SECTION 7: CLIMATE AND AIR QUALITY

7.1 INTRODUCTION

This Environmental Impact Statement (EIS) provides supporting information to accompany a Waste Licence Application (WLA) to the Environmental Protection Agency (EPA) by Roadstone Dublin Limited for continued operation of its existing construction and demolition waste recovery facility at Fassaroe, Bray, Co. Wicklow and proposed backfilling of the adjoining, worked out quarry void using imported and site-won inert soils.

This Chapter of the EIS, prepared by SLR Consulting Ireland, addresses the potential impacts of atmospheric emissions associated with the continued operation and further development of waste recovery facilities at the Fassaroe site (principally .

In essence, waste recovery operations will comprise

- importation of inert soils and construction and demolition (C+D) waste from external sources
- stockpiling, placement and compaction of inert soil
- processing of C&D waste
- stockpiling of recovered C&D waste and
- off-site export of recovered C&D waste

The principal air quality impact associated with the continued operation of the existing C&D waste recovery facility and the future recovery of inert soils through deposition, is fugitive dust emission. Dust emissions are likely to arise during:

- Trafficking by heavy goods vehicles (HGVs) over unpaved surfaces,
- End-tipping of inert soil or C&D waste
- Stockpiling, handling and compaction of inert soils
- Processing (crushing / screening) of C&D waste

With respect to the potential for air quality impacts, the key objective at the application site is to manage activities in order to ensure that air emissions are prevented where possible and the effects of any residual releases are minimised.

A description of the ambient receiving environment around the waste recovery facility, where air quality could be adversely impacted is provided in Section 7.2. The potential impacts of air emissions on sensitive locations around the facility have been assessed and are presented and discussed in Section 7.3. The following issues are addressed separately for the potential impacts:

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

Baseline studies and subsequent impact assessment have been prepared by environmental scientists employed by SLR Consulting Ireland principally:

- Aldona Binchy MSc.(Eng.) (Environmental Engineering)

7.2 RECEIVING ENVIRONMENT

7.2.1 Climate

The Irish Meteorological Service operates a network of meteorological stations around the country, of which the nearest to the application site at Fassaroe, is located at Casement Aerodrome near Baldonnell, Co. Dublin.

This station is located approximately 20km north-west of the proposed development. Other meteorological stations of interest are located at Dublin Airport, Kilkenny and Rosslare. Given the separation distance to these stations, it is considered that the data from Casement Aerodrome is most relevant to this site.

Detailed observations are made daily at the station and "30 year average" data is compiled and published for climatological purposes. The data from Casement Aerodrome has been compiled for the period 1968 to 1996 inclusive and a summary of the data is outlined as follows:

Temperature

The mean annual air temperature at Casement Aerodrome over the period 1968 to 1996 was 9.3°C, with a range of extreme temperatures from –12.4°C to 30.5°C (see Table 7.1).

Relative Humidity

The relative humidity data at Casement Aerodrome is reported at 09:00hrs and at 15:00hrs daily. The range of monthly values at 15:00hrs over the period 1968 to 1996 varied from 68% to 83%, which is in line with national averages and indicates a reasonable humidity level on a year round basis (see Table 7.2).

Sunshine

The monthly sunshine hours at Casement Aerodrome over the period 1968 to 1996 are reported in Table 7.3.

Rainfall

The annual rainfall amount at Casement Aerodrome over the period 1968 to 1996 is 711.4mm, indicating that it is one of the "drier" locations in the country. There are however 185 days with greater than 0.2mm of rain on an annual basis indicating that the rainfall is relatively evenly spread throughout the year (see Table 7.4).

Wind speed

The mean monthly wind speed at Casement Aerodrome over the period 1968 to 1996 is 11 knots, or 5.7 m/s, with maximum gusts of 81 knots or 42 m/s. The average number of gale days per year is 20.3, indicating that the area is "windy", without experiencing the extreme gusts that occur on the west coast (see Table 7.5).

General Weather

The average number of days per month with other types of weather at Casement Aerodrome over the period 1968 to 1996 is reported in Table 7.6. The general picture is of a higher than national average of snow or sleet (see Table 7.6).

TEMPERATURE (degrees Celsius)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean daily max.	7.8	7.6	9.6	11.8	14.6	17.7	19.7	19.3	16.8	13.6	9.9	8.3	13.1
mean daily min.	2.0	1.7	2.5	3.2	5.7	8.6	10.7	10.3	8.5	6.7	3.6	2.8	5.5
mean	4.9	4.6	6.0	7.5	10.1	13.1	15.2	14.8	12.6	10.1	6.7	5.6	9.3
Absolute max.	15.4	14.7	18.8	21.3	24.7	27.5	29.8	30.5	24.7	21.3	17.7	15.4	30.5
Absolute min.	-12.4	-10.3	-7.8	-4.5	-3.0	0.3	2.5	2.5	-0.3	-4.1	-6.2	-9.7	-12.4
mean no. of days with air frost	7.5	7.7	6.3	4.9	1.0	0.0	0.0	0.0	0.0	1.4	5.9	6.6	41.3
mean no. of days with ground frost	15.3	15.0	13.1	12.8	6.3	1.1	0.1	0.1	1.6	4.5	11.0	13.5	94.3

Table 7.1 Mean Ambient Air Temperature

RELATIVE HUMIDITY (%)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean at 0900UTC	87	86	84	80	77	77	79	81	84	86	87	87	83
mean at 1500UTC	82	77	72	68	68	68	68	68	71	76	81	83	74

Table 7.2 Mean Ambient Air Relative Humidity

SUNSHINE (hours)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean daily duration	1.63	2.38	3.04	4.85	5.65	5.63	5.01	4.83	4.04	3.07	2.16	1.42	3.64
greatest daily duration	8.1	9.2	10.9	13.6	15.4	16.0	15.4	14.4	12.3	9.8	8.5	6.9	16.0
mean no. of days with no sun	10	7	5	2	2	2	1	2	3	5	7	11	55

Table 7.3 Mean Sunshine Hours

RAINFALL (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean monthly total	68.7	50.7	53.8	49.9	56.6	53.0	48.9	63.7	58.7	67.2	67.2	73.1	711.4
Greatest daily total	31.4	42.8	30.0	35.3	34.3	108.6	41.4	73.0	32.1	48.5	58.4	42.9	108.6
mean no. of days with ≥ 0.2mm	18	14	17	14	15	14	14	14	15	16	16	17	185
mean no. of days with ≥ 1.0mm	13	10	12	10	11	10	9	10	10	11	11	12	131
mean no. of days with ≥ 5.0mm	5	3	3	3	4	3	3	4	4	4	4	5	45

Table 7.4 Mean Rainfall

WIND (knots)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean monthly speed	14.1	12.5	12.8	10.1	9.1	8.7	8.9	8.7	10.1	11.2	12.3	13.3	11.0
max. gust	80	78	71	59	63	53	58	58	69	65	68	81	81
max. mean 10-minute speed	57	54	47	43	43	36	39	39	46	44	49	57	57
mean no. of days with gales	5.2	2.7	2.7	0.6	0.5	0.1	0.1	0.2	0.6	1.4	2.4	3.7	20.3

Table 7.5 Mean Wind Speed

WEATHER (mean no. of days with)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
snow or sleet	4.6	4.8	3.5	1.4	0.1	0.0	0.0	0.0	0.0	0.0	0.4	2.1	16.9
snow lying at 0900UTC	2.4	1.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	5.3
hail	0.8	1.2	2.8	2.2	1.3	0.5	0.1	0.1	0.3	0.1	0.7	0.6	10.7
thunder	0.0	0.1	0.2	0.3	0.9	0.9	0.8	0.6	0.3	0.2	0.2	0.1	4.8
fog	2.5	2.3	1.8	2.4	1.6	1.4	1.2	2.8	2.9	2.7	1.8	2.3	25.9

Table 7.6 General Meteorological Conditions

7.2.2 Air

The existing C&D waste recovery facility operated by Roadstone Dublin Ltd. is located in centre of Fassaroe townland, Co. Wicklow, approximately 1.5 km west of Bray and 2km north-east of the village of Enniskerry, Co. Wicklow.

At the present time, aggregate processing and value added production facilities are operated by Roadstone Dublin Ltd within the application area. Greenstar Ltd. operates a materials recovery and transfer facility at Fassaroe Lane beyond the northeastern boundary of the application area.

A small number of existing residences are located in close proximity to the site. The nearest sensitive locations are the residences located immediately to the north of the site along Berryfield Lane and residences located along the Fassaroe Avenue east and south of the site. The locations of these residences are shown on the site map in Figure 7.1.

The existing inert waste facility is accessed via the Fassaroe Junction on the N11 National Primary Road. Traffic turning off the N11 runs for a short distance over the local road network, travelling initially westwards and then turning south on a public road (Kilbride Road) until it comes to a small roundabout junction with Fassaroe Avenue, a private road, leading to the entrance to Roadstone Dublin's landholding.

The principal existing sources of air pollution (dust emissions) in the receiving environment around the application site in Fassaroe are those associated with

- the existing inert C&D waste recovery facility;
- the ongoing aggregate processing activities (washing and screening of imported sand)
- readymix concrete production operations at the western side of the application site
- road traffic along the local road network and
- waste management activities at Greenstar's nearby facility at Thornhill Road

Additional air pollution is likely to arise from traffic movements along the local road network and the N11 National Primary Route linking Dublin and Rosslare ,Co. Wexford.

Ambient Atmospheric Dust

Dust in the air has always been 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 agricultural disturbance and working of land. Road use, aggregate and mineral extraction, as well as industrial activity, all contribute further to ambient dust levels.

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.

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 quarries and aggregate extraction. This standard measures total dust deposition i.e. both soluble and insoluble dust.

Baseline Dust Concentrations

At the present time, routine dust monitoring is undertaken at a number of locations across the application site using Bergerhoff gauges. Recorded dust deposition rates are indicated in Table 7.7 at a number of monitoring locations indicated in Figure 7.1. This data indicates that existing total dust deposition rates along the boundary of the existing facility are currently controlled and generally well below the TA Luft threshold limit of 350 mg/m^2/day.

Monitoring Period	Deposition (*mg/m²/day)*	
	D1	**D2**
2006		
April	234	182
September	187	218
2007		
April	139	187
September	129	62
2008		
April	173	139

Table 7.7 Existing Dust Deposition Rates

Traffic Emissions

Apart from the restoration and recovery activities at the application site and other production activities at nearby sites, the only other significant source of air pollution in the vicinity of the application site is traffic along the existing local road network. Many of the pollutants emitted by motor vehicles are also produced by a wide range of other industrial and domestic processes. Data from the EPA (Ireland's Environment – A Millennium Report) indicates that road transport sources produced most of the emissions of Carbon Monoxide (81%) and substantial amounts of hydrocarbons (VOC 60%), oxides of nitrogen (NO_x 50%) and Carbon Dioxide (11%). Data from the UK Department of the Environment, Transport and the Regions (Digest of Environmental Statistics No. 20) indicates that the quantity of PM_{10} emissions (ie. particles with a diameter of 10µm or less) due to traffic is of the order of 28%.

While no site-specific PM_{10} levels have been measured, some limited, historical air quality monitoring by Wicklow County Council and the EPA suggests that PM_{10} concentrations in the urban centres of the County fall within permissible air quality limits (Exceedence of daily limit of 50µg/m^3 on no more than 35 days per year). This suggests that PM_{10} concentrations in this location will not present any cause for concern.

7.3 IMPACT OF THE SCHEME

7.3.1 Climate Impacts

The nature and scale of the proposed development is such that no significant impact is likely to be caused to the climate. The restoration of the application site using inert soil stones and C&D waste is limited in scale and duration. In the short-to medium term, there are unlikely to be any changes to the microclimate and the effect of the proposed development will, in effect, be insignificant. There will be no long-term changes to the microclimate. No mitigation measures are therefore warranted.

7.3.2 Dust Impacts

There are two assessment criteria for dust emissions (a) health related effects and (b) nuisance effects. Health related effects are assessed with reference to Council Directive 1999/30/EC relating to limit values for air quality whereas dust as a nuisance is generally assessed to VDI 2119 Measurement of Particulate Precipitations (Bergerhoff Method) and referred to as the German TA Luft standard. The accepted standard for dust deposition levels is 350mg/m^2/day.

The nearest activities to dust sensitive locations are likely to be

(i) the recovery / processing of C&D waste at the centre of the application site
(ii) the handling, placement and stockpiling of inert soils close to residences beyond the northern boundary of the application site.

Due to the nature of the proposed works and the location of the facility, it is expected that the larger (coarse grained) dust particles which may be disturbed by backfilling and placement of inert materials and by recovery (screening and crushing) of C&D wastes will settle from the atmosphere within the application site. 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.

Away from the site restoration and recovery activities, exposed soils at or close to the surface are likely to dry out during periods of prolonged dry weather. On windy days, finer soil particles on these surfaces, as at the silt lagoon, may become airborne and result in dust emissions.

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.

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.

The available dust monitoring data from the site suggests that continuation of all established activities, including C&D waste recovery activities, 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. The only new activity envisaged in 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.

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, specifically beyond the northern boundary. Dust emissions during dry windy periods at this time could constitute a temporary minor negative impact for the nearby residents.

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.

7.4 MITIGATION MEASURES

A number of mitigation measures are outlined below to further reduce the possibility of negative dust impacts arising in the course of the site restoration and recovery works at the Fassaroe site.

7.4.1 Dust Minimisation at Source

When adverse conditions apply (dry, windy weather), water from a bowser should be sprayed on dry unpaved road surfaces in order to minimize dust rise.

Backfilled excavations and topsoil capping should be grassed as soon as practicable after completion of soil placement.

Stockpiling of imported soils should be minimized. Soils should ideally be placed and compacted in-situ immediately after being unloaded. If and when temporary stockpiling of soils is required, they should be placed as close as practicable to the centre of the application site, away from nearby residences.

In order to reduce the potential for dust emissions, the area of bare or exposed soil should, insofar as practicable, be kept to a minimum. Consideration could be given to establishing vegetation cover over temporary slopes pending final backfilling and restoration to original ground level.

7.4.2 Traffic on Unpaved Roads

In order to minimise dust emissions from traffic along unpaved haul roads through the application site, it is recommended that they be constructed of recovered C&D waste generated on-site. The recovered materials should have a very low silt content (similar to that of Class 6F1 or Clause 804 material as per the NRA Specification for Road Works) and should be adequately compacted in order to minimise dust rise. The haul roads should have a minimum compacted thickness of 150mm of recycled material.

When adverse conditions apply (dry, windy weather), water from a bowser should be sprayed on dry unpaved road surfaces in order to minimize dust rise. Heavy goods vehicles leaving the site will continue to pass through the wheelwash facility in order to prevent transport of fine particulates onto the local road network.

7.4.3 Monitoring

It is envisaged that dust monitoring will be undertaken on an ongoing basis at points along the site boundary closest to sensitive receptors (specifically nearest residences), at the locations (D1, D2, D3) indicated on Figure 7.1.

REFERENCES

Department of Environment Heritage and Local Government (2004) *Quarries and Ancillary Activities: Guidelines for Planning Authorities*

Environmental Protection Agency, (2000) *Ireland's Environment : A Millenium Report*

European Union (1999) *Council Directive 1999/30/EC* of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air

T.A Luft (1988) *Atmospheric Emissions*

FIGURES

N
W E
S

D3 (PROPOSED)
D2
D1
EXISTING POND
SILT AREA
SILT AREA
EXISTING POND
SILT POND / CLOSED DEPRESSION

0 50 100 150 200m 300 400 500
Metres
1:5000

NOTES

1. Based on OSi 6inch sheet no. 21

2. Ordnance Survey Ireland Licence no. SU 0000709
(c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)
- D1 Dust Monitoring Locations
- R Location of Residences
- Building

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DUST MONITORING LOCATIONS

FIGURE 7.1

Scale: 1:5,000 @ A3
Date: APRIL 2009

0059.00017.18.FIG 7.1.0.DUST MONITORING LOCATIONS