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INTRODUCTION

7.1 This Chapter of the Environmental Impact Statement (EIS) provides supporting information to accompany a planning application to Wexford County Council and a Waste Licence Application (WLA) to the Environmental Protection Agency (EPA) by Roadstone Wood Ltd. for partial backfilling of the worked out quarry void using imported inert soil at Brownswood, Enniscorthy, Co. Wexford and operation of an inert waste recovery facility.

7.2 It considers the potential for the quarry restoration works to impact upon air quality within the vicinity of the application site. The chapter describes the scope, relevant legislation, assessment methodology, the baseline conditions currently existing at the application site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

7.3 An assessment of the potential impact upon air quality has been undertaken with reference to EIA good practice, the EIA Regulations, and other guidance documents.

7.4 This chapter, prepared by SLR Consulting Ireland, assesses the potential impacts of atmospheric emissions associated with the development and operation of an inert waste recovery facility at the Brownswood site. BHP Laboratories undertook the baseline dust monitoring presented in this chapter on behalf of Roadstone Wood Ltd.

7.5 The application site comprises a worked out quarry which is to be restored. It is located approximately 2.5 km south of Enniscorthy, County Wexford. The site is accessed from N11 National Primary Road. Traffic turning off the N11 runs for short distance over the local road network before entering the site. Land use at and in the immediate vicinity of the application site is primarily industrial and commercial. Surrounding land use comprises isolated rural housing and agriculture land.

7.6 At the present time, although rock extraction activities have ceased at the quarry site, readymix concrete, block and asphalt production continue to be operated within the former quarry property.

Scope of Assessment

7.7 The sections below describe the scope of the assessment in terms of the potential air quality impacts associated with the proposed quarry backfilling and restoration project. The following issues are addressed separately for the potential impacts:

- methodology used to assess the potential impacts of the activities at the facility on air quality at local properties;
- baseline conditions pertaining to the measured (or estimated) existing air quality levels around the proposed development;
- evaluation criteria;

- prediction of the potential impacts;
- evaluation of these impacts;
- description of mitigation measures which will be incorporated into the design and operation of the facility to eliminate or reduce the potential for air quality impacts;
- summary of any residual impacts and reinstatement;
- monitoring proposals

Fugitive Dust Emissions

7.8 The principal air quality impact associated with the quarry backfilling and restoration works are fugitive dust emission during the operational phase of the project. Dust emissions during construction phase are likely to arise during :

- Trafficking by heavy goods vehicles (HGVs) over unpaved surfaces,
- End-tipping of inert soil ,
- Stockpiling, handling and compaction of inert soils
- Rare or occasional separation of any non-inert construction and demolition wastes (principally metal, timber, PVc pipes and plastic) intermixed within the imported inert soil

7.9 Dust in the air is a natural occurrence. The action of wind over dry ground will carry small particles into the air. Although large emissions of dust occur naturally, man-made dust events are caused by disturbance and working of land. Road use, aggregate and mineral extraction, as well as industrial activity, all contribute further to ambient dust levels.

7.10 The extent to which dust particles can become a nuisance or a hazard will depend on the amount of the particles which become airborne and the extent to which they spread over a large area. Normally the particles will be of a wide size range. The larger particles will not remain airborne for long. In general, the smaller the particle, the greater the distance over which it might travel.

7.11 Dust is defined as particulate matter in the range 1 - 75µm. The particles of dust between 1 and 10µm are known as particulate matter <10µm (PM_{10}), or 'suspended particles' for which there are standards for the protection of health. These particles occur predominantly as a result of combustion. Particles larger than 10µm, tend to deposit close to source and impact on public perception, often creating a nuisance where settled particles show up as deposits on clean surfaces such as cars and window ledges.

7.12 Dust may be generated by the handling and storage of soils etc and by vehicles using unpaved site haul roads. For these operations involving the mechanical break up of solids, the most common concern regarding dust emissions is the potential nuisance effect from the larger fraction particulates (greater than 10µm in diameter).

7.13 There is little evidence to suggest that the larger fractions of particulates are associated with health impacts. However buffer zones are often defined by planning authorities around potentially dusty activities to ensure that sufficient

protection against nuisance is provided. The Guideline for Planning Authorities produced by the DoEHLG (2004) states that '*residents living in proximity to quarries can potentially be affected by dust up to 0.5km from the source, although continual or severe concerns about dust are most likely to be experienced within about 100m of the dust source'*.

Vehicle Emissions

7.14 Vehicle exhaust emissions resulting from traffic generated by the operation of the proposed inert soil recovery facility may have the potential to temporarily affect local pollution levels, both within and surrounding the application site. No combustion emissions are expected during operation of the proposed waste recovery facility.

7.15 The pollutants of greatest concern in respect of the impact on public health, which are found in the exhaust emissions of road traffic and plant, are NO_2, PM_{10}, CO and benzene. Of these pollutants, NO_2 and PM_{10} are present in the highest concentrations relative to air quality standards. Where air quality standard limits for these pollutants are complied with, other combustion pollutants are typically insignificant.

Assessment Scenarios

7.16 The air quality assessment presented herein compares the 'no development' scenario with the proposed development scenario. On the basis of the potential impacts identified above, the following issues have been considered

- Potential for dust generation, release and impact during importation of inert soils from external sources
- Impact of stockpiling, placement and compaction of inert soils; and
- Impact of vehicle exhaust emissions.

Relevant Air Quality Planning Policy, Legislation and Guidance

7.17 There are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds for inert mineral / aggregate dust. There are a number of methods to measure dust deposition but only the German TA Luft Air Quality Standard relates a specific method of measuring dust deposition with dust nuisance. The EPA has adopted this standard for all licensable activities and the Department of Environment, Heritage and Local Government (DoEHLG, 2004) proposed its adoption by Local Authorities for planning applications relating to surface mineral workings. This standard measures total dust deposition i.e. both soluble and insoluble dust.

Air Pollution Act 1987

7.18 The principal national legislation for the control of air pollution is the *Air Pollution Act, 1987* (SI No. 6 of 1987). This Act provides a comprehensive statutory framework for the control of air quality by Local Authorities, specifically through 'orders' or 'plans' produced under Part IV *Special Control Areas* and Part V *Air Quality Management Plans and Standards* to which

Local Authorities must have regard to in planning. Part V of the Act also makes provision for transposing Air Quality Standards into law.

7.19 The Act also has relevance to potential nuisance emissions of dust and or odours. Section 24(2) of the Act states '*The occupier of any premises shall not cause or permit an emission from such premises in such a quantity, or in such a manner, as to be a nuisance'*.

Air Quality Framework Directive

7.20 In order to protect human health, vegetation and ecosystems, the European Union (EU) Air Quality Framework Directive sets down air quality standards in Member States for a wide variety of pollutants. These rules make provision for monitoring, assessment and management ambient air quality. This is transposed into Irish law through the *Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999* (SI No. 33/1999).

7.21 Four "daughter" directives set limits for specific pollutants. The first two of these directives cover: sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead, carbon monoxide and benzene. These two directives were transposed into Irish law as the *Air Quality Standards Regulations 2002* (SI No. 271/2002).

7.22 The third and fourth daughter directives deal with ozone (3rd) and polyaromatic hydrocarbons, arsenic, nickel, cadmium and mercury in ambient air (4th). These are transposed into Irish Law in the *Ozone in Ambient Air Regulations 2004* (SI No. 53/2004) and the *Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009* (SI No. 58/2009).

7.23 Clean Air for Europe (CAFE 2008/50/EC) replaces the Air Quality Framework Directive and the first three daughter directives.

Environmental Management Guidelines (EPA, 2006)

7.24 The *Environmental Management Guidelines for the Extractive Industry (Non-Scheduled Minerals)* present a summary of current environmental management practices for surface workings within the extractive industry. They are based on a review of current environmental management practice in Ireland, the UK and Europe.

7.25 The published guidelines are intended to provide general advice and guidance in relation to environmental issues to practitioners involved in the planning, design, development, operation and restoration of surface extractive industry developments and ancillary facilities in Ireland.

7.26 In relation to surface extractive industry developments and ancillary activities, the guidelines recommend that total dust deposition (soluble and insoluble) from activities on site shall not exceed a dust emission limit value (ELV) at site boundaries of *'350mg/m^2/day (when averaged over a 30-day period)'*

Guidelines for Planning Authorities: Quarries and Ancillary Activities (DoEHLG, 2004)

7.27 The DoEHLG Planning Guidelines on Quarries and Ancillary Activities are primarily addressed to statutory planning bodies. They provide an overview of environmental issues and best practice / possible mitigation measures associated with surface working of aggregates and associated ancillary activities. The guidelines are routinely referred to by practitioners involved in the planning, design, development, operation and restoration of surface workings and ancillary facilities in Ireland.

Methodology

Dust

7.28 The factors which affect the potential for dust to be created during operational activities and to disperse to sensitive receptors beyond the site boundary and cause nuisance. These factors are as follows:

- The nature, scale and duration of activities undertaken on site;
- The character and land use of the area surrounding the site;
- The local climate and meteorology; and
- Dust control measures employed on the site.

7.29 The likelihood of dust nuisance occurring has been assessed by considering each of the factors above, and by reference to the historical operations of the facility and baseline conditions as measured during dust deposition monitoring. The qualitative assessment examines the sensitivity of dust sensitive receptors, their location in relation to dust sources and the prevailing wind speed and direction, the distance from source, and the frequency of precipitation.

Selection of Sensitive Receptors

7.30 For the purposes of this air quality assessment the term 'sensitive receptors' includes any persons, locations or ecosystems that may be susceptible to changes as a consequence of the development of the proposed inert waste recovery facility. The receptor locations considered for human exposure are those where the public may be exposed for relevant exposure periods for comparison against Air Quality Standards (e.g. 1 hour, 8 hours or 12 months).

7.31 All isolated residential properties surrounding the site have been selected, in addition to one or more of the closest residences for assessment against long term Air Quality Standard limits.

7.32 Ecological receptors of concern are those areas designated under EU Habitats Directive (92/43/EEC) or the Birds Directive (79/409/ EEC).

RECEIVING ENVIRONMENT

Local Air Quality Management – Special Control Areas

7.33 There are no Air Quality Management Plans or Special Control Areas designated by Wexford County Council that require consideration by this assessment.

Background Air Quality

AQS Pollutants

7.34 The application site and the surrounding area fall into Air Quality Zone D and will be typical of rural locations throughout Ireland. No monitoring in the vicinity of the site is routinely undertaken for Air Quality Standard pollutants. As such, background values for use in the assessment have been taken from the nearest EPA monitoring location in Zone D. This is located at Wexford, approximately 40 km from the application site and is considered the most appropriate data set available for assessing baseline conditions in the study area.

7.35 During 2005 and 2006, pollutants monitored at Wexford included nitrogen dioxide (NO_2), particulate PM_{10}, sulphur dioxide (SO_2) and carbon monoxide (CO). The annual mean values available have been taken from the EPA website[1] are presented in Table 7-1 below:

Table 7- 1
Background Air Quality

Year	NO_2	PM_{10}	SO_2	CO
2005	6.58	25.33	14.18	0.32
2006	24.3	32.02	15.04	11.47

Baseline Dust Monitoring

7.36 A dust deposition monitoring programme has been carried out at several locations around the Old Quarry in Brownswood since 2007. Monitoring has been undertaken by BHP Laboratories in compliance with Condition 17 of Section 261 Quarry Registration No. QY3.

7.37 Dust monitoring is conducted using the 'Bergerhoff method'. The deposition gauge used in the survey is the 'Bergerhoff' dust gauge, which comprises a plastic collection bottle and a post with protective basket, set at 1500mm above ground level. The input of the atmospheric material is determined over a planned period measurement (usually one month) by exposing the plastic collection bottle. The total dust is expressed as deposition of soluble and insoluble particulate matter (mg/m^2/day) arising from on-site operations.

[1] http://erc.epa.ie/safer/dataAndResources/PubliclyAvailableResources.jsp

7.38 The dust deposition limit of 130 mg/m^2/day set by Condition 17 of the Section 261 (Ref. No QY3) is typically applied to dust deposition when monitored using the 'Frisbee' collection method. However, at the Brownswood site, Roadstone Wood Ltd. opted to employ the 'Bergerhoff' method to collect and measure dust deposition levels.

7.39 The prescribed limit for dust deposition when using the Bergerhoff Method of 350 mg/m^2/day relates specifically relates to that monitoring method and takes account of both soluble and insoluble dust levels. The increased limit does not represent any real or actual increase in ambient dust level, but merely reflects a difference in the methodologies used to monitor dust deposition levels.

7.40 For the purposes of this study therefore, the assessment of the baseline dust deposition results is benchmarked against a dust deposition of 350 mg/m^2/day limit conventionally adopted when employing the Bergehoff method.

7.41 Dust deposition monitoring is undertaken at two locations identified in Figure 7-2 and designated D01 and D02. The results of the dust deposition monitoring from 2007 to 2010 are presented in Table 7-2 below.

Table 7- 2
Dust Deposition Monitoring Results

Period	Location 1 (D01)	Location 2 (D02)	Limit mg/m^2/day
2007			
June	176.4	140.7	350
September	136.3	107.4	350
October	37.46	29.5	350
December	5.4	1.3	350
2008			
January	23.5	<5	350
February	17.3	<5	350
March	12.9	59.9	350
April	29.2	15.6	350
June	52.3	9.9	350
July	84.5	40.5	350
August	56.1	20	350
October	35	37.8	350
November	124.4	67.2	350
December	206.7	83.9	350
2009			
January	52.2	51.1	350
February	109	96	350
March	107	158	350
April	98	232	350
May	362	68	350
June	94	88	350

Period	Location 1 (D01)	Location 2 (D02)	Limit mg/m^2/day
2010			
February	267	184	350
March	199	56	350
April	237	56.1	350
May	90.6	76.1	350

7.42 The results of the dust deposition monitoring results show that the dust deposition levels around the existing quarry are low at both locations monitored during the period from 2007 to date, and well within the dust threshold limit of 350 mg/m^2/day recommended by the DoEHLG (2004) Guidelines for Quarries and Ancillary Activities. Measured dust levels only marginally exceeded the limit of 350mg/m^2/day in May 2009.

Climate Data

7.43 The closest weather monitoring station to the Old Quarry at Brownswood is Rosslare (Position: 52^0 15'00''N; 06^0 20'5''W), approximately 40 km to the south. Monthly annual mean and extreme meteorological data for Rosslare Observation Station for 1961 to 1990[2] is shown in Table 7-3 and Table 7-4. Monthly Precipitation Data for Rosslare for 1993 to 2008 is provided in Table 7-5 and percentage occurrence of wind speeds is shown in Table 7-6.

7.44 Climate data (rainfall and wind data) was supplied by Met Eireann Office. Rosslare station was officially closed in April 2008 and replaced by an Automatic Weather Station at Johnstown Castle, Co. Wexford.

7.45 Ireland has a typical maritime climate (it is classified as *Cfb* on the Köppen climate classification system) with relatively mild and moist winters and cool, cloudy summers. The prevailing winds are north easterly in direction. The climate is influenced by warm maritime air associated with the Gulf Stream which has the effect of moderating the climate, and results in high average annual humidity across the country.

7.46 The moderating influence of Atlantic is felt throughout Ireland. The annual mean temperature for different areas in Ireland varies between mountainous regions, lowlands and the coast. Mean daily maximum temperatures are typically between 7.9 to 17.9^{0}C and mean daily minimum temperatures are typically between 3.8 to 12.2^{0}C for the Wexford area (based on data from Rosslare, refer to Table 7-3).

7.47 The east of Ireland, which is sheltered from Atlantic frontal systems, is sunnier than the west. The sunniest months are May and June. The mean daily duration recording of sunshine for the Wexford area is 4.33 hours of sunshine. December is the dullest month with 1.75 hours of mean daily duration of sunshine. May is the sunniest month and with 6.88 hours of mean daily duration of sunshine – this is because of its long days and fine weather (based on data from Rosslare refer to Table 7-4).

[2] http://www.met.ie/climate/rosslare.asp

Table 7- 3
Average Meteorological Data for Rosslare (1961-1990)

Month	Mean Daily Max Temp. (^{0}C)	Mean Daily Min Temp. (^{0}C)	Mean No. of Days with Ground Frost	Mean No. of Days with Snow / Sleet	Mean No. of Days with Fog
January	8.2	3.9	11.0	2.7	2.0
February	7.9	3.8	8.6	3.7	2.2
March	9.3	4.3	7.2	1.9	3.2
April	10.9	5.6	4.4	0.8	4.2
May	13.2	7.9	1.3	0.1	3.2
June	15.9	10.4	0.0	0.0	4.4
July	17.9	12.1	0.0	0.0	5.0
August	17.9	12.2	0.0	0.0	4.6
September	16.3	10.8	0.1	0.0	3.9
October	13.8	9.0	0.8	0.0	2.5
November	10.6	5.9	5.6	0.2	1.7
December	9.1	4.8	8.5	1.3	1.6
Year	**12.6**	**7.6**	**47.4**	**10.7**	**38.5**

Table 7- 4
Average Meteorological Data for Rosslare (1961-1990)

Month	Sunshine (hours)	Mean No. of Days with No Sun	Relative Humidity At 0900UTC	Relative Humidity At 1500UTC	Mean No. of Days with Gales
January	1.94	11	86	81	2.5
February	2.47	8	85	79	1.5
March	3.87	5	84	76	1.1
April	5.74	3	82	76	1.3
May	6.88	1	81	77	0.3
June	6.59	2	82	78	0.2
July	6.29	1	82	77	0.1
August	5.86	2	84	78	0.2
September	4.79	3	84	77	0.5
October	3.27	6	86	80	0.9
November	2.50	9	85	79	1.3
December	1.75	11	86	82	1.9
Year	**4.33**	**61**	**84**	**78**	**11.7**

7.48 Rainfall in Ireland normally comes from Atlantic frontal systems which travel north-east over bringing cloud and rain. Monthly rates of precipitation are typically between 52-116.3 mm for the Wexford area (based on rainfall data from Rosslare, refer to Table 7-5), with the winter months receiving the heaviest amounts. The mean of the Met Office records indicate that average annual rainfall for the area of the site is approximately 910.6 mm / yr (refer to Table 7-5). In terms of dust generation, precipitation is a controlling factor i.e. during wet conditions dust generation is inhibited.

Table 7- 5
Monthly Precipitation Data for Rosslare (1993-2008)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1993	85.7	24.7	33.0	58.3	138.3	94.5	64.9	20.6	163.2	113.0	107.0	142.3	1045.5
1994	103.3	140.6	100.1	80.4	64.5	28.4	81.3	76.1	63.3	117.1	83.6	100.4	1039.1
1995	132.6	86.1	53.1	36.9	46.4	9.2	58.9	19.7	49.3	66.1	115.3	127.9	801.5
1996	221.4	68.7	108.3	98.4	43.3	27.7	35.8	66.6	17.8	119.2	117.1	37.5	961.8
1997	17.6	76.2	13.2	30.6	64.0	127.4	34.9	261.2	61.1	64.6	183.1	78.3	1012.2
1998	149.4	15.1	108.3	110.7	19.2	111.9	40.6	38.3	73.7	96.5	120.2	101.2	985.1
1999	105.1	28.8	31.2	51.2	58.0	29.8	11.4	87.3	110.8	56.0	49.0	118.3	736.9
2000	48.7	85.8	8.4	74.2	50.5	27.1	50.4	52.9	143.8	170.7	179.4	174.7	1066.6
2001	79.5	97.8	80.8	72.0	19.8	45.8	84.7	89.0	70.4	126.4	38.3	51.6	856.1
2002	109.3	105.0	53.1	112.7	89.1	49.8	36.0	40.7	12.4	282.8	229.0	118.5	1238.4
2003	80..0	64.5	47.6	85.7	112.2	82.8	82.8	5.0	76.3	44.2	105.1	106.1	892.3
2004	124.2	63.5	56.2	41.8	33.5	42.3	43.9	82.8	117.8	181.4	34.0	57.4	878.8
2005	59.1	39.1	49.6	109.1	53.6	38.5	126.8	30.8	69.7	138.7	81.8	56.7	853.5
2006	42.4	39.5	106.2	20.9	108.3	17.1	49.1	66.4	80.1	115.8	117.2	141.5	904.5
2007	46.3	85.2	58.8	23.6	44.6	112.5	74.6	81.5	41.3	52.0	77.6	62.1	760.1
2008	120.7	23.4	69.0										213.1
Average	95.3	65.3	61.1	62.9	59.1	52.8	54.8	63.7	71.9	116.3	109.2	98.3	910.6

7.49 The most important meteorological parameters with regard to the dilution and dispersal of air pollutants are the wind speed and direction. A windrose for Rosslare station is presented in Figure 7-1 for the period 1993-2007 inclusive. It is evident that the prevailing winds are from a south-westerly direction, with 35.1% of the hourly observations from a direction of 200-250 degrees. Approximately 12.6% of winds are from the north-eastern sector with an incidence of calm wind (<0.5m/s) conditions of about 26%.

Table 7- 6
Percentage Occurrence of Wind Speeds at Rosslare

Direction	Wind Speeds (knots)						
	<3	4-6	7-10	11-16	17-21	>21	All
350-10	0.8	1.4	1.7	0.4	0.3	0	4.6
20-40	0.7	0.9	1.8	1.3	0.9	0.3	5.9
50-70	1.1	1.5	2.1	1.2	0.7	0.1	6.7
80-100	0.9	1.1	1	0.3	0	0	3.3
110-130	0.6	1.1	1	0.2	0	0	2.9
140-160	0.9	1.4	1.4	0.4	0.2	0	4.3
170-190	1.3	2.5	3.4	1.2	0.5	0	8.9
200-220	2.3	4.1	6.7	2.6	1.1	0.2	17
230-250	3.2	5.5	6.8	2	0.6	0	18.1
260-280	2.8	3.1	2	0.3	0	0	8.2
290-310	1.8	1.9	1.2	0.3	0	0	5.2
320-340	1.5	2.6	2.3	0.4	0	0	6.8
Calms	8.1						8.1
Total	**26**	**27.1**	**31.4**	**10.6**	**4.3**	**0.6**	**100**

Surrounding Area and Receptors

7.50 The application site is located at approximate Irish National Grid Co-ordinates E297600 N137300. The land use surrounding the proposed inert waste recovery facility is an established development mix of industrial and commercial enterprise at the Old Quarry and at Murphy's Quarry to the south, with isolated rural housing and agricultural enterprises further afield. There are 19 residential properties within 500m of the application site boundary, as shown in Figure 7-2. Brownswood House, a listed property, occurs immediately south of the Old Quarry site and is shown in Figure 7-2.

7.51 There is a Special Conservation Area – Slaney River Valley (Site code: SAC 000781) designated under EU Habitats Directive (92/43/EEC), adjoining the boundary of the application site, however it lies in excess of 200m from the former quarry void where most of the proposed backfilling activity will take place.

7.52 The long-term receptor locations considered in the assessment are detailed in Table 7-7 below. Short term receptors considered include all roads, i.e. N11 and other side roads, footpaths and fields.

Table 7- 7
Receptors

ID	Receptor	Type	X Co-ordinate	Y Co-ordinate
R1	Brownswood	Residential	297672	137426
R2	Brownswood	Residential	297698	137478
R3	Brownswood	Residential	297821	137581
R4	Brownswood	Residential	297879	137560
R5	Brownswood	Residential	297837	137625
R6	Brownswood	Residential	297953	137588
R7	Brownswood	Residential	297959	137637
R8	Brownswood	Residential	297897	137643
R9	Brownswood	Residential	297784	137761
R10	Brownswood	Residential	297829	137855
R11	Brownswood	Residential	298100	137330
R12	Brownswood	Residential	298199	137279
R13	Brownswood	Residential	298153	136833
R14	Brownswood	Residential	298195	136752
R15	Brownswood	Residential	298231	136685
R16	Brownswood	Residential	298317	136607
R17	Brownswood	Residential	298221	136590
R18	Brownswood	Residential	298152	136675
R19	Brownswood	Residential	298140	136726
R20	Brownswood House	Residential	298044	136751
R21	Slaney River Valley	SAC 000781	-	-

ASSESSMENT OF IMPACTS

Dust

7.53 Dust effects will be dependent on the scale of release, frequency of wind speeds capable of carrying airborne dust (i.e. greater than 3m/s)[3] and frequency of rainfall considered sufficient to effectively suppress wind-blown dust emissions (greater than 0.2 mm/day)[4].

7.54 A windrose from Rosslare meterological station reproduced in Figure 7-1, and the percentage occurrence of wind speeds in Table 7-6 identify the frequency of wind speeds above 3m/s.

Potential Dust Effects

7.55 The proposed quarry backfilling and restoration area does not lie within 200m of residential or other dust sensitive receptors. As a result the potential for dust impact will be low due to the natural attenuation provided as dust falls out of suspension and is deposited on the ground. However, to provide a robust assessment due to the potential dust generating area, receptors within 500m of the soil infill have been investigated.

7.56 A table showing the distance from the receptor to the proposed soil infill boundary, and the frequency with which these receptors would be affected by winds from the direction of the quarry restoration area is presented below.

Table 7- 8
Frequency of Affective Winds

Receptor ID	Distance from Restoration Boundary (m)	Affective Winds (Degrees)	Frequency (%)
R1	300	140-160	4.3
R2	320	140-160	4.3
R3	300	170-190	8.9
R4	300	170-190	8.9
R5	300	170-190	8.9
R6	350	170-190	8.9
R7	350	170-190	8.9
R8	350	170-190	8.9
R9	400	170-190	8.9
R10	400	170-190	8.9
R11	200	230-250	18.1
R12	250	250-280	8.2
R13	300	320-340	6.8
R14	350	320-340	6.8
R15	350	320-340	6.8
R16	400	320-340	6.8

[3] K. W. Nicholson (1988) A review of particle re-suspension. Atmospheric Environment Volume 22, Issue 12, 1988, Pages 2639-2651
[4] Leeds University. Good Quarry. Available at: http://www.goodquarry.com/

Receptor ID	Distance from Restoration Boundary (m)	Affective Winds (Degrees)	Frequency (%)
R17	400	320-340	6.8
R18	400	320-340	6.8
R19	400	320-340	6.8
R20	300	350-10	4.6
R21	250	20-130	18.8

Note: Distances and directions are approximate.

7.57 Due to the fact that the prevailing wind is from a south-west direction, only one of the residential receptors (R11) within 500m of the proposed backfilling and restoration activity will be affected for more than 10% of hours in a year. Receptor R11 will be affected for 18.1 % hours in a year. Furthermore, due to precipitation, typically for 60% of the year, dust generation would be suppressed. The actual percentage of time that potential impacts exist is therefore reduced further.

7.58 Receptor R21, the Slaney River Valley SAC could be affected by the proposed restoration scheme for approximately 18.8% of hours in a year. However due to the nature of the proposed works and the location of the restoration area within a closed depression, it is expected that the larger (coarse grained) dust particles which may be disturbed by backfilling and placement of inert materials will settle from the atmosphere within the application site or the surrounding quarry complex (100m). It would also be expected that the smaller (fine grained) dust particles would have the potential to become airborne and settle some distance from the source, beyond the site boundary (up to 500m away).

7.59 The movement of traffic along existing unpaved haul routes through the application site has the potential under adverse conditions (ie. dry, windy weather) to generate significant dust emissions. When vehicles travel over an unpaved road, the force of the wheels on the surface pulverizes the exposed surface material. Particles are lifted and dropped from rolling wheels and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

7.60 The quantity of dust emissions from a given segment of unpaved road varies with the volume of traffic, the weight and speed of the vehicles and the fraction of silt and fine grained particles in the road surface materials. Tests, however, show that the road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

7.61 The only new activity envisaged by this proposal is the end-tipping, placement and compaction of inert soils and stones within the former quarry void. Such activities within a closed depression, where the sides of the existing quarry void effectively act to screen any dust emissions, are considered unlikely to give rise to any significant additional dust emissions.

7.62 The available dust monitoring data from the site suggests that continuation of established activities, including movement of traffic, will not give rise to dust

emissions in excess of the German TA Luft standard of 350mg/m^2/day at or beyond the site boundary.

7.63 There is a possibility that dust levels may rise for a limited duration when soil backfilling and placement works are undertaken close to existing ground level in close proximity to residences adjoining the site boundary, particularly those beyond the northern boundary. Dust emissions during dry windy periods at this time could constitute a temporary minor negative impact for the nearby residents.

7.64 In the longer term however, on completion of the site restoration works and the return of the site to agricultural use, the concentration of airborne dust would be expected to be reduced slightly from present day levels as a result of covering and seeding exposed, unvegetated soil surfaces. This will most likely constitute a minor positive impact for the local environment.

7.65 On the basis of the significant buffer distance between the proposed restoration area and receptors, and the location of receptors in relation to the void to be in-filled and prevailing winds, also the topography of the site, the potential dust impact at all receptor locations is considered to be low.

Climate

7.66 Direct impact on local climate from this restoration project is likely to be undetectable. The carbon emissions associated with transport of materials to the facility will contribute in a very small and unquantifiable way towards change in climate.

MITIGATION MEASURES

7.67 Mitigation measures for dust control are already in place across the Old Quarry and are included in the existing Environmental Management System. The layout of the existing sprinkler system used for dust suppression is shown in Figure 7-3. The extension of this system to cover the waste recovery site and the effective application of dust mitigation measures will continue to be monitored by Roadstone Wood Ltd.

Dust

7.68 A number of mitigation measures are outlined below to reduce the possibility of negative dust impacts arising in course of site restoration. Dust control measures are presented in Table 7-9 and are in general accordance with best practice guidance[5].

[5] Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (2006), Environmental Protection Agency

Table 7- 9
Summary of Dust Control Measures

Site Operation	Particulate matter Control Measures	Estimate of Effectiveness
Soil Placement and Backfilling	Restrict access to restored areas	High
	Avoid soils handling during adverse weather conditions	High
	Optimise timing of operations, particularly in relation to meteorological conditions	High
	Imported soil compacted in-situ immediately after being unloaded to minimise wind blown particulate matter	High
	Soil mounds to be seeded immediately upon completion of construction	Moderate
	Drop heights to be minimised at all times	High
	Soil mound heights restricted to minimise particulate matter emissions	Moderate
Stockpiling	Stockpiling of imported soils to be minimised	Medium
	Use of water sprays on soil stockpiles, when necessary	High
	Siting of stock piles to take advantage of shelter from wind	High
Haul Roads	Controlled use of fixed haul routes	Moderate/High
	Haul routes to be regularly maintained by grading hardcore to minimise particulate matter generation	High
	Optimise separation distances to sensitive receptors	High
	Speed controls to be implemented and enforced on all haul routes	Moderate
	Water bowsers / sprinkle system to be used as required	High
Access Road	Paved site access road	High
	Use of wheel cleaning equipment	Moderate/High
	Use of water bowsers on access road when required	High
	Use of road sweeper on paved road when required	Moderate
	Speed controls to be implemented on access road	Moderate
Monitoring	Dust deposition monitoring stations around site	Moderate

CONCLUSIONS

7.69 This air quality assessment has considered the impact of the proposed inert waste recovery facility on the aerial environment. The assessment has considered dust and particulates associated with site activities and HGV traffic.

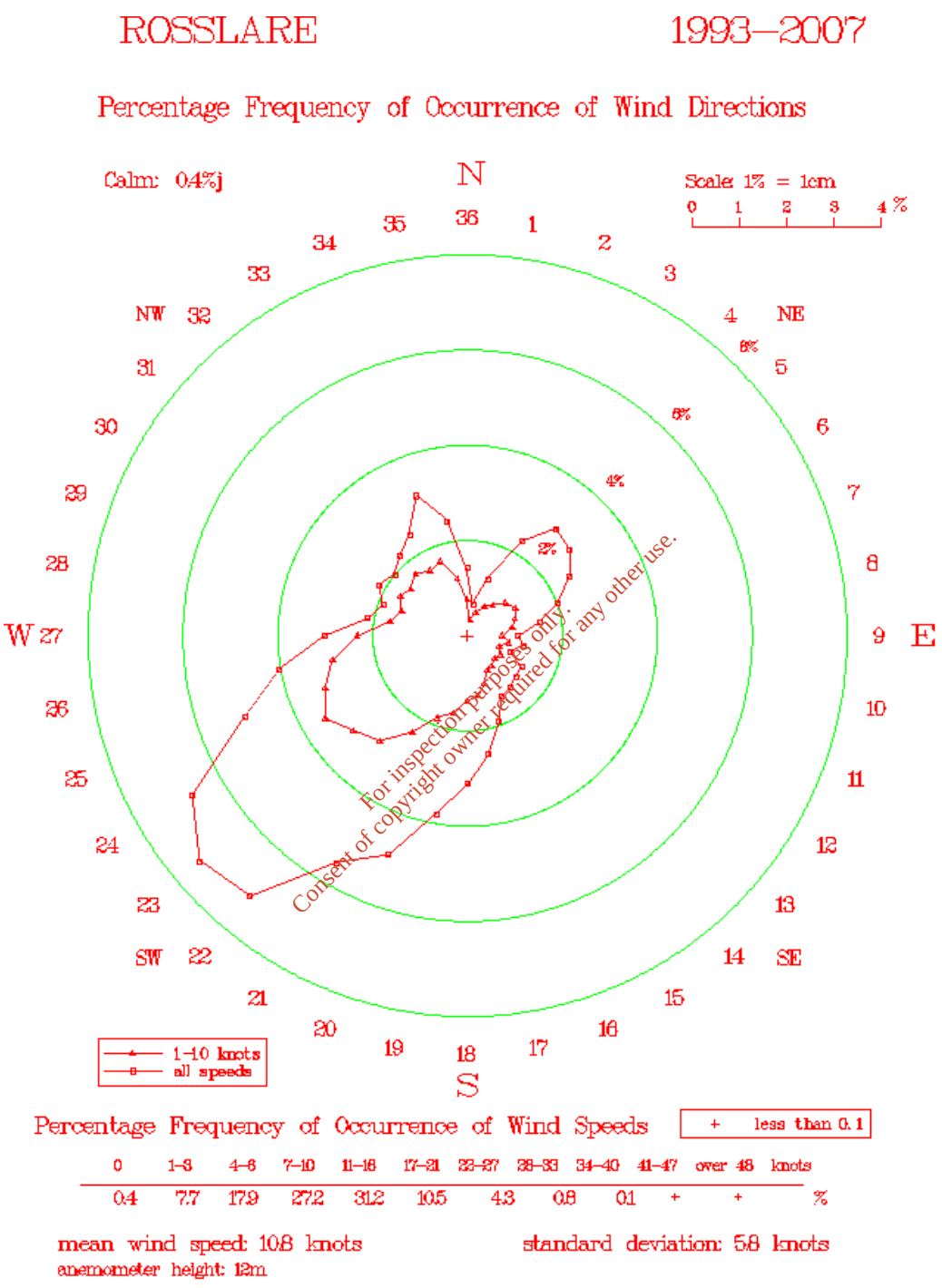
7.70 The significance of impacts has been assessed against the baseline scenario considering the backfilling and restoration of the existing quarry void at the Old Quarry in Brownswood.

7.71 The following conclusions can be made:

- The proposed development will not result in significant increases or exceedences of the 'custom and practice' limit criterion for dust nuisance at sensitive receptor locations at any stage;
- The predicted impact from deposited dust at residential receptors is considered to be negligible.

7.72 Mitigation measures for dust control are already in place at the site and included in the existing site Environmental Management Plan. The effective application of these mitigation measures will continue to be monitored.

FIGURES



Windrose (Rosslare Meteorological Station 1993-2007)