Variation (mg/m^3)	Predicted Environmental Concentration (mg/m^3)	Limit Value (mg/m^3)	PEC as a % of the Ambient Limit	Variation as a % of the Ambient Limit
NO_2 (1-Hr)	26	31.13	20.65	-10.479	46.65	200	23.3%	-5.24%
NO_2 (Ann)	13	0.93	0.77	-0.165	13.77	40	34.4%	-0.41%
NO_X (Ann)	25	1.25	1.03	-0.220	26.03	30	86.8%	-0.73%
SO_2 (1-Hr)	6.4	29.71	18.97	-10.739	25.37	350	7.2%	-3.07%
SO_2 (24-Hr)	5.7	2.68	2.08	-0.594	7.78	125	6.2%	-0.48%
PM_{10} (24-Hr)	20	0.20	0.16	-0.040	20.16	50	40.3%	-0.08%
PM_{10} (Ann)	20	0.06	0.0513	-0.011	20.05	40	50.1%	-0.03%
$PM_{2.5}$ (Ann)	14	0.06	0.0513	-0.011	14.05	25	56.2%	-0.04%
CO (8-hr)	600	23.48	13.91	-9.578	613.9	10000	6.1%	-0.10%
Benzene (Ann)	0.2	0.06	0.05	-0.011	0.25	5	5.0%	-0.22%
HCl (1-hr)	0.01	5.29	3.46	-1.831	3.47	100	3.5%	-1.83%
HF (1-hr)	0.005	0.35	0.23	-0.122	0.236	3	7.9%	-4.07%
Hg (Ann)	0.0015	0.00032	0.00026	-0.0001	0.0018	1	0.2%	-0.0061%
Cd (Ann)	0.001	0.00032	0.00026	-0.00006	0.0013	0.005	25.1%	-1.21%
As (Ann)	0.001	0.00034	0.00028	-0.00006	0.0013	0.006	21.3%	-1.08%

8.5.3.2 Road Traffic

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, PM_{10} and $PM_{2.5}$. However, impacts from these emissions have been screened out using the UK DMRB guidance (UK DEFRA, 2018), on which the TII guidance was based. This guidance 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.

During the future operational years in 2027 and 2037, the proposed development will increase traffic levels by a maximum of 76 AADT on the R152 north of the Indaver site. However, it will not increase traffic volume (AADT or HGVs), speeds or change the road alignment by an amount greater than the criteria discussed above. Therefore, none of the road links impacted by the proposed development satisfy the above criteria and an assessment of the impact of traffic emissions on ambient air quality is not necessary. Cumulative traffic data associated with other existing and proposed developments in the vicinity of the Indaver site were also included in the calculations where such information was available. It can therefore be determined that the impact to air quality from traffic emissions during the operational stage is negative, long-term and imperceptible.

8.6 Mitigation Measures and Monitoring

8.6.1 Construction Phase

Construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction.

The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within 200m of the construction area. The measures to be implemented are outlined below, these will be incorporated into the ***Construction Environmental Management Plan*** **(CEMP)** (see **Appendix 5.1** of **Volume 3**) for the site.

- 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.
- Any road that has the potential to give rise to fugitive dust will 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 will be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- 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.
- Hoarding or screens shall be erected around works areas to reduce visual impact. This will also have an added benefit of preventing larger particles of dust from travelling off-site and impacting receptors.

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 will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

8.6.2 Operational Phase

Impacts to air quality during operation are not significant therefore no mitigation is proposed. The site will continue to operate within the EPA licence conditions set for the plant, which will ensure no significant impacts to air quality occur.

8.7 Cumulative Effects

There are a number of planned or permitted developments in the vicinity of the existing facility which have the potential to cumulatively impact air quality. Each project has been reviewed in turn below for the potential cumulative impact to air quality.

8.7.1 Irish Cement Flue Dust Portland Cement Silo

There is the potential for cumulative dust emissions. However, it is predicted that this development will not result in any additional emissions to atmosphere during operation. The planners report submitted as part of the application details that

"*projected pollutant emissions are insignificant*". Therefore, cumulative impacts are deemed imperceptible and there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

8.7.2 Irish Cement fossil fuel replacement and alternative raw materials project

There is the potential for cumulative construction stage dust emissions, however, the EIA Report[4] prepared by Brady Shipman Martin (2017) Section 8.4.1 states that dust soiling effects are predicted within 25m of the works area and PM_{10} effects within 10m. As there are no sensitive receptors within this area and there is sufficient distance between the works areas and the Site Suitability Project area cumulative dust impacts are not predicted.

Section 8.44 of the EIA Report (Brady Shipman Martin, 2017) determined that cumulative operational phase emissions from both the Platin site and the Indaver site were insignificant.

Therefore, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

8.7.3 SSE Generation100kV Transmission Substation

There is the potential for cumulative construction dust related impacts as a result of the substation development if the construction phase overlaps with the construction of the site suitability project. However, due to the small scale of the development there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

8.7.4 Garballagh Lower Solar Farm

Cumulative air quality impacts associated with the solar farm development are not envisaged due to the low volume of construction required and the use of materials with a low dust generation potential. There are no emissions to atmosphere associated with the operational stage of this development.

Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

8.7.5 Garballagh Lower Solar Farm - Electrical Substation (110kV)

Cumulative air quality impacts associated with the electrical substation development are not envisaged due to the low volume of construction required. There are no emissions to atmosphere associated with the operational stage of this development.

[4] Available from IE Licence P0030-06, https://www.epa.ie/licensing/

Thus, there is no potential for any significant negative direct nor indirect cumulative impacts to arise from the Indaver Site Sustainability Project in combination with the project above.

Cumulative air quality impacts during the construction phase have been assessed to be imperceptible. Cumulative operational phase impacts are long-term and insignificant.

8.8 Residual Effects

8.8.1 Construction Phase

Provided the dust minimisation measures outlined in **Section 8.6.1** are implemented construction stage impacts to air quality are predicted to be short-term and not significant.

8.8.2 Operational Phase

The impact of the proposed development on air quality is predicted to be imperceptible with respect to the operational phase.

Therefore, no residual impacts of significance for air quality are predicted for the operational phase of the proposed development.

8.9 References

Brady Shipman Martin (2017) Platin Cement Works EIA Report for Development for Further Replacement of Fossil Fuels with Alternative Fuels and Alternative Raw Materials

Department of the Environment, Heritage and Local Government (DEHLG) (2004) Quarries and Ancillary Activities, Guidelines for Planning Authorities

EPA (2010) Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)

EPA (2015) Advice Notes for Preparing Environmental Impact Statements – Draft September 2015

EPA (2017) Guidelines on the Information to be contained in Environmental Impact Statements - Draft August 2017

EPA (2019) Air Quality Monitoring Report 2018 (& previous annual reports)

EPA (2019) EPA Website: http://www.epa.ie/whatwedo/monitoring/air/

German VDI (2002) Technical Guidelines on Air Quality Control – TA Luft

Indaver (2009) Environmental Impact Statement, available for inspection under the EPA IE Licence W0167-02, http://www.epa.ie/licensing/

Indaver (2012) Environmental Impact Statement, available for inspection under the EPA IE Licence W0167-03, http://www.epa.ie/licensing/ and SID application http://www.carranstownamendments.ie/

Met Éireann (2019) Met Eireann website: https://www.met.ie/

Paine, R & Lew, F. "Results of the Independent Evaluation of ISCST3 and ISC-PRIME" Prepared for the EPRI, ENSR Document No. 2460-026-3527-02 (1997)

Transport Infrastructure Ireland (2011) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes

UK DEFRA (2016) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16)

UK DEFRA (2018) Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. TG(16)

UK DEFRA (2019) NO_X to NO_2 Calculation Spreadsheet (Version 7.1)

UK Department of the Environment, Transport and Roads (1998) Preparation of Environmental Statements for Planning Projects That Require Environmental Assessment - A Good Practice Guide, Appendix 8 - Air & Climate

UK Highways Agency (2007) Design Manual for Roads and Bridges, Volume 11, Section 3, Part 1 - HA207/07 (Document & Calculation Spreadsheet)

USEPA (2016) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1

USEPA (2019) AERMOD Description of Model Formulation

USEPA (1995) User's Guide for the Industrial Source Complex (ISC3) Dispersion Model Vol I & II

USEPA (2000) Seventh Conference on Air Quality Modelling (June 2000) Vol I & II

USEPA (1998) Human Health Risk Assessment Protocol, Chapter 3: Air Dispersion and Deposition Modelling, Region 6 Centre for Combustion Science and Engineering