9.0 AIR

9.1 Introduction

9.1.1 The impact on air quality of the proposed Civic Amenity Facility at Labre Park is considered. The assessment deals with the existing site conditions, the construction phase of the development and the completed development.

9.1.2 The proposed facility is situated in a mixed residential and industrial area. The nearest sensitive locations to the site are the existing houses at Labre Park. There are a small number of residences at Nugget Cottages at approximately 100m to the southeast. There is also a proposed residential development adjacent to the northern boundary of the proposed Civic Amenity Facility. This residential development is also considered a sensitive location.

9.1.3 During the construction phase, the main air quality aspects concern dust generation on site, and on haul routes to the site. The impact of construction traffic on local air quality is also considered.

9.1.4 The air quality aspects of the completed development include vehicular emissions from traffic to the facility, emissions from vehicles on site, and dust and odour generation.

9.2 Assessment Criteria for Airborne Pollutants

Combustion Products from Vehicles

9.2.1 The EU Directive for the framework for ambient air quality management (96/62/EC) and the various Daughter Directives introducing pollutant limit values (1999/30/EC and 2000/69/EC) have been transposed in Irish Legislation by the Air Quality Regulations, 2002 (S.I. No. 271 of 2002). The pollutants regulated in this legislation in Ireland include: Sulphur Dioxide, Nitrogen Dioxide and Oxides of Nitrogen, Particulate Matter (PM_{10}), Lead, Benzene and Carbon Monoxide.

9.2.2 The Air Quality Regulations, 2002 sets limit values for sulphur dioxide (SO_2) for:

- Annual (April to March) and winter (October to March) as 20 µg/ m^3,
- Daily limit value as 125 µg/m^3 and
- Hourly limit value periods as 350 µg/m^3, respectively.

9.2.3 The Air Quality Regulations, 2002 sets limit values for nitrogen oxides for:

- Annual limit value (for the protection of vegetation) as 30 µg/m^3,
- Annual limit value (for the protection of human health) as 40 µg/m^3 and
- Hourly limit value periods as 200 µg/m^3, respectively.

9.2.4 The Air Quality Regulations, 2002 sets limit values for PM_{10} for:

- Annual limit value (for the protection of human health) as 20 µg/m^3 and
- Daily limit value periods as 50 µg/m^3, respectively.

9.2.5 The Air Quality Regulations, 2002 sets a limit value of 0.5 micrograms per cubic metre (µg/m^3) for an annual mean ambient air concentration of lead.

9.2.6 The Air Quality Regulations, 2002 sets a limit value of 5 micrograms per cubic metre (µg/m^3) for an annual mean ambient air concentration of benzene.

9.2.7 The Air Quality Regulations, 2002 sets a limit value of 10 milligrams per cubic metre (mg/m^3) for a daily (8-hour) mean ambient air concentration of carbon monoxide.

9.2.8 There are a number of air quality monitoring stations situated in Dublin City, including a monitor for sulphur dioxide and smoke in Ballyfermot, close to the site of the proposed development. There has been an ongoing issue in the city, for a number of years, in relation to the nitrogen dioxide concentrations in ambient air, with the annual mean for the city in 2002 being reported as 29 µg NO_2/m^3, which includes the contribution of traffic-derived emissions.

9.2.9 In assessing whether a change in traffic pollutant concentration is significant, the U.K. Design Manual for Roads and Bridges (DMRB) states that an increase of less than 4µg/m^3 in NO_2 is not considered a significant change. This corresponds to 10% of the annual limit. Likewise a change of 2µg/m^3 of PM_{10} is not considered a significant change.

Assessment Criteria for Dust Deposition

9.2.10 For dust deposition, there are no national or EU guidelines on acceptable deposition rates. The German air quality limits (TA Luft, October 2002) of 350mg/m^2/day for non-hazardous dust are taken as a guideline criterion in this assessment. This is the limit also commonly applied at construction and quarry sites in Ireland.

9.3 Existing Air Quality

9.3.1 The dominant sources of air pollution in the vicinity of Labre Park arise from traffic, with a contribution from domestic and industrial combustion sources. Added to this is a contribution from distant pollutant sources, such as distant traffic and industrial emissions in the Dublin urban and greater urban areas.

9.3.2 Data on air quality is published by the Environmental Protection Agency (EPA), which is responsible for collating and disseminating national air quality data. For air quality monitoring purposes, the country is divided into four zones:

- Zone A - Dublin
- Zone B - Cork
- Zone C - towns >15000
- Zone D - remainder

9.3.3 Dublin City Council carries out air quality monitoring in the Dublin urban area.

9.3.4 The most recent compiled and published data is for 2002/2003: Dublin City Council "Air Quality Monitoring and Noise Control Unit Annual Report 2002 -2003", and "Air Quality Monitoring Report 2002", published by the EPA. All air quality parameters were reported to be within the applicable air quality standards for the year of monitoring.

9.3.5 The air quality status for 2002/2003, in relation to the (annual mean concentrations) significance criteria is summarised as follows:

- Nitrogen dioxide: 29 µg/m^3 (average of all zone A stations)
- PM_{10} : 23 µg/m^3 (average of all zone A stations)
- Sulphur dioxide: 8 µg/m^3 (average of all zone A stations)
- Carbon monoxide: 3.8 mg/m^3 (Winetavern St) [daily mean]
  4.8 mg/m^3 (Coleraine St.) [daily mean]
- Benzene: 3.8µg/m^3 (Winetavern Street)
- Lead: 0.03µg/m^3 (average of all zone A stations)

9.3.6 The nearest Dublin City Council monitoring station to the proposed development is at Ballyfermot, where monitoring of sulphur dioxide and PM_{10} is carried out. Monitoring of sulphur dioxide is also carried out at Bluebell. Results (annual mean concentrations) for 2002/2003 for these monitoring stations were:

- Sulphur dioxide: 6 µg/m^3 (Ballyfermot)
- Sulphur dioxide 11 µg/m^3 (Bluebell)

9.3.7 PM_{10} data for Ballyfermot is posted on the EPA website (www.epa.ie). Data presented for 2004 shows that air quality standards for PM_{10} are complied with. The air quality standards applicable in 2004 permit an exceedence of a daily concentration of 55 µg/m^3 on no more than 35 occasions in the year. In 2004, this level was exceeded on only 4 occasions at this location.

9.3.8 A recent air quality monitoring study carried out in Ballyfermot during winter 2003-2004 (at Killeen Road) reported the following airborne pollutant concentrations (these are not annualised means):

- Nitrogen dioxide: 31.8 μg/m^3
- PM_{10} : 19.2 μg/m^3
- Benzene: 1.8 μg/m^3

9.3.9 As regards existing levels of surface dust deposition, a visual inspection of the site did not detect any significant evidence of significant dust deposition. There is however from time to time unauthorised dumping at the site, which may on occasions give rise to wind blown dust.

9.3.10 The existing air quality indicators in the Dublin region are within current air quality standards (allowing for the sliding implementation scale to 2010). Reductions in levels of nitrogen oxides and PM_{10} will however be required in order to achieve the stricter limits which will apply in 2010. Dublin City Council has developed an Air Quality Management Plan for the Dublin Region, which aims to improve air quality through measures aimed at reducing emissions from traffic, domestic sources, commercial and industrial premises.

9.4 Air Quality Aspects of the Development

Construction Phase - Dust

9.4.1 The main air quality aspects during the construction phase of the development may arise from the creation and propagation of dust on-site by the construction activities, and along the haul routes by construction vehicles. Vehicle exhaust emissions along the haul routes are also considered.

9.4.2 The proposed development will not result in extensive areas of open soil for protracted durations, or require major excavations. Rainfall and soil moisture content provide a natural dust control mechanism. During prolonged periods of dry weather, there is however potential for dust generation, which could result in a slight to moderate nuisance in the immediate vicinity of the site.

9.4.3 The greatest proportion of dust generated during construction activities is likely to be of relatively large aerodynamic size. From experience at a range of construction sites, it is observed that the dust generally settles within the site itself, with little dust passing over the site boundaries.

9.4.4 Dust deposition rates at the nearest houses could reasonably be expected to be less than 350 $mg/m^2/day$, at which level there would be little noticeable effect. The construction specifications will include provisions to manage dust emissions effectively on-site. There is therefore a low probability of complaints, and the impact is likely to be insignificant.

9.4.5 During prolonged periods of dry weather, dust generation on haul routes to the site may be significant. Soil and mud can be deposited on roads for several hundred metres from a site by vehicles serving the site. This gives rise to dust which gets re-suspended by passing traffic, and can result in soiling of properties along the route. The impact would generally be slight, with dust deposition confined to the roadside boundaries of properties along the route. Again, the impact would be short-term as dust would be cleared during periods of rainfall.

Construction Phase – Traffic Emissions

9.4.6 Combustion air pollutants are generated from construction vehicles and plant. The U.K. DMRB calculation model was used to carry out a screening assessment on potential air quality impacts from construction vehicles ("Design Manual for Roads and Bridges", version March 2000). The impact from construction vehicle emissions is estimated based on a nominal 8 truck movements per hour, at a speed of 30km/hr in the vicinity of the site.

9.4.7 This volume of truck movements is calculated to generate a mean annual nitrogen dioxide concentration of *ca.* 0.9 $\mu g/m^3$, and a mean annual PM_{10} concentration of *ca.* 0.2 $\mu g/m^3$ at the nearest houses to the proposed development in Labre Park. These projected increases are considered negligible, in the context of the significance criteria, and the existing local airborne pollutant concentrations.

Emissions from the Completed Development

9.4.8 The main air quality aspects during the operational phase of the development are emissions from vehicles, dust generation, and odours.

Operational Phase – Traffic Emissions

9.4.9 The traffic access to the site will be mainly from the two main roads in the area, i.e. Killeen Road and Kylemore Road, via the Kylemore Park Industrial Estate. Current and predicted average traffic flows in the vicinity of the proposed development were obtained from the traffic consultants responsible for the section of the Statement devoted to traffic and parking. These figures have been used to predict average concentrations of (a) carbon monoxide, (b) benzene, (c) oxides of nitrogen, (d) nitrogen dioxide and (e) particulate matter (PM_{10}) for the most sensitive receptors to:

- The junction of Killeen Road and Kylemore Park North and
- The junction of Kylemore Road and Kylemore Park South.

9.4.10 An annual rate of increase in traffic volumes of 3% (as reported in the traffic section of the Statement) has been used to extrapolate from the current traffic flows (2005) to those expected in 2014, whether the proposed development takes place or not. The traffic consultants have estimated that HGVs will comprise no greater than 10% of the traffic flows in this area – the average Greater Dublin traffic is comprised of 7-8% HGVs.

9.4.11 The impact on air quality as a result of the projected increase in road traffic has been calculated using the procedures given in UK Department of Transport's Design Manual for Roads and Bridges (2003), Volume 11, Section 3, Part 1, Air Quality. This document was prepared by the United Kingdom Highways Agency, the Scottish Office for Industrial Development, the Welsh Office and the Department of the Environment for Northern Ireland. The Annex provides a screening method for the prediction of ground level concentration of various pollutants at sensitive receptor points close to new traffic developments.

9.4.12 Average concentrations of carbon monoxide, benzene, nitrogen dioxide, oxides of nitrogen and PM_{10}, at reference dates 2005 and 2014, have been determined for the most sensitive residential receptor points close to the development. These receptors are situated at:

- Le Fanu Drive, located (at its closest point) *ca.* 85 m from the junction of Killeen Road and Kylemore Park North, and
- Labre Park, located (at its closest point) *ca.* 35 m from the junction of Kylemore Road and Kylemore Park South.

9.4.13 This is considered to be where the most significant effects of increased traffic flow will be felt. The residences situated closest to the entrance of the proposed development are not considered to be the receptors that will experience the greatest impacts of traffic-derived emissions, as the existing traffic flows are not as considerable as those located elsewhere in the environs. It can be assumed that the impacts on air quality at the residences close to the site entrance will be significantly lower than those calculated for the receptors modelled in this study.

9.4.14 Calculations have been made based on existing traffic flows and those predicted to result from the proposed development. As the average speed of traffic, as well as distance of potential receptors from junction points have a significant effect on the generation of pollutants, calculations have been carried out using 3 different traffic speed scenarios at various road-links. These speeds are 15 km/hr (to represent traffic turning at junctions), 30 km/hr (to represent traffic slowing to turn at junctions) and 50 km/hr (to represent normal traffic-flow on urban roads). The results of these calculations are presented in Tables 9.1 and 9.2.

9.4.15 As a worst-case situation, the proposed development will lead to an additional 953 AADT [Annual Average Daily Traffic] (8% HGV) at the Killeen Road junction with Kylemore Park North and an additional 477 AADT (8% HGV) at the Kylemore Road junction with Kylemore Park South.

9.4.16 In order to facilitate direct comparison with the evaluation criteria discussed above, the traffic peak hour concentrations have been adjusted to give predictions of:

- The annual maximum daily (8-hour) concentration of carbon monoxide,
- The annual mean concentration of benzene,
- The annual mean concentration of oxides of nitrogen (NO_x) and nitrogen dioxide (NO_2), and
- The annual mean and daily mean concentrations of PM_{10},

using the methodology given in Appendix 1 of Volume 11, Section 3, Part 1 of the UK Dept. of Transport Design Manual for Roads and Bridges (2003). These adjusted figures for 2005 and 2014 are given in Tables 9.1 and 9.2.

9.4.17 To summarise the screening model findings, if the development is fully operational in 2005, when these modelled pollutant concentrations are converted to the corresponding long-term significance criteria (see Tables 9.1 and 9.2), the indications are that there will only be slight increases in the pollutants modelled at both residential receptors. As can be seen from the table, the increases involved will all lead to pollutant concentrations that will be in compliance with the appropriate legislative limit values. The contribution of the traffic emissions to the local air quality conditions, assuming the 2002-2003 data is representative of 2005 conditions, is given in Table 9.3.

9.4.18 Furthermore, by the year 2014, all discrete traffic-pollutant concentrations are likely to have been significantly reduced (compared to 2005), as a result of legislation-driven technology. At this time, if the development takes place, there will be a *ca.* 20% reduction in carbon monoxide found at the most sensitive receptors, a *ca*. 30% reduction in nitrogen dioxide and a *ca.* 45% reduction in PM_{10}, compared to 2005 predictions.

Table 9.1: Air Quality Assessment at Proposed Labre Park Civic Amenity Facility

Summary of predicted air quality impact (due solely to traffic) at residential receptor (Le Fanu Drive) located closest to the Killeen Road – Kylemore Park North Junction. The receptor distances from Killeen Road and the Junction are 34m and 82m respectively. The average traffic speeds modelled on Killeen Road and at the junction Are 50 kmph and 15 kmph respectively. NOTE: It is important to note that there is no legislative limit value for NO_x, as opposed to NO_2.

Situation	Carbon Monoxide (mg/m³)		Benzene (μg/m³)		Oxides of Nitrogen (μg/m³)			Particulates (μg/m³)	
	Daily mean conc.	**Legislative limit value**	Annual mean conc.	**Legislative limit value**	Annual mean NOx conc.	Annual mean NO2 conc.	**Legislative limit value (NO2)**	Annual mean conc.	**Legislative limit value**
2005 no change	0.06	**10**	0.06	**5**	15.7	5.4	**40**	1.7	**50**
2005 with development	0.06	**10**	0.06	**5**	16.1	5.5	**40**	1.8	**50**
2014 with development	0.05	**10**	0.05	**5**	10.9	4.0	**40**	1.0	**20**

Table 9.2: Air Quality Assessment, proposed Labre Park Civic Amenity Facility

Summary of predicted air quality impact (due solely to traffic) at residential receptor (Labre Park) located closest to the Kylemore Road – Kylemore Park South Junction. The receptor distances from Kylemore Road and Kylemore Park South are 30 m and 27 m respectively. The average traffic speeds modelled on Killeen Road and on Kylemore Park South are 50 kmph and 30 kmph respectively. NOTE: It is important to note that there is no legislative limit value for NO_x, as opposed to NO_2.

Situation	Carbon Monoxide (mg/m³)		Benzene (μg/m³)		Oxides of Nitrogen (μg/m³)			Particulates (μg/m³)	
	Daily mean conc.	**Legislative limit value**	Annual mean conc.	**Legislative limit value**	Annual mean NO_x conc.	Annual mean NO_2 conc.	**Legislative limit value (NO_2)**	Annual mean conc.	**Legislative limit value**
2005 no change	0.06	**10**	0.07	**5**	20.0	6.5	**40**	2.1	**50**
2005 with development	0.07	**10**	0.07	**5**	20.1	6.7	**40**	2.2	**50**
2014 with development	0.05	**10**	0.07	**5**	12.3	4.4	**40**	1.1	**20**

Table 9.3: Summary of predicted air quality data, in comparison to average Dublin City Council data for 2002-2003, at the modelled receptors.

Receptor, Year	**Carbon Monoxide (mg/m^3)**			**Benzene ($\mu g/m^3$)**			**Nitrogen Dioxide [NO_2] ($\mu g/m^3$)**			**PM_{10} ($\mu g/m^3$)**		
	Daily mean conc.			Annual mean conc.			Annual mean conc.			Annual mean conc.		
	Without Development	With Development	**Legislative Limit Value**	Without Development	With Development	**Legislative Limit Value**	Without Development	With Development	**Legislative Limit Value**	Without Development	With Development	**Legislative Limit Value**
Le Fanu Drive, **2005**	4.3	4.3	**10**	3.8	3.8	**5**	29.0	29.1	**40**	23.0	23.1	**50**
Labre Park, **2005**	4.3	4.3	**10**	3.8	3.8	**5**	29.0	29.2	**40**	23.0	23.1	**50**

Operational Phase – Dust Generation

9.4.19 Recyclable and other inert waste materials deposited in the skips and other receptacles have negligible potential for dust generation. From observation at other Civic Amenity sites, this type of collection does not give rise to dust. Construction and demolition waste would however have potential for generation of wind-blown dust, during dry weather periods. The site will only accept inert construction waste. There is therefore no health hazard associated with any such wind blown dust, just the potential for dust nuisance.

9.4.20 There is also potential for dust generated due to waste materials which may fall to the ground while being transferred into the waste receptacle. This material would be broken down by passing traffic, and could result in windblown dust within the yard areas. The impact would be limited to the site and is unlikely to have an effect beyond the boundary.

9.4.21 Dust build-up on road surfaces and paved areas within the site will be kept under control by good housekeeping and regular sweeping.

9.5 Overall Air Quality Impact

9.5.1 The predictions for road traffic pollution generation indicate that there will be slight increases in the levels of various traffic-related pollutants as a result of the proposed development in the vicinity of the receptors modelled in Le Fanu Drive and Labre Park. These receptors represent the likely worst-case impacts on air quality from traffic. However, with reference to current European Union and Irish legislative criteria, this increase will not have a significant effect on air quality, even under worst-case average traffic conditions. It can be seen from the summary table (Table 9.3) that the development will not have a significant negative impact on current air quality conditions in the area.

9.5.2 The proposed development has low inherent potential for odour generation. If slight odours are occasionally generated within the site, it is considered that they would not be noticeable beyond the site boundaries.

9.5.3 The proposed development is assessed for its potential to cause bioaerosol, H_2S and odour air quality impacts.

- The current ambient air quality in the vicinity of the proposed Civic Amenity site is good in terms of bioaerosol and H_2S concentration levels with all measured levels within the assessment criteria concentration levels.
- Currently, when wind blows from the west-southwest there may be a perceived odour plume travelling across the proposed site. This is a solvent-based odour. This is dependant on the facility emitting the odours during this wind direction. The operators of the proposed facility need to be aware of such odours as complaints at a later date could be blamed upon them.
- In terms of bioaerosol, H_2S and odour air quality, the operation of the proposed site should cause no impact. Green waste will be compacted within an enclosed container for transport off-site for further processing. No mixing or shredding activities of green waste will be carried out in the green waste deposit area of the site, thereby significantly reducing the risk of any bioaerosols becoming airborne and travelling in wind fields to nearby residents. The compacted material will be removed off-site approximately every 48 hours.
- In terms of H_2S and odour air quality, the operation of the green waste and deposit area (roadside waste and sweepings) should cause no impact. The majority of collected materials will be compacted into an enclosed container and transported off-site regularly, therefore the ability for odour and H_2S to be generated/escape is significantly reduced.
- No deleterious human health effects are expected as a result of the development of the proposed facility.

Health related impacts for the proposed development in terms of Bioaerosols

9.5.4 It is not anticipated that any deleterious effects will occur as a result of the development of the facility. The current ambient air quality is good as is demonstrated by measurements detailed elsewhere in this report. Hydrogen Sulphide levels are below WHO guidelines and as such no human health effects are to be expected.

9.5.5 No shredding or composting of green waste will take place on the site. All green waste will simply be collected for transport for off site composting. The operation of compacting the green waste into containers minimises the potential for an increase in bioaerosols such as *Aspergillus fumigatus* or Mesophilic bacteria at the proposed facility. Any bioaerosol will be further reduced by relatively simple work site management. This would include covering the waste in the containers when not being worked upon and during the night. When being transported off site the waste should also be contained. Any potential for natural decomposition of the green waste will be minimised by arranging regular removal of the waste for off-site composting. Aspergillus is a natural organism present and multiplying in any organic waste however it is only when decomposition of material is relatively advanced, as in the composting process itself, that large numbers of spores, conidia, are potentially released into the environment. Such a level will not occur in this facility because of the absence of composting.

9.5.6 Literature reviews carried out on the health implications from bioaerosols show that no environmental human health effects have been reported for a facility such as this from anywhere in the world.

9.5.7 While the risks to vulnerable individuals such as immuno-compromised is greater from Aspergillus there is no evidence that the risk attributable to living near a green waste site is greater than exist already anyway. Because the site will compact the green waste into containers for off-site processing, and not carry out shredding or composting on site, the health implications from the operation of the site are considered to be negligible.

9.5.8 Aspergillus is ubiquitous in the environment and several domestic daily activities are associated with higher levels. Indeed it is certainly possible that innocuous activities such as cutting the grass as would result in a greater peak in Aspergillus levels than the proposed facility.

9.6 Mitigation

Construction

9.6.1 During the construction phase there is a potential impact due to mud carried out from the site, and subsequent dust generation in dry weather. Soiling of roads can be minimised by cleaning of vehicles leaving the site, and covering of trucks carrying fine materials.

9.6.2 The contract specification for the construction of this development will include the adoption of a "Dust Control Plan" within the construction contract documentation which will seek to minimise the potential impact of construction dust emissions on adjacent communities and the road network. The plan will require the implementation of best practice procedures, such as the watering down of demolition sites and provision of wheel washes for construction vehicles. Inspection and monitoring of dust generating activities will be the responsibility of a senior site engineer who will have the authority to resolve any problems through suitable control procedures or, if necessary, by suspending work.

Operation

9.6.3 The air quality impacts during the operational phase are negligible, and there is no requirement for mitigation, other than standard housekeeping measures to ensure that the roads and set-down areas are kept clean, and that waste material spillages are immediately cleaned up in the vicinity of the waste receptacles.

Road Traffic

9.6.4 Emissions of pollutants from road traffic can be controlled by either controlling the number of road users or by controlling the flow of traffic. For the majority of vehicle-generated pollutants, emissions rise as speed drops, although the opposite is true for oxides of nitrogen. Emissions are also higher under stop-start conditions when compared with steady speed driving. Because of these effects, the calculations of the impact of road traffic were made using different speed considerations. Mitigation of traffic-emissions is best controlled, in this instance, by adopting the measures outlined in the traffic section (**section 5.8**) to maintain free-flowing traffic, especially during peak traffic periods.

9.6.5 The pollutant concentration predictions discussed above show the effect of average speed on the generation of vehicle emissions. The free flow of the traffic in suburban areas and in the vicinity of proposed developments is normally essential in order to minimise the generation of traffic related pollutants. When this development is operational, however, even if the average traffic speed at junctions drops below 20 km/hr (which is unlikely), compliance with all the legislative criteria is likely to be achieved at the nearest sensitive residential receptors.

9.7 Residual Impact

9.7.1 The predictions for road traffic pollution generation indicate that there will be slight increases in the levels of various traffic-related pollutants as a result of the development in the vicinity of the receptors modelled in Le Fanu Drive and Labre Park. These receptors represent the likely worst-case impacts on air quality from traffic. However, with reference to current European Union and Irish legislative criteria, this increase will not have a significant effect on air quality, even under worst-case average traffic conditions.

9.7.2 The current bioaerosol air quality within and in the vicinity of the site is good and is within the proposed assessment criteria presented in Table A.9.2.

9.7.3 The current H_2S concentrations levels are low, and within the assessment criteria outlined in Table A.9.2.

9.7.4 A solvent odour was detected within the proposed site boundaries. It is important for the proposed site operator to be familiar with any potential odours, which may cause operational problems for the proposed Civic Amenity site.

9.7.5 No deleterious human health effects are expected as a result of the development of the proposed facility.

9.7.6 The proposed Civic Amenity site will not cause any significant bioaerosol, H_2S or odour impact if it is operated in accordance with the proposed operation plan and compacted green waste and deposited waste is removed off-site at regular intervals. All drains should be kept clean and free from debris.

9.8 Summary

9.8.1 The impact on air quality of the proposed Civic Amenity Facility at Labre Park was assessed.

9.8.2 Based on a review of published air quality data for the Dublin region, the existing environment in the vicinity of Labre Park is considered to be within air quality standards.

9.8.3 During the construction phase of the development, there is a slight potential for dust nuisance at nearby properties, associated with construction traffic. This can be controlled by standard mitigation measures, such as wheelwashes and covering loads of fine materials.

9.8.4 The modelling studies undertaken as part of the environmental impact assessment have shown that the predicted pollutant concentrations present at the proposed development site are not significant. The site is typical of an urban environment in terms of air quality. The proposed development will not result in a significant negative impact on air quality.

9.8.5 The potential for generation of dust from the Civic Amenity Facility is considered to be minimal. During construction, mitigation measures will control dust and mud impacts on the neighbourhood, while during the operational phase, good general housekeeping will ensure that dust generated due to spillages is minimised.

9.8.6 The potential of nuisance due to odours was assessed. Provided green waste materials, and road sweeping wastes are regularly removed from the site, there is negligible potential for any associated odours.

9.8.7 The proposed civic amenity site will not cause any significant bioaerosol, H_2S or odour impact if it is operated in accordance with the proposed operation plan and compacted green waste and deposit waste is removed off-site at regular intervals. All drains should be kept clean and free from debris.

9.9 Monitoring

9.9.1 Not Applicable

9.10 Reinstatement

9.10.1 Not Applicable

9.11 Forecasting methods

9.11.1 Prediction of traffic derived pollutants was carried out using the procedures given in the Design Manual for Roads and Bridges (2003), Volume 11, Section 3, Part 1, Air Quality. This document was prepared by the United Kingdom Department of Transport, the Scottish Office for Industrial Development, the Welsh Office and the Department of Environment for Northern Ireland.

9.12 Difficulties in compiling specified information

9.12.1 Not Applicable.

9.13 References

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Appendix 9.1:

Odours & Bioaerosols

date
Jan 2005

project
Labre Park EIS

client
Dublin City Council

A.9.1 Odours & Bioaerosols

Introduction

A.9.1.1 Odour Monitoring Ireland performed a baseline bioaerosol assessment of the proposed Civic Cmenity proposed for Labre Park, Ballyfermot, Dublin 12. Additionally when on-site, Odour Monitoring Ireland performed a baseline hydrogen sulphide (H_2S) survey and sniff odour assessment. Both techniques have been developed by Odour Monitoring Ireland through extensive searches of literature and are successfully used in many EPA compliance studies of landfill sites.

A.9.1.2 Bioaerosol monitoring was performed by volumetric sampling using both impactor plates and liquid impinger sampling techniques. H_2S monitoring was performed using a Jerome 631 X gold leaf analyser while baseline odour monitoring was performed using a peer reviewed published technique adapted by Odour Monitoring Ireland. Meteorological conditions were assessed using recorded results from Dublin Airport, Casement Aerodrome and site specific recorded results.

A.9.1.3 The overall study allowed for the assessment of baseline bioaerosol and odour air quality within and in the vicinity of the proposed site.

Aims of Study

A.9.1.4 The main aims of the study included:

1. Assessment of baseline bioaerosol air quality in the vicinity of the proposed site,
2. Assessment of H_2S air quality in the vicinity of the proposed site,
3. Assessment of odour air quality in the vicinity of the proposed site.

Sampling locations and residential locations

A.9.1.5 Figure A.9.1 illustrates the location of the proposed site in relation to local businesses and residents. All monitoring locations (see Table A.9.1) were used to provide background monitoring data of:

- The entrance of the proposed facility,
- At boundary locations around the proposed site.

A.9.1.6 This allowed for the development of bioaerosol, H_2S and odour baseline data for the proposed development.

Figure A.9.1: Site location and baseline bioaerosol monitoring locations

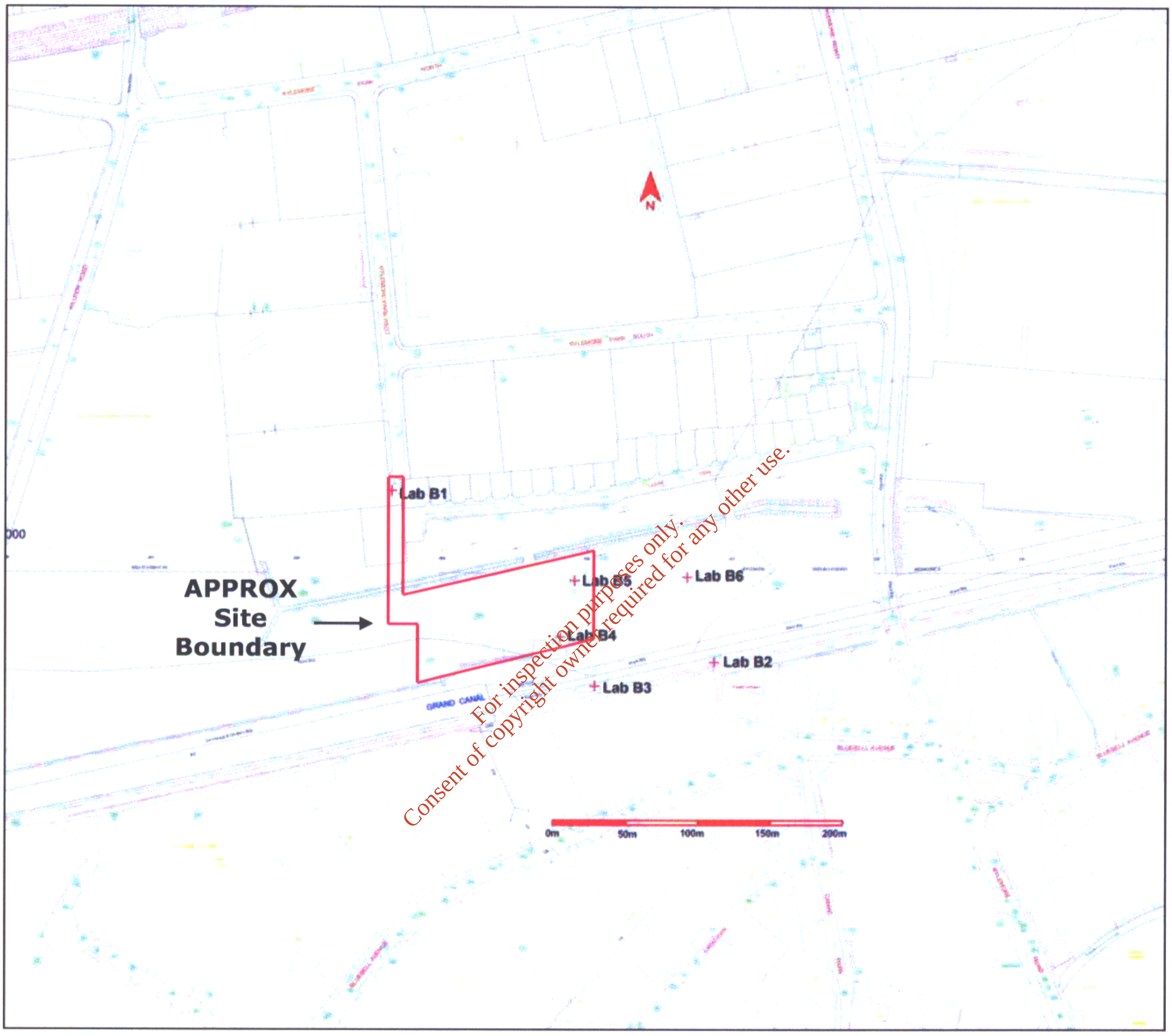

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Table A.9.1: Monitoring locations and parameters monitored

Location ID	Parameter monitored	Grid reference location
Lab B1	Bioaerosols and Hydrogen sulphide	N309865.665399 E232656.941876 Next to proposed entrance
Lab B2	Bioaerosols and Hydrogen sulphide	N310087.772574 E232538.112108 South of proposed site
Lab B3	Bioaerosols and Hydrogen sulphide	N310004.907643 E232522.073734 South of proposed site
Lab B4	Bioaerosols and Hydrogen sulphide	N309992.514355 E232539.327136 West of proposed site
Lab B5	Bioaerosols and Hydrogen sulphide	N309990.084298 E232577.722031 North of proposed site
Lab B6	Bioaerosols and Hydrogen sulphide	N310068.332121 E232583.797172 North of proposed site

Bioaerosol sampling

A.9.1.7 Monitoring was performed in strict accordance with available information and advice including the sources:

1. Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting Facilities. (1999). The UK Composting Association.
2. Macher, J. (1999). Bioaerosol assessment and control. American Conference of Government Industrial Hygienists, Kemper Woods Centre, 1330 Kemper Meadow Drive, Cincinnati, OH.
3. Direct Laboratories, (formerly ADAS), Woodthorne, Wergs Road, Wolverhampton, WV6 8QT.
4. SKC Inc, 863 Valley View Road, Eighty-four, PA, 15330.

A.9.1.8 Impactor plate sampling was carried out in accordance with the document "Sampling Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting facilities, The Composting Association, UK.

A.9.1.9 Two sampling techniques were employed including:

- Biostage single stage 400 hole impactor (SKC Inc, PA) - This is directly equivalent to the Andersen N6 single stage impactor and meets the requirements of NIOSH 0800 and NIOSH 0801 biological sampling standards (i.e. this impactor is a direct copy of the Andersen N6 impactor with added benefits including the Surelok system which prevents any air leakages. This was an inherent problem of the Andersen N6 single stage impactor).
- Biosampler glass impinger (SKC Inc, PA) - This impinger resembles the all glass impinger (AGI 30) with added design features, which overcome some of the sampling problems encountered with the AGI 30. The Biosampler inlet design limits the collection of airborne particles to those that would be inhaled by the human nose. The sampler is normally operated with a liquid that swirls upwards on the sampler inner wall and removes collected particles minimising re-aerosolisation of collected particles. The Biosampler also reduces particle bounce off the inner wall helping to ensure bioaerosol viability. The Biosampler can be used over long sampling times with the use of a mineral oil (8 hrs).

A.9.1.10 Different sampling times were used throughout the study. Generally, sampling times of 5, 10, and 15 minutes were used to assess ambient background levels using the impactor plates as longer sampling times can lead to desiccation of the plate and impacted microbes.

A.9.1.11 The Biostage (i.e. Andersen N 6 equivalent impactor) was calibrated using a Bios Primary flow calibrator to a volumetric flow rate of 28.3 *litres* min^{-1} and Hi Flow 30 battery operated automatically timed pumps were used for suction airflow.

A.9.1.12 The Biosampler incorporates critical flow orifice, which regulate air flow to a volume of 12.5 litres min^{-1} once a vacuum of greater than 0.5 atmosphere is maintained (sonic flow). A Gast high vacuum pump (Vac U Sampler) was used to maintain this vacuum pressure. The Biosampler volumetric airflow rate was checked frequently using the Bios Primary flow calibrator. Suction dial regulators were fitted to each pump for easy and troubleshooting.

A.9.1.13 Both the Biostage and Biosampler were fixed to tripods ensuring an adjustable sampling height of between 0.40 to 1.9 metres. The sampling height was fixed at 1.5 metres. Two Biostage impactors and one Biosamplers impingers were used throughout the study period. The use of correctly designed sampling equipment ensured correct operation at all times throughout the study period.

A.9.1.14 Direct Laboratory Services Ltd, Woodthorne, Wergs Road, Wolverhampton, WV6 8TQ is UKAS accredited (Testing Laboratory No. 0680) to BS/EN/ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories. In accordance with their schedule of testing, Micro method 001 and Micro method 133 facilitate the accredited testing for Total viable counts (TVC), moulds and yeasts. The two medias include Ohio Agricultural Research Station media (OAES) for moulds and yeasts, and standard plate count agar (TVC) for total Mesophilic bacteria. OAES media facilitates the distinctive sporulation of Aspergillus *fumigatus*, which is used to identify the species. This medium was developed over 15 years ago and allows full development of the sporing heads of most fungal species and hence may be used for both enumeration and identification purposes.

A.9.1.15 Malt extract agar is recommended within the Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting Facilities for Aspergillus *fumigatus* sampling but OAES facilitates better sampling and maintenance of this microbe for counting so it was used to facilitate better more conservative results. Sterile fresh 90mm plates were supplied by the analysing laboratory in sealed coolers. Fresh plates were used to eliminate the formation of a skin upon the plate upper surface (i.e. develops with age). It was thought that this may cause problems while using an impaction method. Liquid samples were received in sterilised sealed 20 ml vials. Each vial contained a sterile peptide buffer saline solution.

Transport of bioaerosol samples

A.9.1.16 All sampling plates during monitoring were allowed to equilibrate to ambient temperature before sampling. This allowed for the development of less harsh conditions upon impacted bioaerosols. It was also noticed that cooled plates (approximately 5^0C formed a outer "skin" which could facilitate particle bounce. Following equilibration, it was apparent from observation, better "knitting" of impactor plates occurred. Before each sampling event, the Biostage impactors were sterilised using cotton wool and 70% Isopropanol. The impactors were autoclaved for complete sterilisation before sampling. Once sampled, all agar plates were inverted, sealed with parafilm, placed within a flexible plastic container, and neatly stacked within a mobile cooler for delivery to Direct Laboratories in the UK.

A.9.1.17 A flight was taken from Dublin to Birmingham, where the sample containers were collected by a laboratory representative. Once received, they were incubated at the appropriate temperatures of 30^0C for Total viable counts (i.e. Mesophilic bacteria) and 37^0C for Aspergillus *fumigatus* by the laboratory technician. Liquid samples were serial diluted and plates with the same media (i.e. OEAS and TBC). Results were received within 8 days following sampling.

Hydrogen sulphide sampling

A.9.1.18 Hydrogen sulphide (H_2S) is commonly associated with waste handling operations. It is used as an indicator gas for the assessment of significant odour nuisance in the vicinity of wastewater treatment plants, landfills and composting facilities. The World Health Organization (WHO) recommends that in order to avoid substantial complaints about odour annoyance among the exposed population, hydrogen sulphide concentrations should not be allowed to exceed 0.005 ppm (5 ppb; 7 μg m^{-3}), with a 30-minute averaging time. The OEHHA (2000) adopted a level of 8 ppb (10 μg m^{-3}) as the chronic Reference Exposure Level (cREL) for use in evaluating long-term emissions from hot spots facilities. The only instrument capable of providing comparison with such reference levels is a Jerome meter. This is a real time data-logging H_2S gold leaf analyser for the measurement of ambient hydrogen sulphide levels (Sheridan, 2003).

A.9.1.19 An ambient H_2S profile monitoring exercise was carried out in the vicinity of the proposed Civic Amenity site using a pre-calibrated Jerome 631 X H_2S gold leaf continuous analyser with data logging capabilities. Samples were taken approximately 1.0 meter above ground level. The Jerome meter is a real time analyser with a range of detection from 3 ppb to 50 ppm. The Jerome meter was allowed to sample continuously at each monitoring location Lab B1 to Lab B6. The average H_2S ambient air concentration was recorded every minute. Average H_2S concentrations were computed replicate samples at each location to allow for establishment of ambient H_2S levels in the vicinity of the proposed Civic Amenity site.

Odour monitoring by sniff assessment

A.9.1.20 Due to the fact that point source sampling and analysis via a laboratory-based olfactometer is not a realistic, sensitive or accurate methodology for the assessment of ambient odours, sniff assessment in accordance with GIRL and VDI guideline methodologies was use. One trained sniffer allocated odour intensity levels and odour characters/quality to the odour plumes detected. This is a proven method for many facilities and countries in Europe and it is highly publicised (Sheridan, 2001, 2002, 2004).

A.9.1.21 Since the function of sniff assessment is to ascertain nuisance and plume location no emissions were calculated. This qualitative and semi-quantitative survey tentatively determines the odour sources responsible for the perceived odour concentration. In this study, the direction from which the odour plume travels is reported.

A.9.1.22 The sniff squad recorded their location on a scaled map while they allocated odour intensities and frequencies to the tracked plume. This information was beneficial due to the fact that the industries/residents may become immune to the odour easily and therefore act as a qualitative methodology in ascertaining their responses. The n-butanol detection threshold of the sniff squad was measured and results were reported by means of highlighting upon the scale map illustrating plume location and arbitrary offensiveness levels for the study area (See Figure A.9.2).

Assessment criteria

A.9.1.23 Table A.9.2 illustrates the assessment criteria used for comparison of baseline monitoring results to ascertain ambient bioaerosol, H_2S and odour air quality in the vicinity of the proposed Civic Amenity site to be located in Labre Park, Ballyfermot, Dublin 12.

Table A.9.2: Assessment criteria for the ambient bioaerosol, H_2S and odour air quality in the vicinity of the proposed site

Assessment criteria	Reference concentration range	Notes	Reference
Total fungi (includes Aspergillus *fumigatus*)	1000 to 5,000 CFU m^{-3}	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003	McNeel et al., 1999 Wheeler et al., 2001, Swan et al., 2003
Mesophillic bacteria	5,000 to 10,000 CFU m^{-3}	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003	Gorny and Dutkiewicz (2002) Wheeler et al., 2001 Swan et al., 2003 Dutch Occupational Health Association NWA 1989.
Hydrogen sulphide (H_2S)	5.0 to 8.0 ppb	WHO Guideline value and Southern Californian Air Quality Management concentration level	Sheridan, 2003
Odour	Qualitative assessment of the presence of odour plumes assessed in accordance with adapted VDI and GIRL guidelines- VDI 3940	Assessed as sniff odour units - used in this study to determine the presence/non-presence of odours within the site boundary.	Sheridan 2003 Van Langenhove, H., van Broeck, G., (2001)

Notes: CFU m^{-3} = Colony Forming Unit per cubic metre of air sampled

Results

A.9.1.24 Tables A.9.3, A.9.4 and A.9.5 illustrate the monitoring results obtained during the monitoring period. All results presented are standard measurement units for the respective monitored parameter.

Ambient Bioaerosol air quality

A.9.1.25 Table 9.3 illustrates the results from baseline bioaerosol air quality monitoring. Both background Aspergillus *fumigatus* and mesophillic bacteria were assessed. Background bioaerosols could be high due to the location of the canal, the presence of high power lines and due to the fact that the proposed site is located in a highly industrialised area. The presence of electrostatic radiation may charge particles and may cause the pre-concentration of particles in the vicinity of the high power lines. These particles carry attached microbes, which become airborne and therefore become bioaerosols. Highly industrial areas usually have a higher incidence of heavy goods vehicles and cars (from workers), which increase the airborne concentration of dust due to tyre tracking. This dust can become a direct carrier of microbes.

Table A.9.3: Background bioaerosols concentration levels within and in the vicinity of the proposed Civic Amenity site

Location ID	Average Aspergillus fumigatus concentration (CFU m^{-3})	Average Mesophillic bacteria concentration (CFU m^{-3})	Sample count
Lab B1	7	256	6
Lab B2	5.5	65	6
Lab B3	604	2317	10
Lab B4	5.5	51	4
Lab B5	7	35	2
Lab B6	4	25	4

Ambient Hydrogen sulphide air quality

A.9.1.26 Various odour detection thresholds as determined by various researchers are presented in Table A.9.4. The H_2S monitoring results from Monitoring locations Lab B1 to Lab B6 on-site 10th December 8.00am to 10.45am using a real time Jerome analyser are presented in Table 9.5. Computation between both tables allows for the determination of H_2S contributed odour concentration on-site and in the vicinity of the site due to the presence of any odour sources. It also allows for the assessment of H_2S ambient concentration levels in accordance with the assessment criteria presented in Table A.9.2.

Table A.9.4: Various odour detection thresholds for H_2S based on library data

H_2S odour detection threshold (ppb)	H_2S odour detection threshold (µg m^{-3})	References
0.515	0.77	Valentine (1981)
0.510	0.76	Steward (1998)
0.670	1.00	Sheridan, 1998
0.135	0.20	Sheridan, 2001
1.34	2.00	Sheridan, 2000

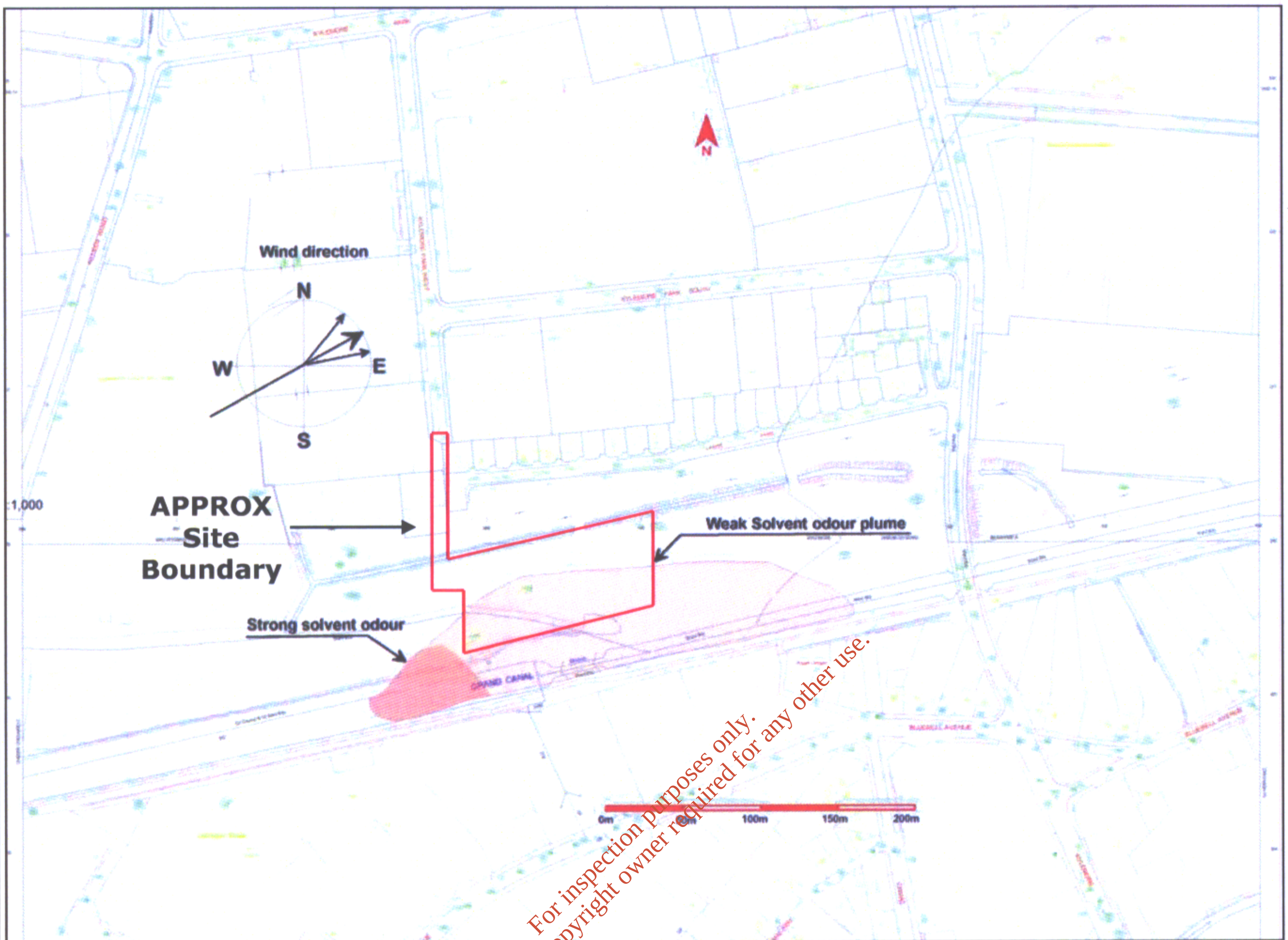
Table A.9.5: Equivalent odour concentration contribution of H_2S monitoring location

Location identity[1]	Minimum/Maximum Odour detection threshold [ppb]	H_2S [ppb]	Odour concentration range in ambient air ($Ou_E\ m^{-3}$)
Monitoring location Lab B1	0.135 to 1.35	3	2.22 to 22.22
Monitoring location Lab B2	0.135 to 1.35	2	1.48 to 14.81
Monitoring location Lab B3	0.135 to 1.35	2	1.48 to 14.81
Monitoring location Lab B4	0.135 to 1.35	3	2.22 to 22.22
Monitoring location Lab B5	0.135 to 1.35	3	2.22 to 22.22
Monitoring location Lab B6	0.135 to 1.35	4	2.96 to 29.63

Ambient odour air quality

A.9.1.27 Figure A.9.2 illustrates the results obtained during the study. These results are illustrated graphically for ease of presentation of results. Odour plume spread outline and strength is illustrated as light and dark red colour superimposed upon a base map of the area.

Figure A.9.2: Current baseline odour plume spread



date
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project
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client
Dublin City Council

Discussion of results

A.9.1.28 The following section discusses in detail the results obtained during the background monitoring survey. Each individual aspect of the background survey is discussed separately.

Ambient Bioaerosol air quality

A.9.1.29 Table A.9.3 illustrates the ambient bioaerosol air quality within and in the vicinity of the proposed Civic Amenity site. As can be observed, Aspergillus *fumigatus* concentrations are low and at ambient concentration levels except for monitoring location Lab B3. Total mesophillic bacteria concentration levels are also at general ambient levels except for location Lab B3. This may be due to the location of the sampling devices next to the weir overflow of the canal water stream, which created turbulent conditions around the lock gate. This turbulence may facilitate the injection of bioaerosols into the wind field, which carried the bioaerosols downwind to the volumetric sampling devices.

A.9.1.30 Following a review of literature, it is reported that concentration levels of bioaerosols in ambient environment range from 0 to 15,673 CFU m^{-3} for Total fungi and 79 to 3204 CFU m^{-3} for Total bacteria. The dataset measured is within the lower end of this range. Background monitoring of bioaerosols is important due to the complexities in monitoring. The main reasons for background monitoring include:

- Microbes are ubiquitous in the environment and air or surface samples will almost always contain some bacteria or fungi.
- Microbes grow and are released at irregular intervals and depend on some sort of air turbulence to be transported from their original source.
- Bioaerosols vary greatly in size and therefore some remain in ambient air for longer periods of time in comparison to smaller, lighter bioaerosols that fall quickly to the ground. This is explained with Stokes law.
- Meteorological factors such as relative humidity, temperature and wind speed greatly effect ambient air concentrations.
- Due to the variety of size and sensitivity, the sampling methodology will greatly affect the measured concentration.

A.9.1.31 In accordance with the assessment criteria reported in Table A.9.1, bioaerosol concentrations levels are within the lower end of this range and no bioaerosol impact exists with the current site.

Ambient Hydrogen sulphide air quality

A.9.1.32 Table A.9.5 illustrates ambient monitoring results for H_2S. As can be observed, ambient H_2S concentrations are below the recommended WHO guideline values (5ppb; 7ug m^{-3}) at all monitoring locations (Lab B1 to Lab B6). A range of odour detection thresholds has been calculated for H_2S (see Table 9.5). As a range exists, the minimum and maximum formulated odour detection threshold is used to calculate the contributory factor in Ou_E m^{-3}. As can be observed, a range from 1.48 to 29.63 Ou_E m^{-3} existed as H_2S odour at all monitoring locations. It is therefore concluded that detected ambient H_2S concentration levels are not significant in accordance with the assessment criteria (see Table 9.2).

Ambient odour air quality

A.9.1.33 One trained sniffer wearing a carbon mask performed a sniff odour assessment in the vicinity of the proposed Civic Amenity site namely along the canal and within and around the boundaries of the proposed site (see Figure A.9.2). The survey was performed in accordance with VDI 3940 and adapted methodology suggested by Van Langenhove et al., 2001. Forty-two individual readings/assessments were performed.

A.9.1.34 During the sniff assessment only one distinct odour character/quality was noted namely a solvent odour (see Figure A.9.2). As the sniff assessor travelled east to west the solvent odour became more distinct and was clearly from a spray booth application. Residents living in the vicinity of this odour could record complaints on days that do not facilitate good mixing and dispersion. Generally, solvent-based odours require high emission concentration levels in order to generate complaints due to their high detection threshold. Weather conditions on the day of monitoring were low breeze (2 to 5 m s^{-1}), wind direction west south-westerly and partial cloud cover.

10.0 CLIMATE

10.1 Introduction

10.1.1 Aspects of climate have been reviewed as part of the Environmental Impact Assessment requirements. The climate at the proposed Labre Park site is anticipated to be typical of that experienced on the east coast of Ireland. Climatic data to represent that of Labre Park area was acquired from the weather station at Dublin Airport. The weather conditions investigated were:

- Precipitation
- Temperatures
- Wind force and direction

10.2 Existing Climate

Precipitation

10.2.1 Table 10.1 illustrates the average precipitation recorded from the weather station at Dublin Airport over a 30-year period 1961 – 1990. The average rainfall in the Dublin region is usually less than 800 mm per annum.

Table 10.1: Monthly and Annual rainfall 1961-1990

RAINFALL (mm)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**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 10.2: Monthly rainfall Jan – Nov 2004

RAINFALL ***(mm)***	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Jan - Nov**
Mean monthly total	77.2	19.9	40.3	31.8	49.9	50.6	38.1	133.9	46.8	124.4	39.9	**652.8**
Greatest daily total	15.3	7.4	9.1	5.1	10.4	22.3	7.1	32.8	12.5	14.7	16.7	**32.8**
No. of days with >= 0.2mm	18	8	16	18	10	14	17	19	17	21	13	**171**
No. of days with >= 1.0mm	12	6	11	10	7	10	11	13	10	16	5	**111**
No. of days with >= 5.0mm	4	1	2	1	4	1	2	7	2	8	2	**34**

10.2.2 The mean average rainfall at Dublin Airport over the thirty year period from 1961 to 1990 is recorded by Met Eireann as being 732.7 mm. In the year to date (January to November 2004) the annual mean rainfall level has been recorded as 652.8 mm, these figures are given in Tables 10.1 and 10.2 above. The rainfall data from Dublin Airport illustrates that the level of precipitation recorded at Dublin Airport between January and November 2004 is comparable to historic data recorded over the 30-year period 1961 – 1990.

Temperature

10.2.3 Historical data from Dublin Airport on the mean and extreme temperatures experienced between 1961 and 1990 are presented in Table 10.3. The mean temperatures at Dublin Airport in 2004 are presented in Table 10.4 and are closely comparable to historical records.

Table 10.3: Monthly and Annual mean and extreme temperatures 1961-1990

TEMPERATURE (degrees Celsius)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**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	10.5	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**

Table 10.4: Monthly and Annual mean and extreme temperatures 2004

TEMPERATURE (degrees Celsius)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Jan - Nov
Mean daily max.	8.4	8.8	10.5	12.8	15.6	19.1	18.7	19.7	17.2	12.6	10.6	**14**
Mean daily min.	2.5	1.0	2.4	4.6	5.9	9.8	10.2	11.4	10.1	6.0	5.3	**6.3**
Mean	5.5	4.9	6.5	8.7	10.8	14.5	14.5	15.5	13.7	9.3	8.0	**10.2**
Absolute max.	12.8	14.8	16.6	18.1	21.3	24.3	21.8	24.2	23.7	16	13.4	**24.3**
Absolute min.	-4.5	-6.4	-5.3	-0.4	1.5	4.6	4.6	5.8	4.9	1.5	-1.0	**-6.4**

10.2.4 The annual mean temperatures at Dublin Airport over the thirty year period from 1961 to 1990 is recorded by Met Eireann as being 9.6°C with the mean daily minimum temperature recorded as 6.4°C and the mean daily maximum temperature recorded as 12.8°C. In the year to date (January to November 2004) the annual mean temperature has been recorded as 10.2°C with the mean minimum and maximum temperatures being 6.3°C and 14°C respectively. The temperature data from Dublin Airport illustrates that data recorded at Dublin Airport between January and November 2004 is comparable to historic data recorded over the 30-year period 1961 – 1990.

Wind Speed & Direction

10.2.5 A wind speed at ground level in excess of about 5 m/s is considered to be the threshold above which re-suspension of fine sized material from an exposed surface may take place.

10.2.6 The impacts of other aspects of the development on Human Beings such as traffic, noise, odour, air quality and visual / landscape are dealt with separately in Sections 5, 6, 9 and 11 of this report.

10.2.7 Historical wind speed data as obtained from Dublin Airport from the period 1961 – 1990 is presented in Table 10.5 below. This is compared with the mean monthly wind speed data for January to November 2004, which is presented in Table 10.6. The monthly wind speed data obtained for the 2004 period is closely comparable to historical records.

Table 10.5: Monthly and Extreme Wind Speeds 1961-1990

WIND (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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**

Table 10.6: Monthly and Extreme Wind Speeds from Jan – Nov 2004

WIND (knots)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Jan-Nov
Monthly speed	12.12	10.85	11.74	10.90	8.96	11.96	10.15	9.63	13.23	11.70	10.72	**11.09**
Max. gust	48	51	61	48	35	46	34	36	45	45	36	**61**

10.2.8 The average monthly wind speed at Dublin Airport over the thirty-year period from 1961 to 1990 is recorded by Met Eireann as being 9.9 knots with a maximum gust of 75 knots recorded for the area. In the year to date (January to November 2004) the monthly mean wind speed has been recorded as 11.09 knots with a maximum gust of up to 61 knots recorded in March 2004. The windspeed data from Dublin Airport illustrates that data recorded at Dublin Airport between January and November 2004 is comparable to historic data recorded over the 30-year period 1961 – 1990.

10.2.9 According to Met Eireann the prevailing wind is from a southwest direction and this is outlined in Figure 10.1.

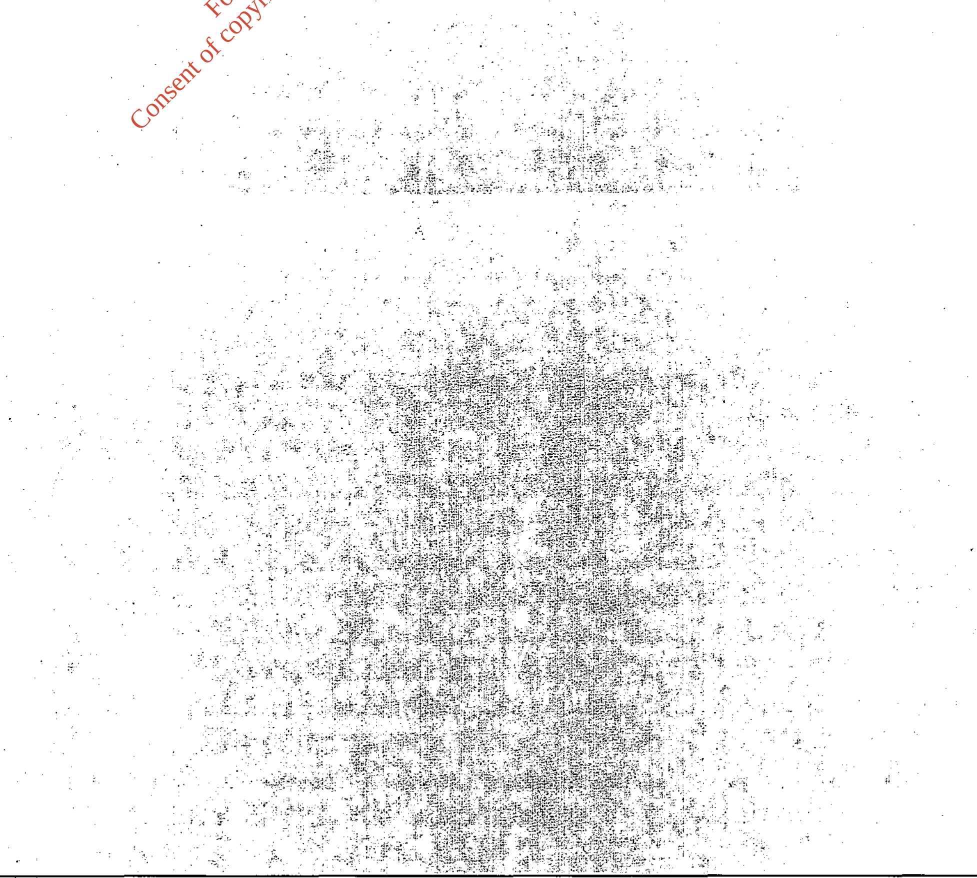
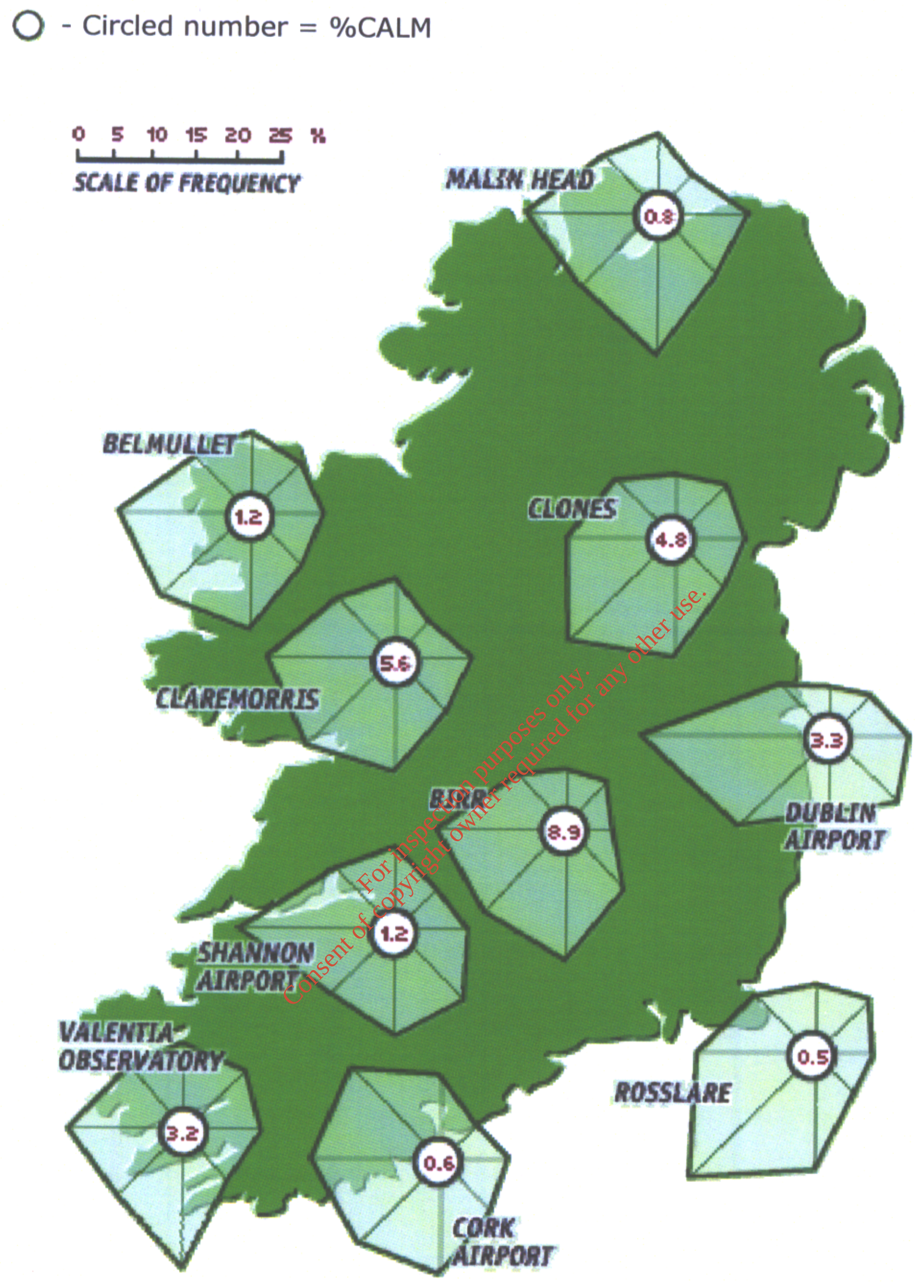


Figure 10.1 – Wind Direction (percentage frequency of wind direction)



date	project	client
Jan 2005	Labre Park EIS	Dublin City Council

10.3 Characteristics of the Proposal

10.3.1 The proposed development is for the construction of a Civic Amenity Facility on a derelict green area (11,053m^2) to the south of Labre Park, Ballyfermot, Dublin 12. The site is currently an area of waste ground.

10.3.2 The construction of the new site will involve the limited removal of topsoil and the construction of new hardstanding site surface with associated fill and site drainage. The development will also involve the construction of two site offices and the installation of two weighbridges.

Site Operation

10.3.3 During operation of the facility the site will be divided into separate areas, which will be used for varying waste management operations, these are:

- Civic Amenity Area – This area will be accessed by members of the public to dispose of recyclables and bulky household wastes. There will also be access to a separate green waste collection area from the civic amenity section of the site.
- Dublin City Council Depot Area – This area will be used by DCC vehicles for the disposal of wastes collected from road sweeping and litter bins in the area to a compactor unit before being taken off site for disposal.
- Waste electrical and electronic equipment Storage Area - The area will be used for the bulk storage of WEEE
- Construction/Demolition Area – for the deposit of construction/demolition waste materials.

10.4 Potential Impacts of the Proposal

10.4.1 It is not expected that the site will have any significant impact on the microclimate and local climate of the area.

10.5 Mitigation Measures

10.5.1 The proposed development is not expected to affect the local climate or microclimate of the area; therefore no mitigation measures are required in this respect.

10.6 Predicted Impacts of the Proposal

10.6.1 The proposed development will not negatively impact the local microclimate or the long-term patterns of weather in the Dublin area, therefore no significant impacts are anticipated.

10.7 Monitoring

10.7.1 Monitoring of climatic data will not be required at this site.

10.8 Reinstatement

10.8.1 Reinstatement will not be required.