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 Limited for operation of a proposed soil recovery facility at Milverton, Skerries, Co. Dublin and backfilling of the quarry void using imported inert soil.

This Chapter of the EIS, prepared by SLR Consulting Ireland, addresses the potential impacts of atmospheric emissions associated with the development of waste recovery facilities at the Milverton site.

In essence, waste recovery operations will comprise

- Importation of inert soil waste from external sources (construction sites)
- Stockpiling, placement and compaction of inert and site-won soil
- Placement of minor quantities of imported inert / recovered construction and demolition waste along temporary haul roads
- Stockpiling of topsoil pending final surface restoration works

The principal air quality impact associated with the proposed 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
- Stockpiling, handling and compaction of inert soil
- Placement of small quantities of inert / recovered 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 proposed soil 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. That nearest to the application site at Milverton is located at Dublin Airport, Co. Dublin.

This station is located approximately 20km south-west of the proposed facility. Other meteorological stations of possible interest are located at Casement Aerodrome at Baldonnel, Mullingar and Clones. Given the separation distance to these stations, it is considered that the data from the Dublin Airport are the 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 Dublin Airport has been compiled for the period 1961 to 1990 inclusive and a summary of the data is outlined as follows:

Temperature

The mean annual air temperature at Dublin Airport over the period 1961 to 1990 was 9.6°C, with a range of extreme temperatures varying from –10.1°C to 28.7°C (see Table 7.1).

Relative Humidity

The relative humidity data at Dublin Airport is reported at 09:00hrs and at 15:00hrs daily. The range of monthly values at 15:00hrs over the period 1961 to 1990 varied from 67% to 81%, 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 Dublin Airport over the period 1961 to 1990 are reported in Table 7.3.

Rainfall

The annual rainfall amount at Dublin Airport over the period 1961 to 1990 is 732.7mm, 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 Dublin Airport over the period 1961 to 1990 is 9.9 knots, or 5 m/s, with maximum gusts of 75 knots or 38 m/s. The average number of gale days per year is 8.2; 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 Dublin Airport over the period 1961 to 1990 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.	7.6	7.5	9.5	11.4	14.2	17.2	18.9	18.6	16.6	13.7	9.8	8.4	**12.8**
mean daily min.	2.5	2.5	3.1	4.4	6.8	9.6	11.4	11.1	9.6	7.6	4.2	3.4	**6.4**
mean	5.0	5.0	6.3	7.9	1.5	13.4	15.1	14.9	13.1	10.6	7.0	5.9	**9.6**
Absolute max.	16.6	15.3	21.3	20.5	23.4	25.1	27.6	28.7	23.9	21.2	18.0	16.2	**28.7**
Absolute min.	-9.4	-6.2	-6.7	-3.7	-1.0	1.5	4.8	4.1	1.7	-0.6	-3.4	-10.1	**-10.1**
mean no. of days with air frost	6.4	4.9	3.3	1.4	0.2	0.0	0.0	0.0	0.0	0.1	3.3	4.8	**24.3**
mean no. of days with ground frost	14.0	12.7	12.4	9.2	2.9	0.2	0.0	0.0	0.6	2.3	9.7	12.5	**76.4**

Table 7.1 Mean Ambient Air Temperature Dublin Airport

RELATIVE HUMIDITY (%)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean at 0900UTC	86	84	82	79	76	76	78	81	82	85	86	86	**82**
mean at 1500UTC	79	75	70	68	67	68	68	70	70	75	78	81	**72**

Table 7.2. Mean Ambient Air Relative Humidity Dublin Airport

SUNSHINE (hours)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean daily duration	1.8	2.5	3.6	5.2	6.1	6.0	5.4	5.1	4.3	3.1	2.4	1.7	**3.9**
greatest daily duration	8.0	9.2	11.9	13.8	15.4	15.9	15.4	14.5	12.4	10.4	8.5	6.9	**15.9**
mean no. of days with no sun	11	8	5	3	2	2	1	2	3	6	8	11	**61**

Table 7.3 Mean Sunshine Hours Dublin Airport

RAINFALL (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean monthly total	69.4	50.4	53.8	50.7	55.1	56.0	49.9	70.5	66.7	69.7	64.7	75.6	**732.7**
greatest daily total	30.3	31.3	35.7	26.2	30.0	46.6	34.8	60.2	40.9	47.5	55.1	41.7	**60.2**
mean no. of days with ≥ 0.2mm	18	14	16	14	16	14	13	15	15	16	16	18	**185**
mean no. of days with ≥ 1.0mm	13	10	11	10	11	10	9	11	10	11	11	12	**128**
mean no. of days with ≥ 5.0mm	5	3	3	3	4	4	3	4	4	4	4	5	**48**

Table 7.4 Mean Rainfall Dublin Airport

WIND (knots)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
mean monthly speed	12.2	11.7	11.6	9.7	8.7	8.0	8.1	8.0	8.9	9.9	10.8	11.8	**9.9**
max. gust	75	73	61	60	58	55	54	56	64	73	64	71	**75**
max. mean 10-minute speed	48	49	42	41	39	36	34	41	35	45	43	47	**49**
mean no. of days with gales	2.1	1.1	1.2	0.3	0.3	0.1	0.0	0.3	0.2	0.5	0.7	1.4	**8.2**

Table 7.5 Mean Wind Speed Dublin Airport

WEATHER (mean no. of days with)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
snow or sleet	6.0	5.5	4.3	1.7	0.3	0.0	0.0	0.0	0.0	0.1	0.9	2.9	**21.6**
snow lying at 0900UTC	2.1	1.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	**4.5**
hail	0.7	0.9	2.2	2.4	1.4	0.3	0.1	0.1	0.0	0.2	0.5	0.8	**9.5**
thunder	0.1	0.1	0.2	0.3	0.6	0.7	0.7	0.6	0.3	0.3	0.1	0.1	**4.1**
fog	4.8	4.3	3.9	4.5	3.6	3.1	3.6	5.3	4.9	4.7	4.0	3.9	**50.5**

Table 7.6 General Meteorological Conditions Dublin Airport

7.2.2 Air

The proposed inert soil recovery facility to be operated by Roadstone Ltd. is located in Milverton townland, Co. Dublin, approximately 1.5km west of Skerries town.

Up to the summer of 2008, quarrying of limestone rock and production of aggregate and readymixed concrete was undertaken by Roadstone Ltd within the application area. A small number of existing residences are located in close proximity to the site. The nearest sensitive locations to the application site are the residences located immediately to the west and north-east of the site along the R127 Regional Road and a number of residences located along the Golf Links Road to the south of the site. The locations of these residences are shown on the site map in Figure 7.1. The main Dublin- Belfast Railway line lies immediately east of the application area, while an 18-hole golf course, Skerries Golf Club, is located directly south of the site.

Traffic access to the application site is primarily obtained via the M1 Motorway and the Lissenhall Interchange. Traffic turning off the M1 runs northwards along the R132 Regional Road (the former N1 National Primary Road) before turning right onto the R127 Regional Road at Blake's Cross. Traffic continues north along the R127 and diverts along the ring road around Lusk village before arriving at the site after a distance of approximately 10km. Only a relatively minor proportion of traffic to the site is likely to run southward along the R127 Regional Road through Balbriggan and Skerries.

In the past, the principal sources of air pollution (dust emissions) in the receiving environment around the application site in Milverton were those associated with

- Quarrying of limestone bedrock;
- Aggregate processing activities (crushing and screening);
- Readymix concrete production;
- Road traffic along the local road network.

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 contributes 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

When the quarry was operational up to summer 2008, there were four significant sources of air pollution in the Milverton area; the existing hard rock quarry, ready-mix concrete production operations located at the quarry, road traffic along the local road network and the main railway line Dublin-Belfast.

Routine dust monitoring was undertaken from 2005 to 2007 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 total dust deposition rates along the boundary of the application site at the time quarrying and production of construction materials was underway was controlled and generally well below the TA Luft threshold limit of 350 mg/m^2/day.

Monitoring Period	**Deposition (*mg/m²/day*)**	
	D1	**D2**
2005		
April	196	139
September	113	100
2006		
April	197	45
September	205	206
2007		
April	201	146
September	228	121

Table 7.7 Existing Dust Deposition Rates

Traffic Emissions

Apart from the restoration and recovery activities at the application site, 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 at the application site, some limited, historical air quality monitoring by Fingal County Council at Blanchardstown suggests that PM_{10} concentrations in suburban centres of the county fall within permissible air quality limits (exceedance of daily limit of 50 ug/m^3 on no more than 25 days per year). Given that the application site is located in a more rural area, this indicates that ambient PM_{10} concentration is highly unlikely to 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. Backfilling the application site using inert soil, stones and minor quantities of inert concrete and demolition 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 principal air quality impact at the nearest residences will be airborne dust arising from handling, placement and stockpiling of inert soil. This impact is likely to be most significant at the residence located immediately 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 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 quarry backfilling 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 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 (i.e. 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 was obtained at a time when the application site was being actively quarried. Activities at the site at that would have included blasting; excavation, handling and processing (crushing) of fragmented rock, transport of materials to and from storage bays and the concrete production facility etc. Given the similarity in the nature and intensity of these activities to those which will be undertaken during the quarry backfilling and restoration works, it is expected that the proposed soil recovery activities including handling and haulage of soil, 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 worked out 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 that beyond the northern boundary of the application site. Dust emissions during dry windy periods at this time could constitute a temporary minor negative impact for the nearby resident(s).

In the longer term however, following 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 from levels previously recorded when the quarry was operational. This reduction will arise on account of the covering and seeding of exposed, un-vegetated surfaces and the reduction in traffic movements across the site. 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 Milverton 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 haul 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 and stockpiles 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 inert and/or recovered construction and demolition waste imported to site (principally concrete and brick derived material). These 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 granular 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 three locations (D1, D2, D3) indicated on Figure 7.1.

REFERENCES

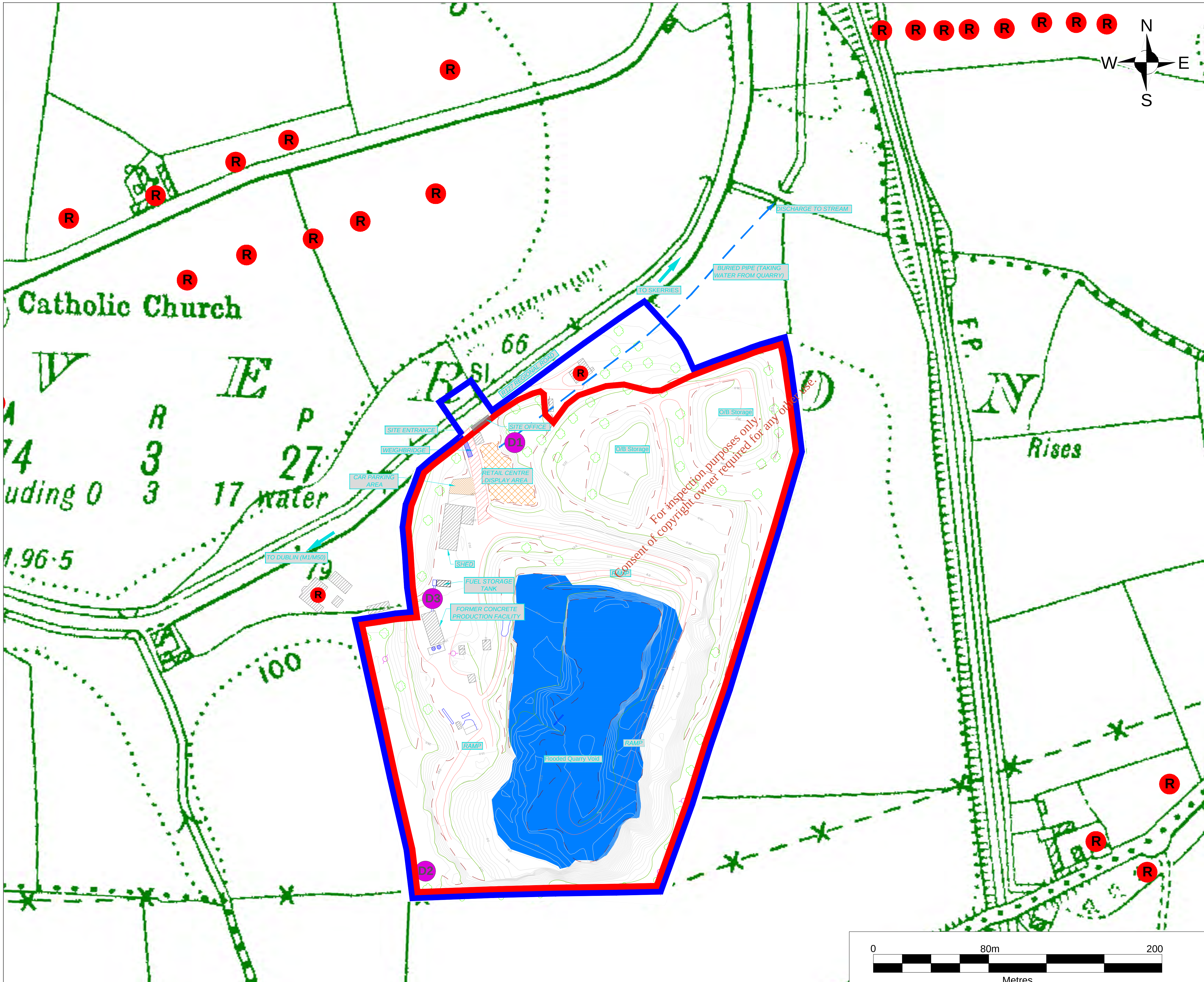
Department of Environment Heritage and Local Government (2004) *Quarries and Ancillary Activities: Guidelines for Planning Authorities*

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



NOTES

1. Based on OSi 25inch Dublin Sheet No. 5 & 5a

2. Ordnance Survey of Ireland Licence No. SU 0000714 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

- Applicant's Land Interest (c. 8.6ha)
- Waste Licence Application Area (c. 7.9ha)
- D1 Dust Monitoring Locations
- Buried Pipe
- Top of Bank
- Bottom of Bank
- Road
- Contour Line
- Building
- Internal Unpaved Road
- Internal Paved Road
- R Location of Residence

roadstone

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DUST MONITORING LOCATIONS

FIGURE 7.1

0 80m 200
Metres
1:2500

Scale: 1:2,500 @ A3

Date: JUNE 2014

00180.00089.18.FIG 7.1.0.DUST MONITORING LOC