SECTION 3

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.1 HUMAN BEINGS

3.1.1 Introduction

Human beings are one of the most important elements of the 'environment' to be considered. One of the principal concerns in the execution of a development is that the local population experiences no significant diminution in the quality of life as a result of the development on either a temporary or permanent basis. All the effects of a development on the environment may impinge upon human beings. Any significant impact on the status of humans that may be potentially caused by a development proposal must, therefore, be comprehensively addressed. Air quality, water quality, noise and landscape impact directly while flora, fauna and road traffic impact indirectly.

3.1.2 Existing Environment

The proposed development site is located within an existing industrial estate, located in south west Dublin city. The nearest private dwellings to the site are located approximately 180m from the site, though due to the numerous other industrial premises located between the residential dwellings and the proposed development site, the site is not visible from the residential houses.

3.1.2 Impacts on Human Beings

(1) Noise

Noise is an identified form of air pollution and uncontrolled it can cause nuisance or a deterioration of amenities and the quality of human life. The potential impact of the waste recycling and processing facility on noise levels within the area is described in Section 3.7: Noise. In summary, it is concluded that the noise levels from on-site activities will not significantly increase ambient noise levels. Specifically, it is concluded that noise levels at the nearest sensitive location (occupied residential premises) will not significantly deviate from the current background daytime noise levels.

Baseline noise measurements are included in Section 3.7. Due to the existing background noise levels existing at the site, from the surrounding road network and industrial units, it is contended that the proposed development will not impact on the surrounding environment. There are no noise sensitive locations (NSL), as defined in typical waste licences i.e. residential housing, schools, hospitals etc, within approximately 180m of the proposed facility. Any NSL would be impacted by closer and larger industrial activities to it than by the proposed development. Therefore the impact of the proposed development on the ambient noise level would be negligible.

(2) Traffic

A desk based traffic impact assessment was conducted in order to assess the potential impacts of additional traffic movements generated during operation of the waste recycling and processing facility (refer to Section 3.8: Traffic). The proposed facility will initially result in approximately seventy six additional traffic movements (two way) per day, which will increase to approximately one hundred and eighty movements (two way) at capacity.

Traffic impact assessment results indicate that the waste recycling and processing facility will not have a detrimental impact on the road network within the industrial estate.

(3) Human Health

A variety of air pollutants have known or suspected harmful effects on human health and the environment. In many similar developments these pollutants are principally the products of combustion from power generation or from motor vehicle traffic. The primary potential air pollutants derived from the proposed development are detailed in Section 3.6.

Traffic derived primary pollutants include the following species; sulphur dioxide (SO_2), particulate matter, lead, oxides of nitrogen (NO_x), carbon monoxide (CO) and volatile organic compounds (VOCs).

The objective of air pollution control is to prevent adverse responses by all receptor categories (human, animal, plant) exposed to the atmosphere. The adverse responses have characteristic response times – short-term (seconds or minutes), intermediate-term (hours or days) and long-term (months or years). Pollutants such as nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and carbon monoxide (CO) can have potential health impacts. NO_2 is a respiratory irritant, which may exacerbate asthma and possibly increase susceptibility to infections. CO reduces the capacity of the blood to carry oxygen around the body at levels >9.9 mg/m^3 (8 hour average) and this may increase the risk of problems in those with angina and disease of the coronary arteries. At high levels, SO_2 is a strong irritant to the eyes and mucous membranes, producing narrowing of the airways and stimulating coughing. While the effects are generally transient and easily reversible in healthy people, the consequences can be more serious for people who suffer from weakened cardio-respiratory systems.

The future contribution of sulphur dioxide and the oxides of nitrogen associated with the increased traffic movements due to the proposed development will be within the recommended limit values at the nearest sensitive receptor and it is unlikely that they will have adverse human impacts at that point. Predicted levels of VOC's, PM_{10}, and Carbon monoxide are also within the recommended limit values (See Section 3.6: Air). Predicted concentration levels indicate that air pollutants will increase marginally due to traffic movements from the proposed development.

However, any such increase is not considered significant and will be well within relevant ambient Air Quality Standards.

(4) Site Structure / Land Use

Any potential impacts of the proposed activities of the waste recycling and processing facility on the existing structural and land usage of the area are not considered significant. Land usage in the vicinity of the development site is predominately low lying land in an urban industrialised setting. The landscape of the area will remain largely unchanged with the existing topographic features. Therefore the change in land usage within the site is not considered a significant impact and is not regarded as important to the area as a whole.

The layout of the site has been designed and will be operated in such a way as to inflict minimum visual intrusion outside the boundary of the site. All developments will take place within the conditions of the planning permission granted by South Dublin County Council.

Following cessation of the waste recycling and processing facility, site restoration will commence in line with an aftercare management plan specific to the site. Therefore any potential impacts of the waste recycling and processing facility on the existing structural and land usage of the area are considered insignificant.

(5) Socio-Economic

The development will have, although limited, varied social and economic effects. These effects may be categorised as follows:

Primary Socio-Economic Effects.

These effects are directly related to the waste recycling and processing facility itself such as changes in local population/job creation. The job creation benefits are secondary to the development, as it is the service provided by the development that will benefit the local and regional community. The function of the Oxigen Environmental Ltd. recycling and processing facility will develop such that the maximum recycling/recovery potential of all waste accepted will be assessed. The categories of waste deemed suitable for segregation and subsequent recycling is dependent on available markets for such materials. The benefits of this activity are obvious with regard to the volume of waste that is directed to landfill.

It is considered likely that the proposed development will have minimal impacts on the existing population structure of the area.

Secondary Socio-Economic Effects.

These include those effects, which arise as a result of services required (e.g. Water Supply, etc.) by the operation of a facility.

Electricity Supply

Electricity demands exerted by the facility will be negligible, with use restricted to administration, and plant usage.

Water Usage

It is anticipated that the normal daily water requirement for the site will be minimal, and will be sourced from the council mains. Process water will be restricted to use by the timber shredder and rotary atomisers on site, therefore, processing related water demands will be low.

Telecommunications

The telecommunications requirement of the facility should not place the current telecommunications network under stress.

Foul Sewage System

It is anticipated that there will be no additional stress placed on the local foul water sewer network.

(6) Environmental Nuisances

As with any facility that deals with waste, some environmental nuisances can occur within the site, and within the environs. Due to the distance between the nearest residence and the waste recycling and processing facility (approximately 200 m), the impact from nuisances is deemed minimal. However some specific measures have been adopted to combat the effect of these nuisances which are detailed below.

Aerosol control

Liquid wastes in the form of road gulley sludges will be accepted on site, and will be stored in specially designed holding tanks on site. These wastewaters shall consist primarily of rainwater, and will be treated (i.e. filtered) on site prior to disposal to the on-site sewer system and it therefore contended that the aerosol generation will be minimal.

Bird control

Waste handling procedures on site will be such that waste is exposed only within the recycling building and all stored waste is stored within sealed containers and therefore not a source of food for scavenging birds. As a result bird control measures are not deemed necessary.

Dust control

Waste handling operations on the site ensure that all tipping of waste occurs within the operational building, and therefore on-site dust generation is restricted to the movement of traffic on site, which is considered to be minimal.

Fire control

Prior to commencement of operation a fire audit of the site will be undertaken to determine the fire extinguishing media requirements of the site. The recommendations of this report shall be implemented within the site. In addition to these recommendations there will be two fire extinguishers located at each door of the waste buildings, namely a powder and foam. All staff on site will be trained in fire prevention, fighting and evacuation procedures. The amount of waste stored on site will be kept to a minimum and will be stored in closed/sealed containers. Firewalls will be constructed within all processing buildings on site.

Litter control

Waste handling procedures that will be implemented at the site, the proposed storage practices to be employed, and the proposed practice of sorting of waste within the building only, will ensure that waste is never left in the open air uncovered, and as such the potential for litter escape will be minimal. A daily litter patrol of the site perimeter and access road will be undertaken, where any wind blown litter will be removed and returned to site.

Odour control

Due to the waste handling procedures, the storage of waste in sealed/covered containers and the sorting of the waste within a building it is anticipated that the potential impact of odour on the nearest residence will be negligible.

Roads control

Access to the facility is via the internal industrial estate road network. The potential impact of the facility on the roads will be through the generation of mud and dust. The access road shall be routinely inspected by site personnel, and will be washed down should the need arise. This will minimise the impact of the facility on the local road network.

Traffic control

The site is finished with a hard standing area, which is sufficient to deal with the traffic volumes expected at the facility. The access road is of good quality and state of repair. It is anticipated that there will be approximately 180 traffic movements a day. It is anticipated that the waste recycling and processing facility will not have an additional impact on the local community.

Vermin control

Pest control measures that will be undertaken at the facility include the setting of poison by an independent specialist pest control company throughout the site. Fly nuisance is minimised by the rapid removal of degradable waste off-site, the washing of the floor within the building with disinfectant and the covering of all stored waste on site

3.2 FLORA & FAUNA

3.2.1 Introduction

This section assesses the potential impacts of the proposed waste recycling and processing facility on the habitats of flora and fauna. This approach and methodology of the survey was undertaken in accordance with the EPA Guidelines on the Information to be contained in Environmental Impact Statements (2002).

The habitats present are described in their current status and an evaluation of the conservation value is also given. Vegetation and faunal surveys were undertaken in order to establish if any sensitive or protected species were present; and to determine the potential impacts on adjoining lands and/or any designated lands located adjacent to the proposed development.

In compiling this chapter, due regard was given to relevant legislation pertaining to flora and fauna assessment. This included :

- Wildlife Act, 1976,
- EC Council Directive on the Conservation of wild birds (Birds Directive - 1979)
- European Communities (Conservation of Wild Birds) Regulations, 1985 to 1999
- EC Council Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (Habitats Directive - 1992)
- European Communities (Natural Habitats) Regulations, 1997
- Wildlife (Amendment) Act, 2000.
- And relevant protection Orders.

3.2.2 Description of the Receiving Environment

The site for the proposed waste recycling and processing facility is located within an industrialised area, namely Ballymount Industrial Estate, which is located approximately 0.5 km off the M50, south east of the Red Cow Roundabout. There are no landscaped or green belt areas adjacent to the site, with the site surrounded by industrial/commercial units.

The site covers an area of approximately eighteen acres, with the terrain for the most part flat leading to large mounds on the south west and south east boundaries. The site is accessed from the Ballymount Road Lower and the Turnpike Road, with two industrial estate access roads leading to the site entrance.

The soils beneath the site is disturbed and consists of light brown, firm poorly sorted glacial tills with limestone boulders. The bedrock geology is identified as Calp Limestones of Lower Carboniferous period.

Surface water run-off from the site drains to the on site surface water drainage network, that discharges into the Ballymount stream, which flows in the County Council underground surface water network adjacent to the site. The Ballymount stream discharges into the Camac River, which has been designated a salmonid river.

The site of the proposed waste recycling and processing facility was previously owned by Corus Steel Ltd (formerly Steel Company of Ireland) and was operated as a steel works, which has been operated as such since 1945, subsequent to which it was used for agricultural purposes..

3.2.3 Study Methodology

An ecological survey of the proposed waste recycling and processing facility and its environs was undertaken to in order to:

- Determine the existing ecology and diversity of the site;
- Establish the presence or absence of important species or habitats.

A baseline survey was undertaken by Bord na Móna Technical Services on 27th May 2004.

Consultation was undertaken with statutory (National Parks and Wildlife Service, Eastern Regional Fisheries Board) bodies, in order to collate all recorded data for the site and its environs. This included the assimilation of information on nearby designated wildlife sites, watercourses and protected species.

All major habitat types occurring on the site were mapped and classified according to dominant species. Belt transects (n=10) measuring ca. 10m length were taken to represent each habitat type recorded and species were recorded in order to collect adequate floristic information for habitat descriptions. Plant cover was subjectively assessed using the DAFOR (Dominant, Abundant, Frequent, Occasional, Rare) scale (Kershaw, 1966). It should be noted that this assessment of occurrence relates to the site itself, and does not reflect the status of the species in a national context. Nomenclature followed Webb (1996) for higher plants, and Hubbard (1984) for the identification of grasses.

3.2.4 Flora and Fauna Habitats

Flora:

The main habitats occurring within the site area are detailed below, with their classifications (according to the Heritage Council) in parentheses.

(i) Managed grassland (GA2)
(ii) Earth banks (BL2)
(iii) Rough ground (ED3)

Of these, the most dominant habitat type was the managed grassland, which is located at all four boundaries of the facility.

(i) Managed grassland

This is the most dominant habitat located within site, with the dominant grass species present including cocksfoot (*Dactylis glomerata*), false oat grass (*Arrhenatherum elatius*), Yorkshire fog (*Holcus lanatus*), red fescue (*Festuca rubra*) and meadow grass (*Poa* spp.). Broadleaf herb species present include germander speedwell (*Veronica chamaedrys*), buttercup (*Ranunculus repens*), dandelion (*Taraxacum* spp), daisy (*Bellis perennis*), common fumitory (*Fumaria officinalis*), red clover (*Trifolium pratense*), ribwort plantain (*Plantago lanceolata*), common birdfoot trefoil (*Lotus corniculatus*), common watercress (*Rorippa nasturtium-aquaticum*) and black medick (*Medicago lupul*).

Plate 3.2/1: Managed grassland

(ii) Earth Banks;

To the south west and south east of the facility there are two earth banks which provide visual screens to the two main roads adjacent to the facility, namely Turnpike Road and Ballymount Road Lower. These mounds were artificially constructed by the previous owners of the facility. These mounds were allowed to colonise naturally and therefore contain many of the species that are present within the managed grassland. Other species present include hogweed (*Heracleum sphondylium*), curled dock (*Rumex crispus*), sweet cicely (*Myrrhis odorata*), common vetch (*Vicia sativa*), and hedge bindweed (*Calystegia sepium*) was observed within the large areas of bramble (*Rubus fructicosus* spp.) that were present within the mound. Dispersed trees are located on the mounds and these include species of ash (*Fraxinus excelsior*), and sycamore (*Acer pseudoplatanus*).

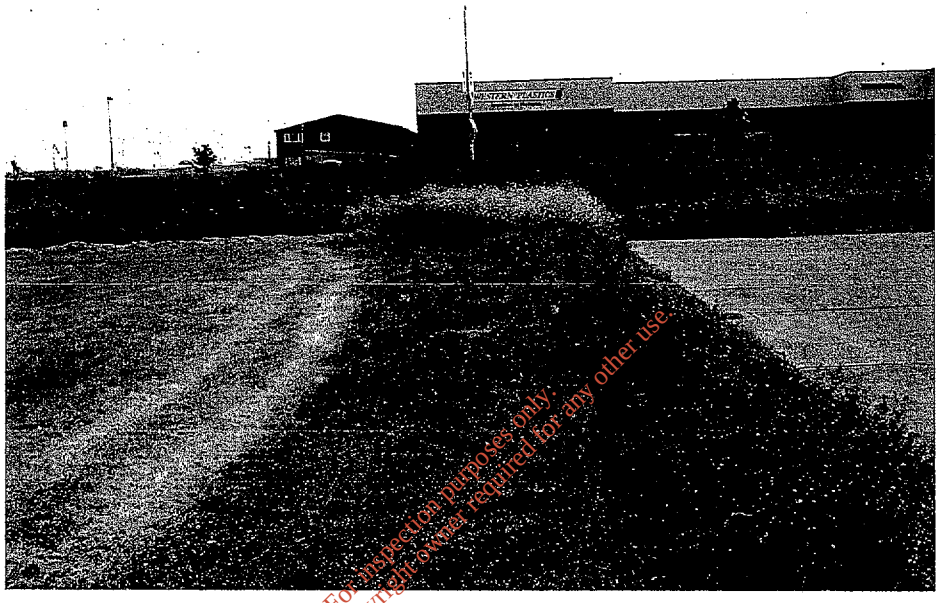
Plate 3.2/2: Earth Banks

(ii) Bare ground;

This habitat is dominated by broadleaf herbs such as dandelion (*Taraxacum* spp.), daisy (*Bellis perennis*), poppy (*Papaver rhoeas*), buttercup (*Ranunculus repens*), common watercress (*Rorippa nasturtium-aquaticum*), wood forget me not (*Myosotis sylvatica*), sticky mouse ear (*Cerastium glomeratum*), common fumitory *(Fumaria officinalis*), green hellebore (*Helleborus viridis*), and shepherds purse (*Capsella bursa-pastoris*).

Weed species that were present include groundsel (*Senecio vulgaris*), common nettle (*Urtica dioica*), bramble (*Rubus fructicosus* spp.), thistle (*Cirsium vulgare*), and purple dead nettle (*Lamium purpureum*).

Plate 3.2/3: Bare ground



Fauna

A large number of Irish land mammals are nocturnal and therefore activity on site during a survey can be quite low making identification difficult. However, during this survey observation of track and any other visible signs were recorded. Due to the species-poor habitats at the site as a result of the industrialized nature of the area, and the lack of any suitable adjacent green belt or landscaped areas it is believed that the number of mammals that would be present on site would be low. One mammal that is frequent on the site is the rabbit *(Oryctolagus cuniculus)*, however sightings of this mammal were limited and, as there were no warrens identified on site, it is probable that this species was a visitor to the site. There were no badger (*Meles meles*) setts or likely roosts for bats located on site.

Even though there was no evidence recorded during the survey, there are some habitats present that would be ideal for many mammals including the field mouse *(Apodemus sylvatica)*, brown rat *(Rattus nor)* and fox *(Vulpes vulpes)*.

Bird fauna, spotted or heard in the vicinity during the survey, included common scavenger species such as hooded crow (*Corvus corone)*, magpie (*Pica pica*) and rook (*Corvus frugilegus*). Other species observed during the survey included the great tit (*Porus major*), pied wagtail

(*Motacilla alba*), blackcap (*Sylvia atricapilla*), wren (*Troglodytes troglodytes*), robin (*Erithacus rubecula*), dunnock (*Prunella modularis*), siskin (*Carduelis spinus*), meadow pipit (*Anthus pratensis*) and blackbird (*Turdus merula*).

3.2.5 Conservation Value and Designated Areas

Nature conservation within the Republic of Ireland

Nature conservation in the Republic of Ireland is governed by the Wildlife Act 1976 and the Wildlife (Amendment) Act 2000. The basic national designation for wildlife is the Natural Heritage Area (NHA), which has been in force in Ireland since the initial designation in 1995. However it was not until the enactment of the Wildlife (Amendment) Act, 2000 that NHAs were legally protected from damage. There are approx. 1200 proposed NHAs in Ireland, to which the process of formal designation commenced in 2002.

Nature conservation within European Community

Two major pieces of European legislation on nature conservation and the designation of sites have been adopted by all member states. This legislation is EC Council Directive on the conservation of wild birds, 1979 (Birds Directive), and the EC Council Directive on the Conservation of Natural Habitats of Wild Fauna and Flora, 1992 (Habitats Directive).

Under the Birds Directive, Ireland is obliged to protect the habitats of birds, which are vulnerable to habitat change or to low population numbers. Aspects of habitat protection include pollution, deterioration of habitat and disturbance, with identified habitats designated as Special Protection Areas (SPA). Under the Habitats Directive habitats that have either international or community interest are given legal protection. This directive seeks to establish 'Natura 2000', a network of protected areas throughout the European Community, through the designation of areas as Special Areas of Conservation (SACs).

Designated sites within 10km of proposed development site

Natural Heritage Areas:

There are no Natural Heritage Areas within 10 km of the proposed development site

Special Protection Areas:

There are no SPAs within the vicinity of the proposed development site.

Special Areas of Conservation:

There are no SACs within the vicinity of the proposed development site.

Conservation value of existing site

The habitats encountered on the site are widespread and very typical throughout the Irish countryside and as none of the habitats recorded are of high conservation value the overall impact of the proposed development on habitats will be negligible.

3.2.6 Potential Impacts of the Proposed Development

It is proposed to remove much of the managed grasslands and convert into hardstand.

3.2.7 Proposed Mitigation Measure

As this habitat is common throughout Ireland, and does not have a conservation value it is deemed that the impact of removing this habitat will be negligible and therefore there are no mitigation measures planned.

3.3 SOIL & GEOLOGY

3.3.1 Introduction

This section examines the type of soils and geology underlying the site. It also addresses the impact of the proposed development on soils and geology.

3.3.2 Study Assessment and Methodology

There were no intrusive ground investigations undertaken as part of this study. The site is predominantly covered by impervious hardstand with green areas along the margin of the site. The site is located within an industrial business park area, and was used for steel stockholding. Prior to this the area was used for agricultural purposes.

Desk-based information on the substrata underlying the proposed development site was obtained through the Geological Survey of Ireland (GSI) and from information held on files within Bord na Móna Environmental Consultancy Services.

3.3.3 Description of the Receiving Environment

Soils

The site is located within an industrial area and as such it is likely that the upper soil horizons beneath the site were altered during construction works.

Quaternary Geology

Quaternary sediments underlying the site are glacial in nature and originate from the Midlandian glaciation. This geological period spans from about 14,000 to 10,000 years before present (BP)). These sediments are referred to as the Dublin Till. They consist of firm to stiff sandy gravely clays with clast (varying in size from cobbles to boulders) present.

Well cards from the Clondalkin region records a depth to bedrock of between 3 & 16 m below ground level (bgl). Depth to bedrock is thought to lie at ca. 4-6 metres beneath the site.

Bedrock Geology

Published Geological data of the study area identify the bedrock geology as the Calp Limestones of Lower Carboniferous period. This formation is Chadian to Brigantian in age and was formed in the deep waters of the Dublin basin as turbidity deposits. The formation consists of dark grey, fine grained, graded limestones with interbedded black,

poorly fossiliferous shales. The Clondalkin Formation, within the immediate vicinity of the site, is karistified and dolomitised in certain areas.

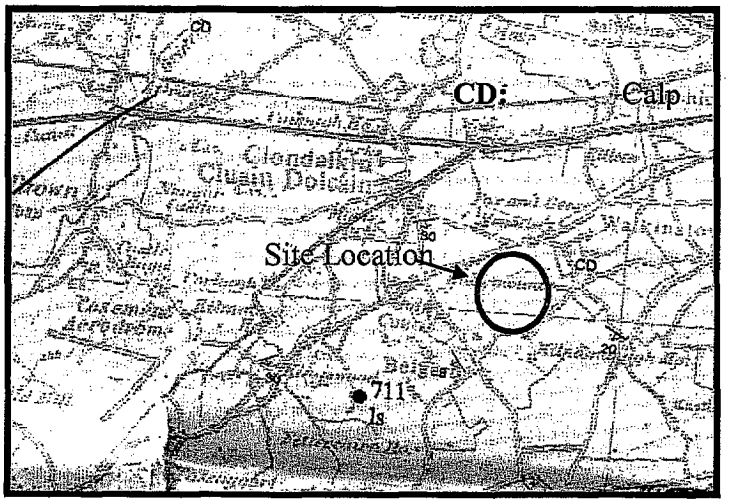


Figure 3.3/1: Geology of Kildare – Wicklow (GSI 1994)

The Calp Limestones in this region is reported to dip at 80 degrees towards the southeast. There are no major faults reported in the region.

Quality of the Subsurface

The site and its surrounds have been used for industrial purposes since the 1970's. Due to the historic industrial nature of the site, there is the potential for previous contamination of the subsurface.

3.3.4 Potential Impacts of the Proposed Development

As there are no geological features of any significance present at or beneath the site, the proposed development will have no impact on local geology.

The proposed development will entail the construction of a hardstand cover over a majority of the site and as such there will be no discharges to the subsoil. Therefore it is considered that there will be no impacts to the underlying subsurface.

3.3.5 Mitigation Measures

All wastes and fuels will be stored in fully bunded areas in accordance with relevant environmental guidelines and recognised standards. All bunds will be tested in accordance with the waste licence conditions. In addition, oil absorbent materials will be kept on site in close proximity to any fuel storage tanks or bowsers during site development works. The refuelling of vehicles will be undertaken in a designated area, which will be fully contained to prevent spillage into the surface water network.

All wastes being delivered to or removed from site will be loaded/unloaded in fully bunded areas. New leachate drains installed on site will be constructed in accordance with all applicable building standards thereby minimising the potential for leaks in underground pipes.

3.4 HYDROLOGY

3.4.1 Introduction

The proposed waste transfer and processing facility is located within the upper catchment of the River Liffey (hydrometric area no. 9), of which the facility is located within the sub-catchment the Camac River (area 54.7 km^2). This river catchment is characterised by high intensity industrial and commercial areas. There is no surface water body located within or adjacent to the site, with uncontaminated surface water from the facility being discharged into the culverted Ballymount stream that flows within the immediate area, which ultimately discharges into the Camac River to the north of the facility.

3.4.2 Baseline Surface Water Assessment

In order to assess the existing nature and quality of surface waters in the vicinity of the waste transfer and processing facility at Ballymount, a baseline water quality assessment was undertaken in May 2004.

This assessment entailed the following:

- Reviewing baseline information obtained through the national river quality survey operated by the Environmental Protection Agency (EPA).
- Analysis of surface waters in the vicinity of the proposed development for chemical parameters.

Surface Water Sampling Locations

EPA baseline data:

Chemical and biological surveys of the rivers of Ireland have been conducted since 1986. This work was initially co-ordinated by the Office of Public Works and local County Councils, though since 1993 has been co-ordinated by the Environmental Protection Agency. Results of these surveys can be found from their website (www.epa.ie) or from their relevant publications. The EPA monitors the River Camac at a number of monitoring stations. There is a monitoring station at Riverside Estate Bridge (station No. 0310), and at Kylemore Road Bridge (station no. 0400), which are located upstream and downstream, respectively, of the discharge from the tributary of the Ballymount Stream that flow adjacent to the facility. There are both chemical and biological rating results available for the Kylemore Road Bridge, with only biological data available for the Riverside Estate Bridge location.

Baseline data for surface water within the vicinity of the proposed development:

Surface water sampling locations were determined following a review of the drainage pattern of the catchment, which indicated optimum sampling points to facilitate characterisation of surface waters in the vicinity of the proposed development. Two no. surface water monitoring locations were chosen to perform this function, and are detailed in Fig 3.4/1.

TABLE 3.4/1 SURFACE WATER MONITORING LOCATIONS

Sample Point Reference I.D	Location	Justification
SW-1	Discharge from the existing facility	To determine the water quality of the waters after leaving the facility
SW-2	Ballymount Stream immediately downstream of existing facility	To determine the water quality within the Ballymount Stream immediately downstream of the existing

Chemical and Biological Results

EPA results:

Chemical and biological quality results are available for Kylemore Road Bridge and biological quality results are available for Riverside Estate Bridge monitoring stations on the River Camac. The median, minimum and maximum chemical results for the Kylemore Road Bridge station location was obtained from sampling undertaken between 1998 and 2000, the biological quality results for both locations are from 1988 to 2000.

TABLE 3.4/2 GENERAL CHEMICAL ANALYSIS RESULTS FOR KYLEMORE ROAD BRIDGE (0400) from 1998 to 2000

Parameter	Minimum	Median	Maximum	No. of samples
pH pH units	6.84	7.16	7.45	220
Conductivity µS/cm	170.75	239.7	266.9	217
Total Ammonia mg/l	0.013158	0.043684	0.130526	218
Un-Ionised Ammonia as N mg/l	0.000111	0.000944	0.0035	219
Dissolved Oxygen mg/l	9.935	10.86	11.77	222
Temperature °C	8.27	9.96	12.145	203
Ortho-Phosphate mg/l as P	0.019	0.038	0.0825	201

Note: Source the Environmental Protection Agency website (www.epa.ie)

TABLE 3.4/3 BIOLOGICAL ANALYSIS RESULTS

Year	Riverside Estate Bridge	Kylemore Road Bridge
1988	2-3	2-3
1989	2-3	1
1990	3	1
1991	3	2
1994	-	1
1996	2-3	1
1998	2-3	3

Note: Source the Environmental Protection Agency website (www.epa.ie)

Q-rating

5	pristine conditions	4	clean conditions
3-4:	slightly polluted conditions;	3, 2-3:	moderately polluted
2,1-2, 1:	seriously polluted		

Results from surface water bodies in the vicinity of the site:

On examination of the drainage network from the facility, it was determined that surface water samples would be collected from the final discharge point from the facility (SW-1), and at the downstream location on the Ballymount Stream (SW-2). Surface water run-off from the facility consists of uncontaminated rainfall that falls on the site. Due to the dry weather spell, there was no discharge from the facility and therefore obtaining a sample from this location (namely SW-1) was not possible at the time of sampling. The results of the analysis from the Ballymount Stream (SW-2) are detailed in Tables 3.4/4 to 3.4/7.

TABLE 3.4/4 GENERAL CHEMICAL ANALYSIS RESULTS FOR SW-2

Parameter	SW-2	Emission Limit Value
pH (pH units)	8.0	>6-<9[1]
Conductivity µS/cm @ 25°C	565	1,000[2]
BOD (TCMP) mg/l	2	40[2]
COD mg/l	<10	>5[1]
Ammonia as N mg/l	0.05	>1[1]
Total Alkalinity as CaCO3 mg/l	191	-
Chloride mg/l	24.7	250
Nitrite as N mg/l	0.03	>0.05[1]
Ortho-Phosphate as P mg/l	0.05	-
Nitrate as N mg/l	1.06	50[2]
TOC mg/l	<5	-
Sulphate mg/l	58.2	200
Fluoride mg/l	0.2	1.0[2]

TABLE 3.4/5 METAL SCAN RESULTS FOR SW-2		
Parameter (mg/l)	**SW-2**	**Emission Limit Value**
Beryllium	<0.02	-
Aluminium	0.22	-
Chromium	<0.02	0.05[2]
Manganese	**0.06**	0.05[2]
Cobalt	<0.02	-
Nickel	0.06	-
Copper	<0.02	0.05[2]
Zinc	<0.02	3[2]
Arsenic	<0.02	-
Selenium	<0.02	0.01[2]
Silver	<0.02	-
Cadmium	<0.02	0.005[2]
Lead	<0.02	0.05[2]
Antimony	<0.02	-
Barium	0.24	1.0[2]
Iron	1.5	2.0[2]
Boron	**0.60**	0.2[2]
Mercury	<0.01	0.001[2]

TABLE 3.4/6 CATION RESULTS FOR SW-2		
Parameter (mg/l)	**SW-2**	**Emission Limit Value**
Sodium	17	-
Magnesium	9.4	-
Potassium	1.8	-
Calcium	73	-

TABLE 3.4/7 ORGANIC RESULTS FOR SW-2		
Parameter (µg/l)	**SW-2**	**Emission Limit Value**
DRO	<10	50
Mineral Oil	<10	50

Note 1 European Communities (Quality of Salmonid Waters) Regulations, SI. 293 of 1988

Note 2 European Communities (Quality of Surface Water Intended For The Abstraction Of Drinking Water) Regulations, S.I 294 of 1989.

Note 3 Values in bold are in excess of emission limit values

\- Limit value unavailable

Figures in bold exceed the emission limit value.

Interpretation of Results

The European Communities (Quality of Salmonid Waters) Regulations, SI. No. 293 of 1988 is the principal means of evaluating surface water in Ireland, therefore, a comparison follows between results obtained and the aforementioned Regulations. In the absence of emission limit values for same, reference is made to the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, S.I No. 294 of 1989. The latter has only limited applicability in practice, as most streams/surface waters will never be used for abstraction as drinking water. Therefore, the emission limit values specified in the latter regulations are to be used for guidelines purposes only.

EPA results

The Environmental Protection Agency results are detailed in Table 3.4/2, which indicate that the River Camac is of good chemical quality. All chemical results detailed are below the surface water standards as detailed in European Communities (Quality of Salmonid Waters) Regulations (S.I. 293 of 1988). The biological results (see Table 3.4/3) indicate that the river is moderately polluted upstream (namely at the Riverside Estate Bridge), with a marginal improvement in quality at the Kylemore Road Bridge.

Results from surface water bodies within the vicinity of the site.

SW-2 (Ballymount Stream; adjacent to site)
This surface water sampling point is located downstream of the proposed discharge point of the facility.

Plate 3.4/1: Ballymount Stream; SW-2

Chemical parameters associated with organic pollution, namely Biochemical Oxygen Demand (BOD_5) (2 mg/l), Chemical Oxygen Demand (COD) (<10 mg/l), Total Organic Carbon (TOC) (<5 mg/l), Ammonia (0.05 mg/l), Nitrate (1.06 mg/l) and Nitrite (0.03 mg/l) were detected at relatively low levels, which would suggest that the stream at this location is relatively clean.

The anion (namely Chloride, Sulphate and Fluoride) and cation (namely Calcium, Sodium, Magnesium and Potassium) results were detected at low concentrations, and were well below the emission limit values.

The metal scan indicated that Manganese (0.06 mg/l), and Boron (0.60 mg/l) results were all marginally above their respective emission limit values, with the remaining metal parameters being well below the limit values.

Organics (namely Diesel Range Organics and Mineral Oil) were not detected at this location.

3.4.3 Potential Impacts of the Proposed Development

The proposed development includes for the installation and operation of a surface water drainage system as shown in Drawing D.1 in Appendix 2. There will be no noticeable increase in the volume of surface waters discharged from the site as the existing site is already almost fully covered with hardstanding (concrete). All process waters i.e. leachate and foul waters, shall be collected separately and discharged to the County Council foul water sewer system.

The surface water drainage system will be fitted with an oil interceptor prior to discharge to the surface water system. The oil interceptor will have an automatic shut-off valve fitted which will stop emissions to the local surface water network if oil is detected in the run-off.

The environmental impacts associated with the proposed development at Ballymount Industrial Estate on the local surface water regime are considered below:

Given the nature of activities on site and vehicle movements required to successfully operate the site, the potential exists for uncontrolled discharge of materials such as fuels, lubricants and hydraulic fluids to the surface water drainage network. Imprudent storage and handling of such oil-based materials can result in uncontrolled discharges that can significantly impact on the receiving environment.

3.4.4 Proposed Mitigation Measures

All newly constructed and existing drains within the facility shall be cleared on commencement of operations within the site by power jetting and all drains to be surveyed by CCTV to ensure removal of any residual matter.

During construction bunded tanks will be used during site development work to store fuels, oils, and lubricants. Strict building practices shall be adhered to to ensure that there is no uncontrolled discharges during the construction phase of the proposed development.

Fuel tanks will be located within fully reinforced concrete bunded areas that conform to the standard bunding specification (BS8007-1987) with the capacity of holding 110% of the tank capacity. The tank will be finished with a suitable sealant resistant to chemical attack/corrosion. A paved area will be provided around the storage tank for fuel dispensing. This area will be surrounded by a safti kerb for the collection of any spillages and leakages and for the collection of surface water run-off. Surface water run-off generated within this channel will be directed to the oil interceptor prior to discharge. Spill kits (absorbent materials) will be located at strategic positions throughout the facility, with each member of staff having received spill prevention and containment training.

3.5 HYDROGEOLOGY

3.5.1 Introduction

This section details the baseline quality of the underlying groundwaters existing at the site and addresses the impact of the proposed development on the underlying groundwaters.

3.5.2 Study and Assessment Methodology

Desk-based information on the underlying hydrogeological conditions beneath the proposed development site was obtained through the Geological Survey of Ireland (GSI) and from information held on files within Bord na Móna Environmental Consultancy Services. There were no intrusive ground investigations undertaken as part of this study.

3.5.3 Description of the Receiving Environment

(1) Aquifer Classification

The site is underlain by Lower Carboniferous rock consisting of the Calp Limestones (CD). These have been provisionally classified by the GSI as a *Bedrock Aquifer which is moderately productive only in local zones (Ll).*

(2) Groundwater Vulnerability

Groundwater vulnerability classification are currently being produced by the GSI for County Dublin. As part of this study, guidelines published by the GSI for mapping vulnerability were used to define and classify the site.

Using GSI criteria for groundwater vulnerability the site has a high - moderate vulnerability rating.

(3) Groundwater Levels

There are no groundwater monitoring boreholes on the site, however water levels taken from adjoining properties (namely Galco Steel Ltd. located immediately south east of the facility) indicate that the groundwater level lies between 2.50 m and 2.80 m below ground level (bgl). The groundwater flows are from the southeast to northwest, towards the nearby River Camac.

(4) Groundwater Quality

The site and its surrounds have been used for industrial purposes since the 1970's. Due to the historic industrial nature of the site, there is the potential for previous contamination

of the groundwaters. Groundwater quality results are available for the adjoining property and these indicate that the quality of the groundwater is good with some localised contamination (see Appendix 4: Groundwater monitoring results for Galco Steel Ltd – Source Galco Steel Ltd. Integrated Pollution Control Licence Application.).

3.5.4 Potential Impacts from the Proposed Development

There will be no direct discharges to groundwater or any groundwater abstractions as part of the proposed development.

The proposed development will entail the extension of the existing hardstand cover over the site (see Appendix 2: Drawing D.1 Site Infrastructure) and as such it is considered that there will be no impacts to the underlying groundwaters.

3.5.5 Proposed Mitigation Measures

There will be no emissions to groundwater from the proposed development. All wastes and other consumables will be stored in bunded areas, which discharge directly into the County Council foul sewer.

Potential leachate from the handling of wastes within the building will be collected within a dedicated drainage system and discharged to foul sewer. This will minimise the potential for indirect emissions i.e. leaks to impact on groundwater quality.

3.6 AIR

3.6.1 Introduction

To determine the baseline air quality and subsequently assess the potential impact of both the site development and operational phases of the proposed development, the following approach was taken:

- Identification of the potential pollutants.
- Monitoring of the above pollutants to assess the current baseline air quality levels in the vicinity of the proposed development.
- Investigation of the potential impact to air quality during the construction and operational phases of the proposed development
- Mitigation measures to minimise against potential impacts.

3.6.2 Overview of Potential Pollutants

Traffic derived pollutants (Oxides of Sulphur and Nitrogen, Volatile Organic Compounds, PM_{10}), odour and the generation of dust are considered the main potential pollutants that may impact on the air quality during the construction and operational phases of the proposed development.

The emission of pollutants into the atmosphere continues to be one of the greatest of all pressures on the global environment. A major component of this pressure is traffic emissions. There are a variety of pollutants, principally oxides of nitrogen, carbon monoxide, volatile organic compounds and particulates that may be emitted to atmosphere from vehicles. Of particular importance in this case is the generation of dust from the construction process and its impact on the air quality. A description of the environmental effects of each potential pollutant is provided in the following sections (1) to (6).

(1) Sulphur Dioxide (SO_2)

SO_2 is a corrosive acid gas, which combines with water vapour in the atmosphere to produce acid rain. Both wet and dry deposition has been implicated in the damage and destruction of vegetation and in the degradation of soils, building materials and watercourses. The principal source of this gas is power stations burning fossil fuels, which contain sulphur.

(2) Oxides of Nitrogen (NO_x)

The term oxides of nitrogen refers predominately to nitric oxide (NO) and nitrogen dioxide (NO_2). These oxides are formed when nitrogen combines with oxygen at the high temperatures generated by fossil fuel combustion. Nitric oxide has no colour, odour, or taste and is non-toxic. In the

atmosphere it is rapidly oxidized to nitrogen dioxide by reaction with ozone. Nitrogen dioxide is a reddish-brown gas that has a pungent, irritating odour. It absorbs light and contributes to the yellow-brown haze sometimes seen hanging over cities. It is one of the main components of smog.

Nitrogen oxides occur both naturally and from human activities. In nature, they are a result of bacterial processes, biological growth and decay, lighting, as well as forest and grassland fires. Road traffic is the principal source of anthropogenic nitrogen oxides and is responsible for approximately half the emissions in Europe ('Ireland's Environment- A Millennium Report' EPA April 2000)

Nitric oxide is the most common form of NOx emitted. Nitrogen dioxide accounts for less than 10%. The amount of nitrogen dioxide emitted varies with the temperature of combustion. As the temperature increases, so does the level of nitrogen dioxide.

NO_2 has a variety of environmental impacts. At high concentrations, nitrogen dioxide is potentially toxic to plants, injuring leaves and reducing growth which, in turn, reduces crop yield. In the presence of sunlight, it reacts with hydrocarbons to produce photochemical pollutants such as ozone. In addition, under specific conditions nitrogen oxides may be easily converted to nitric acid, which is in turn removed from the atmosphere by direct deposition to the ground, or transfer to aqueous droplets (e.g. cloud or rainwater), thereby contributing to acid deposition.

(3) Volatile Organic Compounds (VOC's)

VOC's are released in vehicle exhaust gases either as unburned fuels or as combustion products, and are also emitted by the evaporation of solvents and motor fuels. Certain VOC's are important because of the role they play in the photochemical formation of ozone in the atmosphere. The predominant VOC's associated with transport related activities are included in the measurement programme. Four compounds were chosen as indicators of pollution from these sources; benzene, toluene, ethylbenzene and xylene (BTEX) isomers.

(4) Dust Deposition

Airborne particulate matter varies widely in its physical and chemical composition, source and particle size. Particles are often classed as either primary (those emitted directly into the atmosphere) or secondary (those formed or modified in the atmosphere from condensation and growth). Particulate matter arises from both man-made and natural sources. Natural sources include wind-blown dust, sea-salt and biological particles e.g. pollen. Man-made sources include large carbon particles from incomplete combustion, ash, dust particles from quarrying and construction activities and road traffic generated dust. In general large particles do not stay in the atmosphere for long and are deposited close to their source, whereas small particles can be transported long distances.

Particles, which are deposited to ground, give rise to problems such as soiling of buildings and other materials and also cause a general nuisance. The Technical Instructions on Air Quality Control TA Luft - 1986 recommended guideline value for dust emissions is 350 mg/m^2/day.

In terms of monthly dustfall results in the UK (undissolved solids measurement only- BS1747 sampling method), the following is often quoted: "with insoluble deposits, fallout rates exceeding 200 mg/m^2/day on a monthly average will generally cause nuisance to residential properties at peak periods within that month". Using the above analogy this value is equivalent to approximately 460 mg/m^2/day using the VDI 2119 sampling method. In light of experience, and possibly higher public perceptions, many of those working in the field have adopted much lower informal limits in the region of 100 – 150 mg/m^2/day averaged over a month (using the BS1747 sampling method). This is equivalent to approximately 230 - 350 mg/m^2/day total dissolved and undissolved solids. The German T.A. Luft Standard (1986) recommended value for dust emissions is 350 mg/m^2/day is based on the combined weight of dissolved and undissolved solids, measured over one month using the Bergerhoff dust gauge. The EPA in Ireland has adopted the German sampling methodology and guideline value of 350 mg/m^2/day.

(5) PM_{10}

In recent years, interest has focused on the levels of particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) which have been shown to have health implications at elevated levels, due to their ability to penetrate into the tracheo-bronchial system. A major man-made source of fine primary particles is combustion processes, primarily road transport and coal burning activities. However, road transport is estimated to be the single biggest primary man-made source of PM_{10} in most EU countries (EPA's report entitled 'Ireland's Environment - A Millenium Report'). Of particular concern is diesel combustion, where transport of hot exhaust vapour into a stack can lead to spontaneous nucleation of 'carbon' particulates before emission. An estimated 30 to 70 times more particulates are emitted by diesel engines than petrol fuelled vehicles equipped with catalytic converters and burning unleaded fuel.

Secondary particles are typically formed when low volatility products are generated in the atmosphere, for example the oxidation of sulphur dioxide to sulphuric acid. The atmospheric lifetime of particulate matter is strongly related to particle size, but may be as long as 10 days for particles of approximately 1mm in diameter. With the general rise in traffic, especially in urban areas, levels are likely to continue to increase. Significant natural sources of PM_{10} particles include re-suspension of fine soil material in rural areas, volcanic activity, sea spray, forest fires and reactions between natural gaseous emissions.

(6) Odour

Odour is perceived by the brain in response to chemicals present in the air we breathe. Odour is the response that those chemicals induce. Most odours are a mixture of many chemicals that

interact to produce an overall odour response (Good Practice Guide for Assessing and Managing Odour in New Zealand. Ministry for the Environment, June 2003).

Odours are normally assessed on the basis of nuisance rather than direct toxicological impact however 'offensive odours can cause poor appetite for food, lowered water consumption, impaired respiration, nausea and vomiting and mental perturbation' ('Wastewater Engineering, Treatment and Disposal', Metcalf and Eddy Inc, 3rd Edition, McGraw Hill (1991)).

3.6.3 Baseline Data

A baseline air quality assessment was carried out at the proposed Oxigen Environmental Ltd waste recycling and processing facility in Ballymount in order to determine the background air quality. The following components were identified as potential pollutants and were, therefore included in the assessment:

- Nitrogen Dioxide (NO_2)
- Sulphur Dioxide (SO_2)
- Volatile Organic Compounds (BTEX)
- Dust deposition
- PM_{10}
- Odour

Four locations were chosen for the sampling of SO_2, NO_2, BTEX and dust deposition. The air sampling locations are presented in Figure 3.6/1 overleaf.

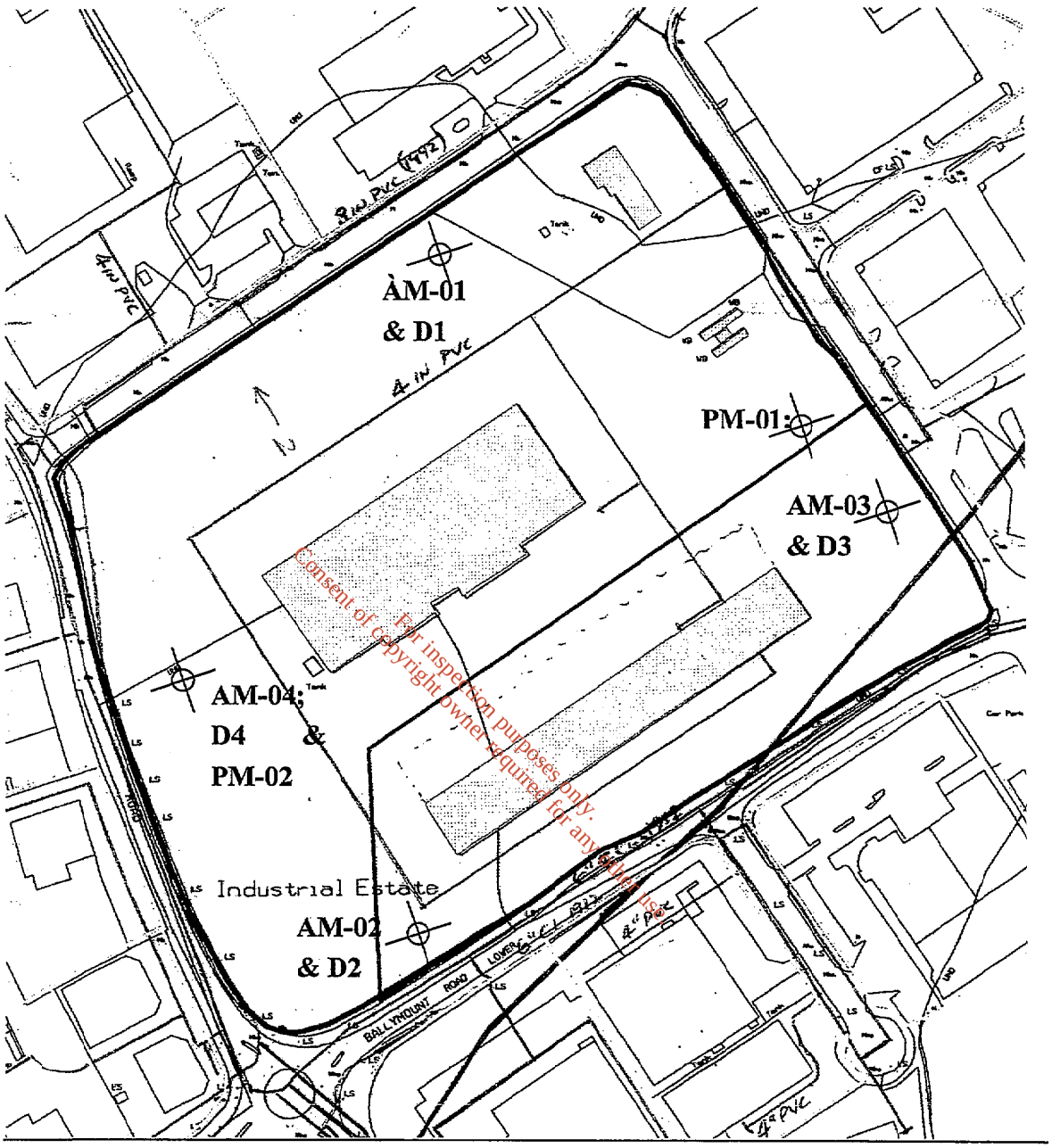


Figure 3.6/1: Air Monitoring Locations

Key

AM: Air monitoring location

D: Dust monitoring location

PM: PM_{10} monitoring location

(1) Nitrogen Dioxide (NO_2)/ Sulphur Dioxide (SO_2)

Background levels of nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) were determined using diffusion tubes and based on the guidelines originally set out by the DTI (UK) for the determination of NO_2 in ambient atmospheres. The diffusion tubes were placed on the stand of the four dust deposition gauges indicated on Drawing J1, in well ventilated areas away from trees and fences and situated approximately 1-2m above ground level. The locations were chosen to reflect background levels of the above species.

Before mounting the tube on the stand, the tube is removed from its protective container. The green cap is placed upwards with the filter end facing downwards to prevent the ingress of particulates. On completion of the 22 day monitoring survey period (4th March to 25th March 2004) the tubes were placed in their protective containers and sent to the laboratory. The sampling location, date and time were recorded for each sample. The tubes were then dispatched to the UKAS accredited laboratory at Gradko International Ltd for analysis.

The SO_2 and NO_2 tubes were analysed by ion chromatography and the results expressed as µg/m3. Results are presented in Table 3.6/1 below:

TABLE 3.6/1: Baseline NO_2 and SO_2 Results

Location	Nitrogen Dioxide ($\mu g/m^3$)	Sulphur Dioxide ($\mu g/m^3$)
AM-01	13.02	2.54
AM-02	11.74	2.31
AM-03	8.17	1.61
AM-04	10.72	1.61

The results obtained for nitrogen dioxide varied from 8.17 to 13.02µg/m^3. The highest recorded value of 13.02µg/m^3 was at AM-01. These results are consistent with those expected for a site located in an urban environment. Annual mean concentrations of nitrogen oxides are expected to be in the range 0-30µg/m^3 for rural environments and 20–90µg/m^3 for urban environments. The EC Directive 85/203/EEC on air quality standards for nitrogen dioxide gives a 98 percentile hourly limit value of 200µg/m^3 which has been adopted as the Irish air quality standard (S. I. No. 244 of 1987). The World Health Organization (WHO) 1999 report on the Guidelines for Air Quality also recommends this hourly guideline value of 200µg/m^3 and a mean annual value of 40µg/m^3. In addition, the Council Directive 1999/30/EC 1-hour limit for nitrogen dioxide is also 200µg/m^3 (as a 95 percentile) and an annual limit of 40µg/m^3, which must be met by 1 January 2010. Furthermore these guideline values have been adopted into Irish law in the form of the Air Quality Standards

Regulations 2002 (S.I. No. 271 of 2002). Although it is not strictly relevant to compare, the values obtained for this monitoring survey are well within these limits.

The concentrations obtained for sulphur dioxide were also shown to be relatively low at all locations. The highest level obtained was at the northern boundary AM-01 (2.54 $\mu g/m^3$). The EC Directive 80/779/EEC on air quality limit values for sulphur dioxide and suspended particulates stipulates a yearly average of daily values taken throughout the year of 120$\mu g/m^3$ and has been adopted as the Irish air quality standard (S. I. No. 244 of 1987). Although not strictly relevant, all the values obtained were shown to be well within this limit. The 1999 WHO report outlines a guideline value of 125$\mu g/m^3$ for maximum daily mean and 50$\mu g/m^3$ for annual mean for sulphur dioxide. These guideline values are clearly not currently being exceeded at the site. In addition, the Council Directive 1999/30/EC gives an hourly limit value of 350$\mu g/m^3$ not to be exceeded 24 times in any calendar year and a daily limit value of 125$\mu g/m^3$ not to be exceeded more than three times a calendar year (99 percentile). Both of these limit values will come into law by 1 January 2005. These guideline values are also laid out in S.I. No. 271 of 2002. It is clear that the results obtained are well below these guideline values.

(2) Volatile Organic Compounds (BTEX)

Diffusion tubes were used to determine the background levels of benzene, toluene, ethylbenzene and xylene isomers based on the guidelines originally set out by the DTI (UK) for the determination of NO_2 in ambient atmospheres. These diffusion tubes were also mounted on the dust gauge stands at the four sampling locations.

Prior to sampling, the brass-end cap from the end of the tube marked with a red dot was removed and replaced with a diffusive end cap. The tube was placed on the stand with the diffusive head pointing downwards. At the end of the 22 day sampling period (4th of March to 25th of March 2004), the diffusive head was removed and this end of the tube was tightly sealed with the brass end-cap and sent to the laboratory for analysis.

The BTEX tubes were analysed by thermal desorption followed by gas chromatography-mass spectrometry and the results expressed as $\mu g/m^3$. The results are shown in Table 3.6/2 overleaf:

TABLE 3.6/2: Baseline BTEX Results					
Location	**Benzene µg/m³**	**Toluene µg/m³**	**Ethyl-Benzene µg/m³**	**m/p Xylene µg/m³**	**o- Xylene µg/m³**
AM-01	0.50	0.33	0.19	0.65	0.19
AM-02	1.50	2.87	0.60	1.91	0.88
AM-03	1.29	2.17	0.46	1.44	0.79
AM-04	0.96	1.83	0.65	1.49	0.84

The concentrations obtained for benzene at the four locations are low ranging from 0.50 µg/m³ to 1.50 µg/m³. The EU legislation pertaining to Benzene is directive 2000/69/EC relating to 'limit values for benzene and carbon dioxide in ambient air'. The recommended limit value is 5µg/m³ over a calendar year. The proposed limit entered into force on 1 January 2003 and every 12 months thereafter is reduced by equal annual percentages to reach 0% by 1 January 2010. This legislation has been adopted by the Irish Environmental Protection Agency and the limits are stated in S.I No. 271 of 2002. The result obtained from the monitoring survey was well within this proposed limit. There are no national or EU limits for toluene, ethylbenzene or xylene. In the absence of such limits, Danish C-values are used to compare the results to recommended average ground level concentrations. These C-values are mean hourly values and must not be exceeded by more than 1% of a period of time. The values are based on long-term exposure to individual substances. These are 400µg/m³ for toluene, 500µg/m³ for ethylbenzene and 100µg/m³ for xylenes. The results obtained from the monitoring survey were below these limit values.

(3) Dust Deposition

Dust direction monitoring was conducted using directional dust gauges conforming to the British Standards BS 1747; Part 5. Each gauge measures the lateral flux through four vertical slots to collectors arranged on a vertical support. Each complete directional dust gauge assembly comprises of;

- One vertical supporting post set at 150mm above ground level.
- Four collecting heads set at 90° to each other.
- Four collecting bottles attached to the collecting heads.

Prior to sampling, the collecting vessels were carefully cleaned with laboratory detergent and then deionised water and allowed to dry. Sampling involved placing the labelled containers in the protecting cages.

Total deposited dust was monitored over a period of 22 days from (and including) the 4th of March to the 25th of March 2004. The date of erection of the cages was noted. Following exposure for 22 days, the vessels were sealed and brought back to the laboratory for analysis for dust. All samples returned to the laboratory were stored at 4°C. Subsequent analysis of all samples was carried out gravimetrically for dust and strictly followed the standard VDI 2119.Total deposited dust was monitored at four locations at the proposed development.

The location of the directional dust gauges are outlined in Table 3.6/3 below and in Figure 3.6/1.

Table 3.6.3 Location of Directional Dust Deposition Gauges

Location	Description
D1	Northern Boundary
D2	Southern Boundary
D3	Eastern Boundary
D4	Western Boundary

Results are presented in Table 3.6.4 below: and outlined in Figure 3.6/2 overleaf.

TABLE 3.6.4 Results of Directional Dust Deposition

Sampling Location Number	Deposition Rate (mg/m^2/day)
D1-N	71.3
D1-S	594.2
D1-E	38.6
D1-W	157.5
D2-N	95.1
D2-S	44.6
D2-E	95.1
D2-W	439.7
D3-N	148.5
D3-S	139.6
D3-E	41.6
D3-W	53.5
D4-N	101.0
D4-S	469.4
D4-E	41.6
D4-W	160.4

There are no national or EU limit values for directional dust deposition rates. The maximum recorded dust deposition rates occurred at D1-N (594.2 mg/m^2/d). The minimum dust deposition rate recorded occurred at D1-W. Inspection of the results indicate that the highest concentrations of dust are coming from a southerly or westerly direction.

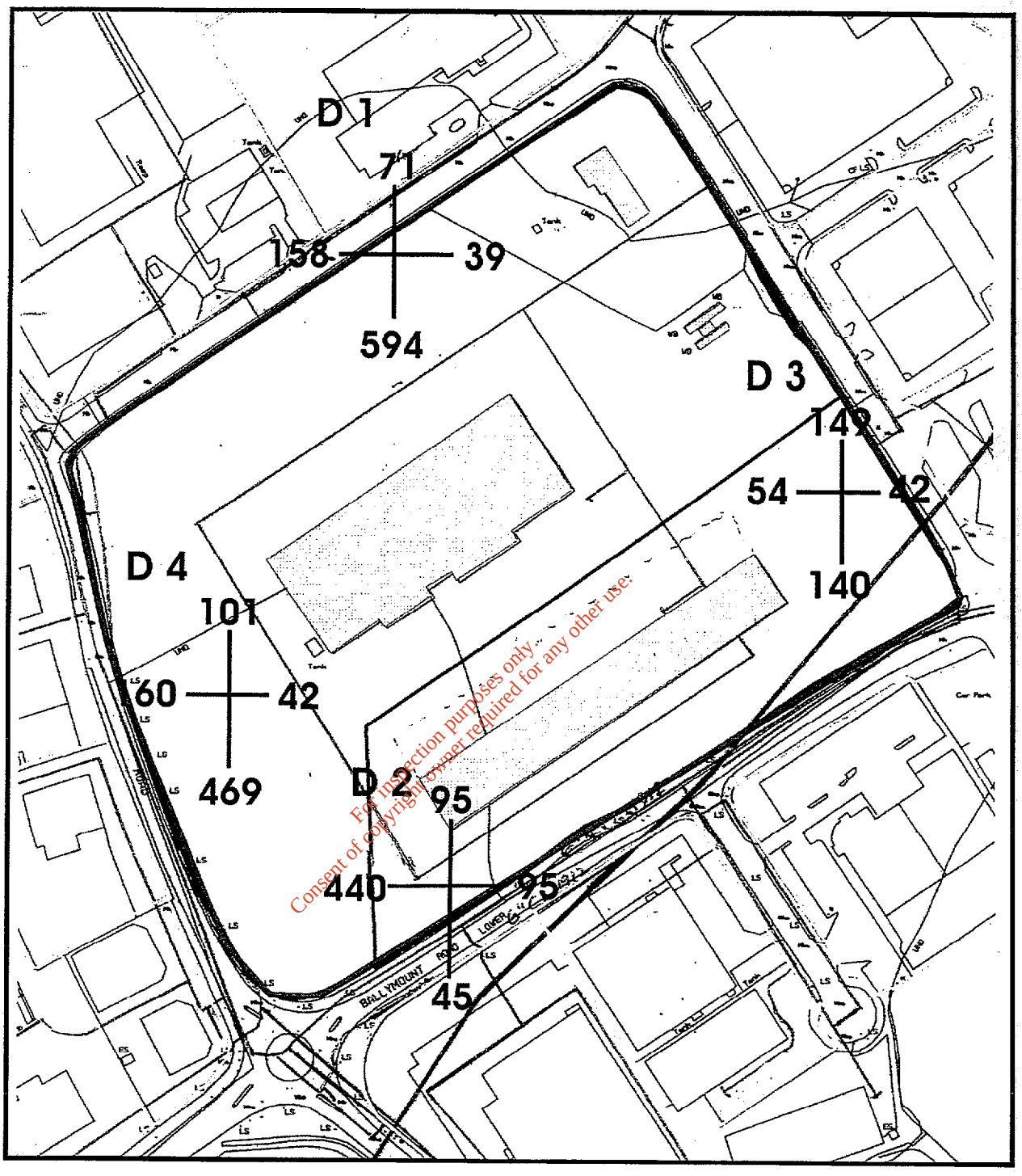


Figure 3.6/2 Sampling location and recorded levels (mg/m^2/d) of dust deposition rates

Key

D: Dust Monitoring location

(4) PM_{10}

The monitoring programme using carried out using a Partisol-plus model 2025 segmented air sampler. The unit is designed to meet the regulatory monitoring requirements for PM_{10} and other particulate sampling methods in the US and Europe. Features of the unit include:

- A flow rate of $1m^3/h$ through a single filter.
- The use of standard 47mm sample filters with a convenient filter exchange mechanism.
- Full microprocessor control and data handling.
- Active volumetric flow control.

Sampling was carried out over a period of 14 days. Due to the start time of the monitoring exercise, each 24 hour sample spans two calendar days, from the afternoon on the first day to the afternoon on the second day. Two monitors were located at the eastern and western boundaries of the site. These locations are indicated as PM-01 & PM-02 on Figure 3.6/1: Air monitoring locations.

The results of the monitoring programme are highlighted in Tables 3.6.5 and 3.6.6

Table 3.6.5 shows that throughout the sampling period at location PM-01 the limit value of 50 $\mu g/m^3$ was not exceeded at any time. The highest recorded daily average at PM-01 was 34.49 $\mu g/m^3$ on 3rd – 4th March.

Table 3.6/5 PM-10 CONCENTRATIONS AT LOCATION PM-01 FROM THE 02/03/04 TO 16/03/04

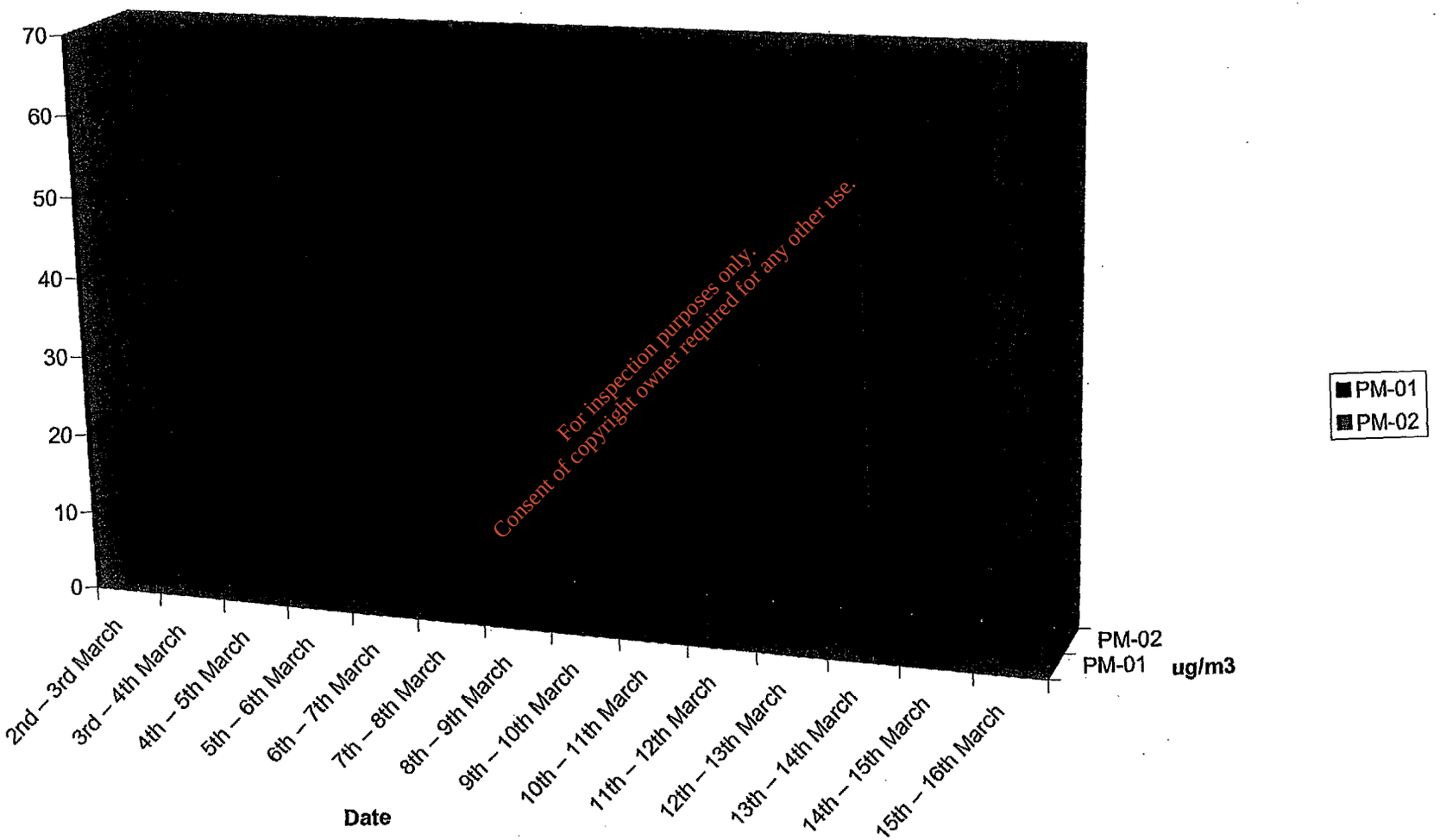
Sampling Date	PM_{10} Concentration ($\mu g/m^3$)
	Daily Average
2nd – 3rd March 2004	19.12
3rd – 4th March 2004	34.49
4th – 5th March 2004	29.09
5th – 6th March 2004	31.59
6th – 7th March 2004	14.13
7th – 8th March 2004	<12
8th – 9th March 2004	<12
9th – 10th March 2004	<12
10th – 11th March 2004	<12
11th – 12th March 2004	27.43
12th – 13th March 2004	19.53
13th – 14th March 2004	<12
14th – 15th March 2004	<12
15th – 16th March 2004	<12
Daily Average	***18.5***
Limit	***50***

Table 3.6.6 shows that the PM-$_{10}$ limit value of 50 µg/m^3 was exceeded at location PM-02 on 8th – 9th March with a value of 66.91µg/m^3. The average daily values at PM-02, which was located on the western boundary, were generally higher than those results recorded at PM-01, which was located on the eastern boundary. This was probably due to PM-02, was located to the busy Turnpike Road, as opposed to the PM-01, which was located adjacent to the less busy internal industrial estate access road. Figure 3.6/3 overleaf highlights the recorded PM_{10} levels at both sampling locations.

Table 3.6/6 PM-10 CONCENTRATIONS AT LOCATION PM-02 FROM THE 02/03/04 TO 16/03/04

Sampling Date	PM_{10} Concentration (µg/m^3)
	Daily Average
2nd – 3rd March 2004	32.83
3rd – 4th March 2004	34.08
4th – 5th March 2004	36.99
5th – 6th March 2004	37.40
6th – 7th March 2004	<12
7th – 8th March 2004	38.65
8th – 9th March 2004	66.91
9th – 10th March 2004	43.64
10th – 11th March 2004	38.65
11th – 12th March 2004	20.78
12th – 13th March 2004	34.91
13th – 14th March 2004	24.52
14th – 15th March 2004	30.75
15th – 16th March 2004	< 12
Daily Average	***33.2***
Limit	***50***

Baseline PM-10 concentrations (ug/m3) at PM-01 and PM-02



(5) Odour

No ambient odour samples were taken during the baseline assessment. Ambient odour measurement was not considered for a number of reasons. Measured ambient odour levels are highly dependent on meteorological conditions on the day of sampling and therefore may not reflect the existing background odour level at the site. Both on-site and off-site odour sources may contribute to measured ambient odour levels and as a result the background levels determined may not reflect the present site activity. At present there are no existing ambient odour guidelines, therefore it would not be possible to determine if significant background odour levels exist at the site.

3.6.4 Environmental Impacts

If uncontrolled, construction and operation of the proposed waste recycling and processing facility could give rise to the following air emissions.

(1) Construction Phase

In general, during this phase the potential impacts on air quality may be attributable to the generation of dust and the movement of construction traffic at the site. The construction phase is projected to extend for a 6 -7 month time period.

Generation of Dust

The impact of fugitive dust generated from the construction phase will, to a certain extent depend on wind direction, wind speed and rainfall. Construction waste generated during this phase will be retained on site and processed during the operational phase of the development. Fugitive dust may arise from the movement of construction vehicles on the existing hardstanding area and transport of spoil around the site. However, the level of dust generation is likely to be of relatively short duration with minimal impact on the receiving environment.

Traffic Pollutants

The movement of construction vehicles at the site during the construction phase of the development will generate exhaust fumes and subsequently contribute to potential emissions of SO_2, NOx, CO, particulate matter and VOC's including BTEX. While the levels of these pollutants are expected to increase during the construction phase of the development, strict adherence to 'good site/engineering practices' (e.g. all vehicles to be switched off when not in use) will minimise the generation of any unnecessary air emissions. In any event it is considered that the level of contamination emitted will be minimal and of short duration.

(2) Operational Phase

NO_2 , SO_2 , BTEX

During the operation phase, the anticipated increase in traffic entering and leaving the proposed development will be up to a maximum of 180 vehicle movements per day (ninety inbound plus ninety outbound). The likely impact on the local air quality as a result of the emissions of CO, NO_2, BTEX and particulate matter (PM_{10}) from the increase in traffic is detailed in Tables 3.6.4 overleaf:

Average traffic flows associated with the proposed development were used to predict ground level concentrations of particulate matter, CO, NO_2 and total hydrocarbons at the nearest sensitive receptor (selected due to proximity). The receptor is located at a distance of 24m from the Turnpike road to the northwest of the facility. This receptor was chosen as it is the nearest residence to the facility and is also on one of the main routes into and out of the proposed development. Therefore it is located in the area considered where the most significant effects of increased traffic flow is currently being experienced, or are likely to be experienced, once the development is fully operational. Assessments of predicted traffic related pollutants were carried out under different traffic speed situations for reference dates 2004 (represents baseline conditions) and 2007 (year when the development is likely to be fully operational). A worse case scenario of all of the 180 traffic movements (two way) passing this residence is applied. The Annual Average Daily Traffic (AADT) flow is calculated by applying a conservative expansion factor of 1.6 to the traffic count carried out from 7.30am to 6.15pm on the access road junction as outlined in section 3.8.Traffic. An estimate of 15% HGV's is also applied as a conservative measure.

Predictive calculations have been carried out in accordance with the procedures given in Annex 1 of Volume 11, Section 3, Part I of the UK Department of Transport and Design Manual for Roads and Bridges (2003). The adjusted figures for 2004 and 2007 are presented in Table 3.6.7 below and can be compared with the following applicable air quality guidelines and regulations:

- S I No. 271 of 2002 Annual Limit value for NO_2 of $40ug/m^3$
- S I No. 271 of 2002 Annual Limit value for Benzene of $5ug/m^3$
- S I No. 271 of 2002 Annual Limit value for PM_{10} of $40ug/m^3$

TABLE 3.6/7 Predictive Modelling of Pollutants at the Entrance of the site and the Nearest Sensitive Receptor on the access road.

Scenario	Traffic Speed (km/hr)	CO Annual Mean (mg/m3)	Benzene Annual Mean (ug/m3)	NO_2 Annual Mean (ug/m3)	PM_{10} Annual Mean (ug/m^3)
2004 No Development	10	5.06	1.55	17.54	34.94
	48	5.02	1.52	15.70	33.86
	96	5.02	1.51	15.93	33.88
2007 No Development	10	5.05	1.54	17.43	34.65
	48	5.01	1.51	15.60	33.78
	96	5.01	1.51	15.77	33.81
2007 With Development	10	5.05	1.54	18.15	34.90
	48	5.02	1.51	15.98	33.86
	96	5.01	1.51	16.15	33.89
Standard			5	40	40

Background levels were taken from existing baseline data or typical urban baseline levels. A level of $5mg/m^3$ of carbon monoxide(as an eight hour average)was used as it was reported in a recent EPA publication *(Irelands Environment 2004 EPA)* to represent potential levels of this parameter in a busy urban environment. This level was only exceeded on two occasions at city centre sampling stations in 2002. The maximum recorded benzene and NO_2 levels during the baseline study were used as conservative measure for background levels. The maximum average PM_{10} level was also used as a conservative measure. Table 3.6.7 indicates that predicted levels of PM_{10}, benzene, NO_2 and CO for the nearest sensitive receptor at present are below the limit values. This is due to the inbuilt assumption in the model that despite the gradual increase in vehicles/day, cleaner technology applied to future vehicle design, will reduce overall emissions, and therefore the impact on the sensitive receptor. Examination of the predicted levels for 2007 with development, indicate a minor increase in NO_2 levels (96kph) but is still not significant in comparison to the limit value. Also speeds above 48 kph are unlikely to be reached on the Turnpike road due to a 30mph speed limit being imposed. A slight decrease is predicted for PM_{10} concentrations in 2007 without development, but it is very slight in comparison to the present background levels. Overall, there is no significant increase in impact predicted at the nearest sensitive receptor for these parameters.

Dust Deposition

The operation of Ballymount waste recycling and processing facility could potentially have implications for the levels of ambient dust as a result of the following activities during normal operations:

- Movement of HGV's within the site boundary.
- Movement of friable material within the site

Each of these has the potential to generate dust emissions and the severity of the impact may be influenced by weather conditions.

Odour

Both on-site and off-site odour sources may contribute to measured ambient odour levels and as a result any background levels determined may not reflect the proposed site activity. Any materials that are received at the proposed site that have the potential to generate odour will be processed within the recycling buildings, thus minimising the potential impact on off site sensitive receptors.

3.6.5 Mitigation Measures

(1) Construction phase

(a) Traffic emissions

The presence of on-site vehicles will give rise to NO_2, BTEX and SO_2 emissions. Good site practices will be implemented to minimise these emissions. All vehicles and machinery will be switched off when not in use to eliminate any unnecessary emissions.

(b) Dust deposition

The use of a water bowser on the hardstanding areas of the site will ensure that there will be no significant dust emission arising from this stage of the development.

(2) Operational Phase

(a) NO_2, SO_2, BTEX

The predicted benzene, SO_2 and NO_2 concentrations in Table 3.6. for the development indicate that the increase in traffic will have little increased impact on the nearest sensitive receptor. This predicted impact is based on the worse case scenario of maximum baseline levels combined with all of the proposed traffic movements associated with the development impacting on the sensitive receptor. Since the predicted impact is not significant there are no mitigation measures proposed for these specific parameters.

(b) Odour

As part of the site's process operation all potentially odorous materials will be stored and processed within the buildings on the site. Any odorous material that is stored inside the process buildings may have the potential to impact on sensitive receptors outside the site boundaries during operations such as door-opening and potential dispersion of odours through vents in the proposed recycling buildings. Door-opening of the buildings will be restricted to receiving and dispatching. Any odour that arises within the process buildings (from stockpiles etc) will be treated directly through the use of odour neutraliser applied using rotary atomisers throughout the plant. These rotary atomisers will be used for this purpose and also for dust control. Use of the odour neutraliser will minimise potential odour emission from vents in the buildings. Implementation of these mitigation measures will ensure the impact of potential odour emissions from the site will not be significant.

(c) Dust Deposition

All of the material received on site will be transported in covered trucks. Further hardstanding of the site and correct maintenance of this area during spells of dry weather (through the use of the water bowser) will ensure that no significant dust is generated

during the movement of vehicles on the site. All friable material will be stored inside the proposed site buildings and therefore will not be subject to the influence of winds that may distribute this material over a wide area. A strict on site policy of maintaining closed doors at all times (apart from receipt and dispatch of waste) for each of the site buildings will minimise the emission of dust from the building and hence any off-site impact.

In conclusion, based on the extensive baseline and predictive studies carried out for the above parameters and strict adherence to the mitigation measures, it is contended that the proposed development will not have a significant impact on the air quality of the receiving environment.

3.7 NOISE

3.7.1 Baseline Noise Study

A survey of the baseline noise levels at the site was carried out by Bord na Móna Technical Services, to determine current noise levels at the proposed Oxigen Environmental Ltd, Waste Recycling and processing facility in Ballymount Road Lower, Clondalkin, Dublin 22.

A day time acoustic assessment was undertaken on the 28th April 2004 between the hours of 08:00 and 22:00 at the locations given in Table 3.7.1.

A night time acoustic assessment was undertaken on the 27th & 28th April 2004 at the locations given in Table 3.7.1 between the hours of 22:00 and 08:00.

Established acoustic methodologies as outlined below were applied for this assessment and subsequent interpretation of the resultant data.

(1) Standards and Guidance

The acoustic assessment and subsequent reporting are in accordance with International Standard Organisation (ISO) 1996 Acoustics – Description and Measurement of Environmental Noise Part 1, 2, and 3 in addition to relevant sections of the Environmental Protection Agency – Environmental Noise Survey Guidance Document.

(2) Monitoring Locations

Table 3.7/1 below presents a geographical description of the four site locations and the nearest noise sensitive location selected to determine the current site specific noise environment. Location N1 is the nearest sensitive receptor which is approximately 180m from the boundary of the waste recycling and processing facility. The nearest receptor is a private residential dwelling.

The remaining noise sampling locations N2 to N5 are within the site boundary and were chosen according to their geographical situation. Each location represents the four major compass variables of North, South, East & West and sampling was carried out at these positions accordingly.

TABLE 3.7.1: LOCATION OF NOISE MONITORING POINTS		
Sample Point Reference ID	**Location (geographical reference from site)**	**Justification**
N1	Private Dwelling to South*†	To assess the background noise levels at the perimeters of the site
N2	Northern Boundary	
N3	Southern Boundary	
N4	Eastern Boundary	
N5	Western Boundary	

*Nearest Sensitive Receptor

† Approximately 180m from site boundary

(3) Monitoring Equipment

The following equipment was employed during the acoustic assessment on the 28th April 2004.

- Bruel & Kjaer Real-Time Noise Analyzer Type 2260 Investigator
- Bruel & Kjaer Sound Analysis Software BZ 7210
- Model 2260 Serial No. 2361174
- Date of Certification and Calibration 26th November 2003
- Microphone Type: Bruel & Kjaer 4189 Serial No. 2363893
- Prisma Tripod.

Each ambient noise level measurement was approximately 30 minutes in duration for daytime monitoring and 15 minutes at night. Weather during the day time monitoring period was dry, with partially cloudy skies, dry ground conditions and calm wind conditions. Weather conditions during the night time monitoring period were cloudy, calm, with dry ground conditions. The monitoring equipment was manned throughout the sampling intervals and observations of noise sources on and off site were subjectively noted in order to aid the interpretation of the results. All measurements were taken with the noise meter positioned at 1.5 m height above local ground level and 1-2 m away from reflective surfaces.

(4) Measurement Parameters

At each of the monitoring locations the following data parameters were recorded:

- L_{eq} Values:

  L_{eq} (t) values represent the continuous equivalent sound level over a specified time (t). This value expresses the average levels over time and is a linear integral.

- Max. P Values:

  The Max. P value represents the maximum sound pressure level produced by a source during the monitoring period.

- L_{90} and L_{10} Values:

  The L_{90} and L_{10} values represent the sound levels exceeded for a percentage of the instrument measuring time. L_{10} indicates that for 10% of the monitoring period, the sound levels were greater than the quoted value. L_{10} is a good statistical parameter for expressing event noise such as passing traffic. The L_{90} represents post event sound levels and is a good indicator of background noise levels.

(5) Vibration Sources

There are currently no vibration sources located in the vicinity of the existing site. Hence there was no baseline evaluation of vibration levels undertaken.

3.7.2 Results of the Baseline Noise Survey

Tables 3.7.2 & 3.7.3 below presents the results of the day time and night time noise survey undertaken on 27th and 28th April 2004 at the proposed Oxigen Environmental Ltd. waste recycling and processing facility in Ballymount Road Lower, Clondalkin, Dublin 22.

TABLE 3.7.2: DAYTIME NOISE MEASUREMENTS

Location	Period (mins)	Time	L_{eq} dB(A)	L_{10} dB(A)	L_{90} dB(A)	Max. P dB(A)
N1	30	11:09	75.1	78.3	63.6	93.3
N2	30	08:08	65.7	68.9	52.7	89.5
N3	30	08:42	57.1	58.3	55.4	69.5
N4	30	09:15	56.6	58.8	53.3	66.3
N5	30	10:30	55.8	57.4	53.6	69.6

TABLE 3.7.3: NIGHT-TIME NOISE MEASUREMENTS

Location	Period (mins)	Time	L_{eq} dB(A)	L_{10} dB(A)	L_{90} dB(A)	Max. P dB(A)
N1	15	02:00	60.4	55.1	43.0	83.6
N2	15	02:51	52.9	45.2	40.1	81.0
N3	15	03:10	46.4	49.2	42.5	57.4
N4	15	03:29	47.0	49.0	40.4	67.1
N5	15	03:48	48.4	52.0	43.5	59.0

Daytime Noise

Daytime noise levels at the site ranged between L_{eq} 55.8 dB(A) to 75.1 dB(A) and was mainly due to traffic noise on Ballymount Road Upper, the M50 motorway and N7 Roadway (city bound), distant intermittent traffic noise on Naas Road (N7 southbound), Long Mile Road and Ballymount Road Lower leading to the Walkinstown area, and noise associated with the operation of adjacent factories. The majority of the noise events that were subjectively noted during monitoring were primarily from off site sources, since no activity actually takes place at the proposed waste recycling and processing facility at present. All of the Leq dB(A) results for all of the locations monitored are above the day time noise limit stipulated by the EPA for licensed facilities of 55 dB(A). This result is to be expected due to the high volumes of traffic in the Ballymount area and surrounding road network throughout the day.

Location N1 is located close to a private dwelling on Ballymount Road Upper. This is a sensitive receptor approximately 180m from the site boundary and is at a location which currently experiences high levels of traffic, as there are a number of facilities in the industrial estate that operates twenty four hours per day, seven days per week, with mechanical devises only operating between 06:30 and 23:30. At location N1, the most notable noise source is traffic on Ballymount Upper road. The traffic on this section of road is very heavy during the morning period. Consequently the peak noise levels at this location are attributed to the passing of vehicles. This is demonstrated by the high L_{eq} value of 75.1 dB(A) and an L_{10} value of 78.3 dB(A). The L_{90} value of 63.6 dB(A), which is a good indicator of background noise levels, is also considered high. Aeroplanes flying overhead and noise from adjacent facilities such as forklift trucks moving and reversing, metal containers being transported and trucks reversing also contributed to noise level readings at N1.

At location N2, the background noise levels are considered high. The L_{eq} 65.7 dB(A) and L_{10} 68.9dB(A). The L_{90} value of 52.7 dB(A) is below the EPA stipulation. The predominant noise sources at this location was traffic on the industrial estate roads, background noise from the M50 (Red Cow Interchange), noise from adjacent factories such as truck horns, reversing beeps and metal clanging in a nearby factory.

At location N3 the monitoring survey recorded noise measurements are not particularly high compared with N1. There are noise sources which included constant traffic noise emanating

from the road which runs along the southern boundary of the proposed facility. There is a continuous stream of traffic including HGV's, cars and vans onto the turnpike roundabout situated at this location. These heavy traffic levels would account for the L_{eq} level of 57.1 dB(A). This location recorded an L_{90} level of 55.4 dB(A) during the monitoring period. Other noise sources subjectively noted at this location were background traffic noise on the M50 (Red Cow Interchange) and aircraft passing overhead.

Location N4 is situated at a location which is adjacent to a busy road section within the industrial estate. Noise sources on the road, grass cutting on the proposed facility, the M50 (Red Cow Interchange) and adjacent factories all contributed to a L_{eq} level of 56.6 dB(A) at this location. The character of the industrial estate's continuous noise events also has an influence on the L_{10} 58.8 dB(A) and L_{90} 53.3 dB(A) values, which would not be considered to be particularly high. However the L_{90} value at N4 is the lowest for all of the locations monitored during the daytime period.

Location N5 is situated at a location which is adjacent to a busy road section within the industrial estate on the western boundary. A significant amount of traffic passes by this location to access the M50 via the Red Cow interchange. Traffic noise is the predominant noise source at this location and this is indicated by an L_{eq} level of 55.8 dB(A). The L_{10} and L_{90} parameters at this location are not particularly high. The L_{90} value of 53.6 dB(A) is a good indicator of background noise levels and this result is influenced by the continuous nature of the traffic movements in the industrial estate. The L_{10} value of 57.4 dB(A) is considered high and is influenced primarily by passing traffic. The results of a traffic survey completed by Bord na Móna on 27th May 2004 estimated that during the morning period, approximately 20% of the total vehicle movements at N5 were HGV's. This would account for up to 74 HGV's passing this location during the monitoring period. There were also 2 occurrences of aircraft passing overhead during the survey.

Night-time Noise

Night-time noise levels at the site ranged between L_{eq} 46.4 dB(A) to 62.5 dB(A) and was mainly due to traffic noise on Ballymount Road Upper, the M50 motorway and N7 Roadway (city-side), distant intermittent traffic noise on Naas Road, Long Mile Road and Ballymount Road Lower leading to the Walkinstown area, and noise associated with the operation of

adjacent factories. The majority of the noise events that were subjectively noted during monitoring were primarily from off site sources, since no activity actually takes place at the proposed waste recycling and processing facility at present. All of the Leq dB(A) results for all of the locations monitored are above the night-time noise limit stipulated by the EPA for licensed facilities of 45 dB(A). This result may be expected due to the volume of traffic in the Ballymount area throughout the night.

Location N1 is located close to a private dwelling on Ballymount Road Upper approximately 180m from the site boundary. This is a sensitive receptor and is at a location which experiences high levels of traffic, as there are a number of facilities in the industrial estate that operates twenty four hours per day, seven days per week, with the operation of mechanical devices restricted to 06:30 and 23:30. Although there is a significant drop off in traffic movements during the night time period, noise levels are still considered to be quite high, with an L_{eq} level of 60.4 dB(A). However due to its urban and industrial location on the edge of a major city, this location is affected by high background noise levels emanating from the M50 motorway and the Red Cow interchange. This is supported by an L_{90} value of 43.0 dB(A) and an L_{10} value of 55.1 dB(A).

Location N2 is situated on the northern boundary of the facility and the L_{eq} 52.9 db(A) level is above the EPA stipulated guideline for night time noise limits of 45dB(A). This value was affected by traffic on the industrial estate roads, with particular influence from HGV's passing intermittently. However it was subjectively noted that background noise levels emanated from the M50 & Red Cow interchange and adjacent factories. The L_{90} value of 40.1 dB(A) for N2 was the lowest recorded L_{90} value throughout the night time monitoring survey for all locations. The L_{10} 45.2 dB(A) is not particularly high and this value is more likely to reflect short intermittent noise events..

Sampling at location N3 resulted in the lowest L_{eq} value 46.4 dB(A) being recorded for all the locations monitored. It was subjectively noted that the L_{eq} level at this location would have been influenced by noise from traffic on the M50 & Red Cow interchange, HGV's & motor cycle activity and intermittent traffic in the industrial estate. The L_{90} value of 42.5 dB(A) is considered low and is a good indicator of general background noise levels. The incidence of

intermittent noise events at this location, is supported by the L_{10} 49.2 dB(A) value and the subjective notes taken throughout the sampling period.

The L_{eq} result of 47.0 dB(A) at location N4 is influenced by background noise from an adjacent facility such as forklift trucks moving and reversing, metal containers being transported and trucks reversing, background noise from traffic on the M50 & Red Cow interchange, aircraft flying overhead and a helicopter flying low over the proposed facility. The L_{90} result at N4 is 40.4 dB(A). This indicates that for 90 percent of the sampling time, noise levels did not rise above 45 dB(A). This is corroborated by subjective notes taken during sampling which indicates that noise events were short in duration.

The L_{10} value recorded at N5 is 52.0 dB(A). Subjective notes recorded during the sampling period, identifies HGV's and the movement of equipment and machinery in an adjacent facility as the main sources of noise contributing to this result. The L_{90} level of 43.5 dB(A) is considered low and is below the night time noise limit of 45 dB(A) stipulated by the EPA.

In summary, both the day and night-time results show high background noise levels at all locations associated with activities and traffic movements at nearby facilities and background noise associated with large volumes of traffic on the surrounding road network (M7, M50, Longmile Road).

3.7.3 Environmental Impacts

Construction Phase

Noise

The construction phase is expected to take place over a period of 6-12 months and activities will generally be restricted to daylight hours between 8.00am and 18:00pm. Weekend construction work is to be restricted to Saturday mornings only (9:00am – 13:00pm). During the various stages of the construction phase, noise will be generated due to the use of construction equipment with a potential to generate noise:

- Site preparation and construction of the proposed site buildings and landscaping of the site surface (noise may be generated by heavy goods vehicles removing spoil and delivering materials, earth moving machinery such as excavators, bulldozers and dump trucks
- Delivery and positioning of plant machinery, noise from the shovel loaders and moving/reversing lorries.

The Sound Power Levels of the equipment that may be used during the construction phase of the proposed development is presented in Table 3.7/4:

TABLE 3.7/4 : PREDICTED EQUIPMENT NOISE LEVELS

Plant Equipment	Predicted L_{wa}
Tractor Scraper	113 at 1m
Dozer	112 at 1m
Small Articulated Dump Truck (to be used in berm forming/removal of overburden)	105 at 1m
Rigid Body Dump Truck	119 at 1m
Hydraulic Excavator	110 at 1m

Construction noise impacts will be assessed in accordance with BS 5228:1997 – Noise and vibration control on construction and open sites. This standard does not however specify noise limits for construction activities but does recognise that since the activities are temporary, noise limits higher than those associated with permanent installations are generally acceptable in the community. International practice dictates that noise limits in the range $L_{Aeq, 1hr}$ of 65 to 75dB are generally acceptable for daytime construction activities.

Assuming a target community noise exposure level of 65 to 75dB(A) as previously mentioned, the permissible sound pressure level (L_{wa}) associated with site construction activities is calculated as follows. The nearest noise sensitive location is located 180m away from the current site boundary where the noisiest construction activities are likely to occur. Assuming a minimal ground-air attenuation of 3dB, the sound pressure level allowed at the construction site to meet the requirement of a community noise exposure in the range $L_{Aeq,\ 1hr}$ of 65 to 75 is calculated as:

$$L_{wa} = (65 \text{ to } 75) + 3 + (20 \log 180 + 8) = 119 \text{ to } 130 \text{ dB}$$

The maximum noise levels associated with individual construction activities at the proposed development will not generally exceed 120dB(A) resulting in a predicted community exposure level at the nearest sensitive receptor of 69dB(A).

As previously mentioned, the construction activities are not continuous, hence the L_{Aeq} experienced at the nearest sensitive receptor will be even lower than this value.

In summary, construction works will temporarily increase the noise levels in the immediate vicinity during the construction phases of the project, due to the use of excavation, landscaping, soil removal and construction of associated ground works and site buildings.

Taking into account the fact that on-site construction activities shall occur during normal working hours and shall employ good engineering and noise mitigation measures where required, it is considered that the noise impacts on the local environment during the construction phase of the proposed development will not be significant.

Vibration

The method of construction and the current state of the site indicates that there will be no major vibration sources during construction phase.

Operation Phase

Noise

The waste recycling and processing facility will be open twenty four hours per day, seven days a week, with the operation of mechanical devices restricted to between 06:30 to 23:30. However the majority of the traffic movements to and from the site between 06:00 and 22:00 Monday to Sunday and with only limited movements occurring outside these hours. Waste is not removed to or from the site after 22:00 hours.

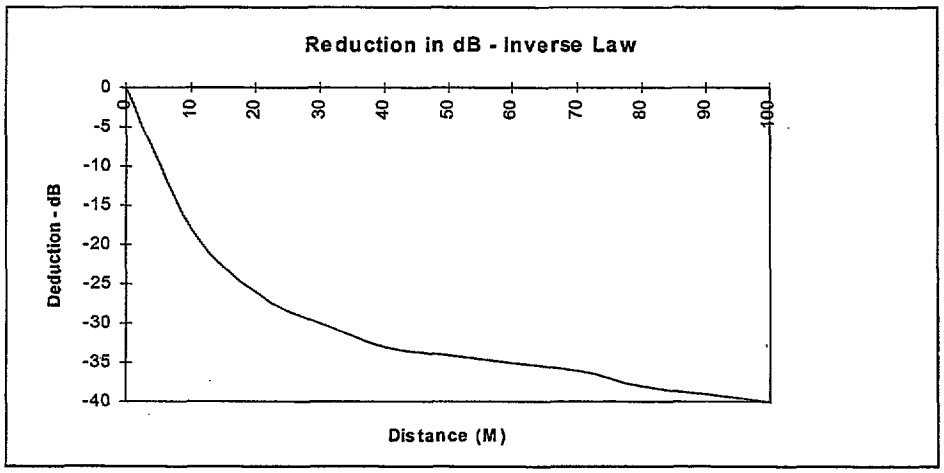
The main noise sources during the operational phase of the waste recycling and processing facility are likely to include:

- Lorries entering and leaving the site
- Employee Vehicles entering & leaving the site.
- Timber shredder
- Skid Steer Loader (Mustang 2070)
- Loading shovel
- Screening Equipment (Trommel, OCC / ONP Star Screens & Conveyors).
- Ballistic Separator
- Balers

Source Noise Predictions:
Tables 3.7/5 and 3.7/6 below show the predicted noise impact at the nearest sensitive receptor from the sound pressure reference levels for the proposed equipment likely to be used during normal operations. These predictions account for the normal hours of operation from 06:00 to 22:00 and out of hours operations between 22:00 and 06:00, when onsite activity will be significantly reduced.

To predict the noise level of identified on-site noise sources at the noise sensitive locations the sound pressure reference level of each source was obtained at a reference distance within its near field, usually 1m. This reference level is in most cases provided by the manufacturer of specific items of equipment and in other cases was obtained by actual noise measurements for operating equipment in similar waste processing facilities. Predictions shall be carried out by employing the inverse square law, which is a "rule-of-thumb" used to calculate the expected reduction in noise levels as one moves away from the source. Generally, as one doubles the distance from the source, a reduction of 6 dB is expected. Within a confined space, however, this rule does not apply due to reflection where a diffuse field is set up at a level higher than that expected from this law. The graph below indicates the expected reduction in sound level as one moves away from the source. The curve flattens out as the distance increases due to the logarithmic function that determines the noise level at a particular distance.

Graphically this may be represented as follows on Figure 3.7/1 below:



The Inverse Square law is defined as.

$$Lp_2 = Lp1 - 20 \text{ Log } (R2/R1)$$

Lp_2 is the calculated sound pressure level at R2 meters towards the receiver location

Lp_1 is the measured reference sound pressure level at R1 meters from the source

Table 3.7/5: Sound Pressure Reference levels for the proposed equipment to be employed at the waste recycling and processing facility and their predicted noise impact– Skip Waste Building

Proposed Equipment	SPL Ref. dB A	Distance (m) of Noise Source(s) to Noise Sensitive Location(s) (Approx.) note 1	Predicted Noise Levels (dB A) At the Noise Sensitive Locations
		NSL1	NSL1
Screening Machine	76@20m	300	52.5
Truck Delivering	90@1m	300	40.5
Forklift operating	78.6@1m	300	29.1
Volvo Loader	90@1m	300	40.5
Skid Steer Loader	84@1m	300	34.5
Accumulative Noise when working in unison	-	-	53.1
Accumulative Noise when working in unison taking into account building / barrier attenuation of at least 5 dB(A)	-	-	48.1

Table 3.7/6: Sound Pressure Reference levels for the proposed equipment to be employed at the waste recycling and processing facility and their predicted noise impact– Dry Recyclables Building			
Proposed Equipment	SPL Ref. dB A	Distance (m) of Noise Source(s) to Noise Sensitive Location(s) (Approx.) note 1	Predicted Noise Levels (dB A) At the Noise Sensitive Locations
		NSL1	NSL1
Screening Machine	76@20m	400	49.9
Truck Delivering	90@1m	400	38
Forklift operating	78.6@1m	400	26.5
Volvo Loader	90@1m	400	38
Skid Steer Loader	84@1m	400	32
Accumulative Noise when working in unison	-	-	50.5
Accumulative Noise when working in unison taking into account building / barrier attenuation of at least 5 dB(A)	-		45.5

Sound pressure reference levels used in predictive noise monitoring are generally taken from the design specifications for each plant equipment as provided by the manufacturer. At this time, Oxigen Environmental Limited cannot provide a comprehensive list of the plant that they intend to utilise at the Ballymount waste recycling and processing facility. Therefore the above assessment was based on a generic list of equipment that is likely to be used during normal operations and which has been used on similar noise impact prediction surveys. The sound pressure reference levels for the trommels were not available during the preparation of the source noise prediction calculations. However, since each trommel will be located indoors, its noise contribution at the boundary or nearest sensitive receptor is not likely to be of significance.

From the results of the noise prediction calculations it is shown that the noise contribution from each of the buildings is below the baseline day time and night time levels experienced at the nearest sensitive location, N1. In the event that all plant and machinery was operating simultaneously in both buildings the daytime level predicted at the nearest sensitive receptor would be 50 dB. In the absence of national guidance notes, the British Environmental Protection Agency guidance values as stated in the Horizontal Guidance for Noise; Part 2 – Noise Assessment and Control (see http://www.environment-agency.gov.uk/commondata/105385/h3_pt2__june_2004__v3_353249.pdf) are used. These state that '.... *if there is a difference in level of 10 dB or more then contribution of the lower*

source can be disregarded'. Therefore as the difference between the lower source (in this case the noise from the plant, which is 50 dB) and the higher source (the background noise level, which is 63.5 dB), is greater than 10 dB, it can be concluded that that the noise from the plant would have a minimal impact on the baseline noise level.

3.7.4 MITIGATION MEASURES

Construction Phase

Noise

The construction phase of the proposed development will occur over a period of 6 months and will be restricted to daylight hours, typically between 8am and 6pm. The most significant noise impacts will occur during the initial site preparation phase. This will be of short duration and hence any impact will be finite.

It is therefore contended that due to the relatively short duration of the construction phase of the proposed development, the noise impact on the nearest sensitive receptors are not likely to be of significance.

All construction plant and equipment will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988, (Statutory Instrument No. 320 of 1988). Typical noise levels for construction machinery ranges from 119 to 130 dB at 1m. However, the negative impact caused by this disturbance will be minimised due to short term construction phase timeframe.

There are several mitigation measures that can be put in place to further reduce noise levels impacting on the receiving environment. These include:

- Proper training of operators in equipment use to minimise noise generation, excessive revving of engines, ensuring that vehicles are operated with noise control hoods closed.
- Proper maintenance of vehicles and equipment, checking the efficiency of silencers, lubrication of bearings
- The control of on-site activities through the implementation of good management practices will combine to ensure that the noise generated at the site will not have any undesirable effects on the existing neighbouring environment.
- Selection of plant with low inherent potential for generation of noise and / or vibration

Vibration

It is not anticipated that any vibration will occur during the construction phase of the site as no major excavation or blasting required. Therefore no mitigation is required

Operation Phase

Noise

The main noise sources listed above are not likely to be operating continuously during the day and therefore, any impact will not be of a continuous nature. Also, it is proposed that all operations concerning sorting / recycling of material will take place indoors and thus further reducing the potential impact from noise sources. However the mitigation measures detailed below should apply to any outdoor activities associated with the operation of the plant and when the plant building entrances / exits (including loading bay doors) are open.

There are several mitigation measures that can be put in place to further reduce noise levels impacting on the receiving environment.

These include:

- Proper training of operators in equipment use to minimise noise generation, excessive revving of engines, ensuring that vehicles are operated with noise control hoods closed.
- Proper maintenance of vehicles and equipment, including the conveyors, screening equipment, shovel loaders and compacting machinery.
- Monitoring of site noise levels to ensure compliance and implementation of cost effective control measures.
- The control of on-site activities through the implementation of good management practices will combine to ensure that the noise generated at the site will not have any undesirable effects on the existing neighbouring environment.
- Selection of plant with low inherent potential for generation of noise and / or vibration
- The closure of all doors on the main plant building.

Vibration

It is not anticipated that any vibration will occur during the operational phase of the site. Therefore no mitigation is required.

3.8 TRAFFIC

3.8.1 Introduction

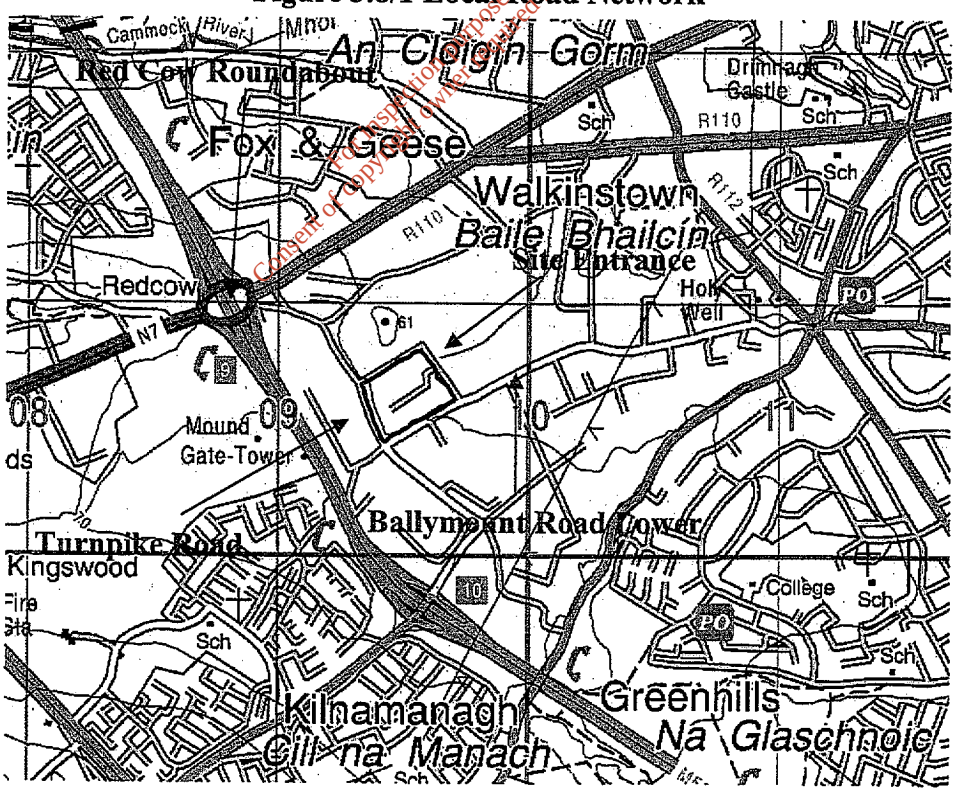
This section of the Environmental Impact Statement (EIS) examines the expected volumes of traffic that will be generated as a result of the proposed development and its impact on the surrounding road network.

3.8.2 Overview of the Road Network and Traffic Volumes

(1) Existing Road Network

The location of the proposed development site with regard to the local network is shown in Figure 3.8/1 below. The site is located approximately 0.5 km east of the M50 motorway, southeast of the Red Cow Roundabout. The site is located within the Ballymount Industrial Estate, and is located on a brownfield site that was previously operated as steelworks. The proposed development will use the existing entrance to the site. The site is bordered on all four sides by roads, namely the Ballymount Road Lower to the south, Turnpike Road to the west and to the north and east by internal industrial estate access roads.

Figure 3.8/1 Local Road Network



Traffic accessing the proposed development will approach the site either from Walkinstown Cross, the M50 or the Red Cow Roundabout via Ballymount Road Lower and Turnpike Road. The same routes will be used by traffic exiting the site. Ballymount Road Lower and Turnpike Road are single two-lane carriageways, both having approximate width of 7.5 m. The general surfacing and structure of the roads is considered good.

(2) Existing Traffic Volumes

In assessing the existing traffic situation at any site proposed for development, traffic impact analysis must be based on reliable and up to date data obtained through recognised and appropriate data collection methods. The capacity and operation of a road network system is dependent on the junctions within that network and it is the operation of these junctions which determine the capacity and vehicle delay on the system. The main corridors upon which the traffic generated by the proposed development will have an impact are the Ballymount Road Lower and Turnpike Road.

In order to assess the current traffic conditions on the road network appropriate to the development site, a traffic and transportation survey was carried out at the site. In order to determine the potential impact of the development two locations were chosen to undertake the survey, which were:

- T-junction between the Industrial Estate access road and Turnpike Road, and
- T-junction between the Industrial Estate access road and Ballymount Road Lower.

A traffic survey was carried out on the 27th May 2004, for both the morning and evening peak hours.

Table 3.8/1: Existing Traffic Volumes at Turnpike Road Junction (AM)

Start Time	North bound	South bound	Turning left from access road	Turning right from access road	From North bound to access road	From South bound to access road
7:30	94	37	4	1	5	4
7:45	109	35	8	0	4	2
8:00	117	44	10	3	18	10
8:15	161	37	15	3	17	10
8:30	159	40	12	1	13	11
8:45	183	43	8	5	16	9
9:00	153	52	6	5	15	9
9:15	167	43	14	4	12	4
9:30	171	43	11	4	11	6
9:45	140	41	14	10	1	6

Table 3.8/2: Existing Traffic Volumes at Turnpike Road Junction (PM)						
Start Time	**North bound**	**South bound**	**Turning left from access road**	**Turning right from access road**	**From North bound to access road**	**From South bound to access road**
16:30	36	23	36	5	0	4
16:45	50	16	35	0	0	3
17:00	40	12	35	0	0	2
17:15	48	8	37	1	0	0
17:30	42	6	36	0	1	1
17:45	59	8	46	0	1	1
18:00	50	13	45	0	1	1
18:15	51	11	38	0	1	1

Table 3.8/3: Existing Traffic Volumes at Ballymount Road Lower Junction (AM)						
Start Time	**West bound**	**East bound**	**Turning left from access road**	**Turning right from access road**	**From West bound to access road**	**From East bound to access road**
7:30	75	102	9	4	16	10
7:45	118	122	3	7	20	7
8:00	118	154	2	4	29	12
8:15	153	146	7	18	42	10
8:30	144	161	1	12	24	10
8:45	127	143	1	12	12	11
9:00	127	154	5	12	14	12
9:15	146	134	3	11	13	9
9:30	113	113	5	15	17	4
9:45	102	95	3	12	10	3

Table 3.8/4: Existing Traffic Volumes at Ballymount Road Lower Junction (PM)						
Start Time	**West bound**	**East bound**	**Turning left from access road**	**Turning right from access road**	**From West bound to access road**	**From East bound to access road**
16:30	77	96	5	41	64	8
16:45	67	49	6	49	65	3
17:00	59	74	9	55	42	7
17:15	27	54	2	23	40	4
17:30	38	53	0	26	54	6
17:45	51	58	2	29	40	4
18:00	62	50	1	31	23	5
18:15	70	38	7	16	18	11

The traffic survey results can be shown in the following figures, with evening figures in brackets (Figure 3.8/2 and 3.8/3)

Figure 3.8/2: Peak time figures for Turnpike Road.

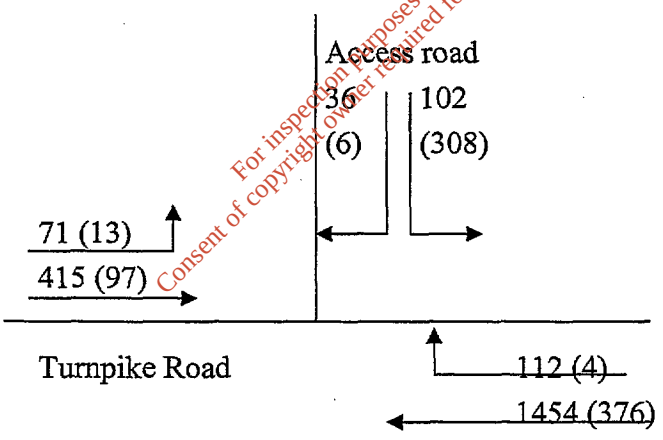
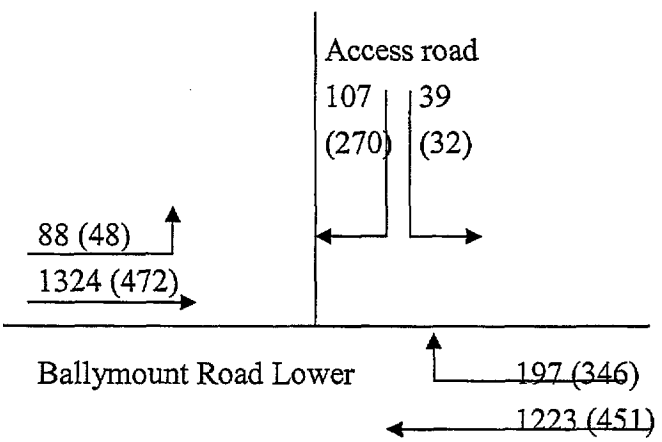


Figure 3.8/3: Peak time figures for Ballymount Road Lower.



(3) Proposed Road Development within the vicinity of the site.

To determine the proposed development planned for the existing road network, the National Development Plan 2000-2006 and the County Development Plan for South Dublin County Council (Draft 2004 - 2010) were consulted. The National Development Plan (NDP) 'is laying the foundation for Ireland's further economic and social development', of which road developments and improvements play a key role. National and regional road development plans have been outlined which will be undertaken by the newly established Road Design Departments within each County Council. As part of the NDP the M50 motorway is to be completed once the archaeological investigations at Carrickmines has been completed, and the Red Cow Roundabout will be upgraded to incorporate the Lucas light rail network infrastructure. The M50 motorway and Red Cow Roundabout will be integral to the access to the site for operational vehicles.

The specific objectives (Part 3) within the Draft County Development Plan for South Dublin County Council provide for 'the improvement of the road network to cater for the transportation requirements of the County'. The development plan has set out two specific time frames for road development i.e. six year roads objective (for lifetime of development plan) and long term objectives. Within both time frames the Ballymount Road Lower has been identified as a road that requires improvement, with the M50 set out in the six year road objectives for an upgrade.

3.8.3 Environmental Impacts

Traffic generation from the site

The maximum amount of waste that will be accepted at the facility will be 350,000 tonnes per year. The predicted maximum volume of waste that will be accepted at the facility will be 7,000 tonnes of material per week based on an average weight of 15 tonnes per refuse vehicle (based on typical weights recorded by Oxigen Environmental Ltd.). Nevertheless the worst case scenario is assumed for the traffic predictions. The waste will be transported to and from the site by 15 tonne refuse vehicles and skip trucks. Traffic movements will also consist of road sweepers which will be parked in the facility overnight. The waste facility is expected to operate twenty four hours a day seven days a week (with the exception of mechanical devices which will be restricted to between 06:30 to 23:30), with the majority of the traffic movements to and from the site between 06:00 and 22:00 Monday to Sunday, with limited movements occurring outside these hours.. These hours may vary depending on market demand.

The acceptance of 350,000 tonnes of material at the site will require 480 inbound and 480 outbound trips per week. This can be broken down to 80 inbound and 80 outbound trips per day, or a maximum of approximately 160 lorry movements (two-way) per day. There will be approximately an additional 20 (two way) movements per day from road sweepers, and ancillary vehicles servicing the site. Processed waste shall be removed off site by the ninety outgoing vehicles, which will bring it to its final destination prior to collecting the next load.

The waste recycling and processing facility will employ 80 full time employees, however there is a separate entrance servicing the office building (see Drawing D.1), which will be used by employees at the site.

It is necessary to distribute this traffic onto the road network based upon the functional area for the waste collection. Traffic movements associated with the waste recycling and processing facility will primarily be that of refuse vehicles and skip trucks entering the site laden with waste and outbound vehicles empty after discharging its load. It is predicted that the proposed development will require approximately three to four years before it will reach the maximum traffic movement figures as outlined above, and that during the initial phases during which the facility shall be operated under the Waste Permit (WPR 041) the traffic movements will be approximately 74 per day (i.e. 37 inbound and 37 outbound).

Junction Analysis

The impacts of the development on the existing road network are likely to be encountered at either the junction with Turnpike Road or Ballymount Road Lower. In order to determine the impact in terms of junction operation and capacity from the proposed development, an analysis of the junction was carried out using the computer modelling program PICADY4 (Priority Intersection Capacity and Delay) produced by the Transport Research Laboratory (UK). This programme is

used to predict the capacities, queue lengths and delays at junctions. The programme gives the Ratio of Flow to Capacity (RFC), and the length and queuing delay. The RFC is used to access the capability of the junction in terms of traffic movement. An RFC of 0.850 or less is considered to be acceptable during the peak period. An RFC of this value indicates that a junction is at 85% of it's operational capacity with a reserve capacity of 15%.

In order to assess the predicted impacts of the traffic the following assumptions were made:

- That traffic would approach and exit the site in equal numbers from the left and right of the entrance
- The majority of the traffic would have an origin within the Greater Dublin Area.

The programme was carried out using the maximum predicted traffic movements for the facility (i.e. 180 movements per day), and using the existing traffic volumes from the peak hours namely 07:30 to 10:00 and 16:30 to 18:30. A full copy of the PICADY4 results are given in Appendix 5 with a summary of the results given below in Tables 3.8/5 and 3.8/6..

Table 3.8/5 Queuing Delay Information for Proposed development at Turnpike Road

Junction	Total demand		Queuing Delay		RFC
	Vehicles	Veh/hr	minutes	Mins/veh	
08:00 – 09:30					
Turning left from access road	46.2	30.8	5.6	0.12	0.059
Turning right from access rd.	82.9	55.3	18.8	0.23	0.173
From North bound to access rd	330.1	220.1	60.2	0.18	0.230
All	1499.1	999.4	84.6	0.06	max 0.331
16:25 – 17:45					
Turning left from access road	27.2	18.1	3.3	0.12	0.035
Turning right from access rd.	251.4	167.6	57.8	0.23	0.387
From North bound to access rd	45.8	30.5	5.9	0.13	0.044
All	721.7	481.1	67.0	0.09	max 0.493

Table 3.8/6 Queuing Delay Information for Proposed development at Ballymount Rd. Lower

Junction	Total demand		Queuing Delay		RFC
	Vehicles	Veh/hr	minutes	Mins/veh	
08:00 – 09:30					
Turning left from access road	100.6	67.1	16.6	0.16	0.155
Turning right from access rd.	46.2	30.8	14.2	0.31	0.136
From East bound to access rd	445.5	297.0	110.8	0.25	0.358
All	2008..8	1339.2	141.6	0.07	max 0.526
16:25 – 17:45					
Turning left from access road	255.5	170.3	46.2	0.18	0.336
Turning right from access rd.	57.1	38.1	12.8	0.22	0.124
From East bound to access rd	488.6	325.7	122.6	0.25	0.488

All	1421.7	947.8	181.6	0.13	max 0.647

The results of the computer modelling indicate that at both junctions the predicted Ratio of Flow to Capacity (RFC) value is less than 0.85 and therefore the impact due to the increase in traffic numbers can be accommodated by the existing road network.

3.8.4 Mitigation Measures

The following traffic management measures are proposed to ensure the free flow of traffic during the life-time of the waste recycling and processing facility:

- A regular inspection of the public highway will be undertaken and in the event of significant quantities of mud on the road, the road shall be swept accordingly. The road will also be inspected for any wind blown litter, which will be collected accordingly. All trucks shall be suitably covered to prevent the accumulation of litter during transport.

- The site entrance is located to the north east of the site, with a system of two weighbridges that will allow for two vehicles to be entering or leaving the site at the same time without contributing to the overall queue system.

- Signs will be placed on the approaches to the waste recycling and processing facility, which will designate the location of the facility and also warn traffic of heavy vehicles turning.

- Traffic to and from the site will not be permitted to park on the public roadway or to impede the free flow of traffic on the adjoining road network.

3.9 CLIMATIC FACTORS

3.9.1 Introduction

Climate change has been identified as the most significant worldwide environmental problem today. In order to stabilise global emissions, cuts of up to 70% in global emissions are necessary. It is expected that the EU will reduce emissions by 8% overall by 2012 under the Kyoto agreement. As part of the EU target, Ireland has agreed to limit the growth in greenhouse gas emissions by 13% above the 1990 levels. (National Climate Change Strategy, October 2000, Dept of Environment and Local Government)

The characterisation of the climatic conditions prevailing at the Ballymount Industrial Estate was conducted utilising historical meteorological data compiled by the Meteorological Service. There is no site specific climatic information available for the specific study area, so information was obtained from the nearest climatological station, which was Casement Aerodrome (approximately 10 km south west of the site). It can be considered that the prevailing climatic conditions at Ballymount Industrial Estate would be similar to that in Casement Aerodrome, as there are only small topographical variations between the weather station and the site.

3.9.2 Baseline Data

(1) Wind

Monthly mean wind speeds recorded at Casement Aerodrome during the period 1968 to 1996 are presented in Table 3.9/1, while the percentage frequency of wind speeds occurring during the period 1981 to 2000 is presented in Table 3.9/2. As illustrated in the wind speed and the wind frequency summary table (period 1981 to 2000) for the Casement meteorological data presented in Appendix 6 a higher percentage of winds in the area are experienced in the range 200° to 270° from north, i.e. ranging from south southwest to west. Moderate to gentle breezes (3.4 to 7.9 m/s) dominate in the area (50% of the year). The strongest winds (greater than 11knots / 5.5m/s) occur during the period from October to March, with the average monthly wind speeds during this period ranging from 5.6 m/s to 7.0 m/s (11.2 to 14.1 knots). Low wind conditions (<3.3 m/s) are experienced at the site for approximately 28% of the year, predominately during the summer months, with the average monthly wind speeds during the April to September period ranging from 4.7 m/s to 5.4 m/s (8.7 to 10.1 knots).

Table 3.9/1: Wind Speeds (knots) at Casement Climatological Station 1968 - 1996													
Mean Monthly Speed	J	F	M	A	M	J	J	A	S	O	N	D	Ann
	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

TABLE 3.9.2: Percentage frequency of wind speeds at Casement Aerodrome 1981 - 2000			
Wind Speed (knots)	Wind Speed (m/s)	Beaufort Scale Descriptive Term	Total Percentage Frequency – All months 1981 to 2000
<1	0 – 0.2	Calm	2.0
1 – 3	0.3 – 1.8	Light air	11.3
4 – 6	1.8 – 3.3	Light breeze	14.6
7 – 10	3.4 – 5.4	Gentle breeze	23.0
11 - 16	5.5 – 7.9	Moderate breeze	26.8
17 – 21	8.0 – 10.7	Fresh breeze	13.0
22 – 27	10.8 – 13.8	Strong breeze	7.0
28 – 33	13.9 – 17.1	Near gale	1.9
34 - 40	17.2 – 20.7	Gale	0.4
41 - 47	20.8 – 24.4	Strong gale	0.05
48 - 55	24.5 – 28.4	Storm	0.003

(2) Precipitation

Average monthly and annual rates of precipitation over the period of 1968 - 1996 for Casement are presented in Table 3.9/3. The results indicate that the annual average rate of precipitation in this area is 711.7 mm. Long term monthly mean precipitation rates ranging from 48.9 mm to 73.1 mm with the highest monthly rainfalls occurring between the months of October to January. During winter the rainfall will be commonly associated with Atlantic frontal depressions whereas during the summer months high rainfall amounts will tend to be associated with intense thundery showers which may be localised in rainfall intensity.

Table 3.9/3: Precipitation Rates at Casement Climatological Station 1968 - 1996													
mm	J	F	M	A	M	J	J	A	S	O	N	D	Ann.
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
Daily Maximum	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

(3) Air Temperature

The pattern of long-term daily temperatures at Casement 1968-1996 is shown in Table 3.9/4. Air temperature ranges from a mean monthly temperature of 4.6°C in February to 15.2°C in July. The average annual temperature (28 year average) is approximately 9.3°C. The highest mean daily maximum temperature of 19.7°C occurs during the month of July. The extreme maximum and minimum temperatures and humidity values for the period are shown in Appendix 6. Climatological scientists have calculated that there has been an increase of 0.6°C ± 0.2°C in the global average surface air temperature since 1860. Known more commonly as 'global warming', this is thought to result from increased atmospheric concentrations of greenhouse gases which are discussed in further detail below.

Table 3.9/4: Air Temperature at Casement Climatological Station 1968 - 1996

°C	J	F	M	A	M	J	J	A	S	O	N	D	Ann
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
Daily Maximum	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

3.9.3 Environmental Impacts

All new developments will result in the release of greenhouse gases, as all will involve the burning of fossil fuels, either directly or indirectly. Accordingly, the development, while not energy intensive will result in the release of greenhouse gases to the atmosphere.

The main source of air emissions from operations at the proposed development that may have the potential to contribute to atmospheric concentrations of the pollutants of climatic concern (primarily CO_2, NOx and SO_2) would be vehicular/traffic.

Adherence to the mitigation measures as mentioned in previous sections (namely air and traffic) and good site practice during both the construction and operation phases of the proposed development will ensure that the overall impact of air emissions will not be significant.

3.9.4 Mitigation Measures

The use of energy efficient technologies in the development will minimise the pollution load generated by the development. Trucks delivering waste to the site will not be allowed to leave their engines idling.

In addition, the following pieces of legislation, technological advances and project design attributes will mean the contribution of carbon dioxide, sulphur dioxide and the oxides of nitrogen associated with on-site traffic movements to local climate change /atmospheric changes, are likely to be minimal:

- compulsory agreements between the European Commission and automobile manufacturers' to increase fuel efficiency and limit CO_2 emissions from new cars.
- the implementation of the Air Pollution Act for the sulphur content in petrol and diesel fuels.

3.10 LANDSCAPE & VISUAL IMPACTS

3.10.1 Introduction

The waste transfer and processing facility is located within a busy industrial estate, approximately 0.5 kilometres off the M50, to the south east of the Red Cow Roundabout. The site is bordered on all four sides by roads namely Turnpike Road, Ballymount Road Lower and a continuous estate access road.

The site entrance is located to the north east of the site, with access to the site via either the Turnpike Road or Ballymount Road Lower. These roads are closely connected to the national primary road, N7, the Dublin motorway M50, or to tertiary Dublin roads which will allow access to the markets throughout Dublin city. There are very few residential buildings within the vicinity of the facility.

The site was operated as a steel works by Corus Steel Ltd. (formerly Steel Company of Ireland Ltd.) until December 2003, when it was purchased by Oxigen Environmental Ltd. for the purpose of operating it as a modern waste transfer and processing facility for their current client base.

3.10.2 Baseline Visual and Landscape Assessment

Local topography, local screening vegetation (i.e. density of trees growing in the local area) and adjacent activities will determine the visibility of the site and its visibility from local residences and roads. Visibility will change with the seasons and the corresponding effect on foliage. Road users will be the main group affected by the waste transfer and processing facility.

The landscape and visual impact of the waste transfer and processing facility at Ballymount Industrial Estate would be caused by the physical change in the appearance of the site. The assessment of the existing environment in relation to landscape and visual impacts focused on:

- Landscape character,
- Context of the site in relation to the surrounding landscape,
- Topography,
- Land use,
- Visual,
- Change in landscape,
- Sensitivity of the landscape and,
- Designation of site.

Landscape character

The overall character of the existing site landscape is that of relatively low lying land in an urban industrialised setting.

The existing site was used as a steel works until December 2003, with the two large operations buildings and the office block still present on site. The site is bordered on all four sides by roads, with industrial and commercial dwellings located beyond. There is a continuous earth bank that is located to the south east and travels to the south west of the facility. This earth bank provides cover for the existing buildings, and restricts views of the facility operations from the two main routes.

Landscape context

The site lies within a large industrial estate, and is bounded on all sides by the industrial estate road network.

Topography

The site of the waste transfer and processing facility lies at approximately 59 m OD, with the earthen banks rising to approximately 63 m OD. The site would be classed as relatively flat, with minimal variances in the topography of the site. The site lies in the surface water catchment of the River Liffey, and within the sub-catchment of the River Camac.

Land use

The site was operated as a steel works by Corus Steel Ltd (formerly Steel Company of Ireland Ltd.) until December 2003. It is proposed to commence dry recycling operations within the site by October 2004 (subject to planning permission requirements SD04A/0358) in accordance with the conditions of the waste permit WPR 041.

Visual

The site is not overlooked, due to the flat nature of the surrounding terrain. The number of houses within this area is limited due to its zoning for industrial uses. It is proposed to operate the facility within the existing buildings on the site, and to construct two buildings (see Section 2) within the facility over the first five years. These buildings shall be constructed in accordance with the planning conditions as set out by South Dublin County Council. The earthen banks to the south east of the facility shall remain, with some additional trees to be planted to provide additional cover from the busy road network.

Change in Landscape

The landscape context of the site and surrounding area has progressively changed over the years from semi-rural to predominately industrial ollowing the zoning of specific areas with the County Development Plan.

Sensitivity of landscape

The site would not be considered sensitive due to the industrial/commercial nature of the surrounding areas.

Designation of the site

Under Section 9.3.2 of the Draft South Dublin County Council Development Plan, views and prospects are protected. The protected views and prospects have been listed in Table 13.9 of the draft plan. None of the protected views or prospects will be impacted upon by this development.

3.10.3 Environmental Impacts

The proposed development will be undertaken on an existing facility, with the existing buildings to be used as part of the process. It is proposed to construct two buildings near to the boundaries of the site. These buildings will be constructed in accordance with the conditions of the planning permission granted by South Dublin County Council, and will be designed in keeping with the buildings on site, and with the nature of the buildings surround the facility.

The site is bordered to the south by regional roads, which services the industrial estate. The impact on the general public will be this aspect of the site. The existing earthen banks with additional tree planting shall reduce this overall impact.

3.10.4 Mitigation Measures

The selection of trees planted will be appropriate to the site conditions and narrow crowned trees will be selected for the traffic movement areas to minimise the risk of future damage from high vehicles.

The colour and finishes selected for all buildings at the facility will continue to be selected in accordance with an overall colour scheme and will be muted in shade and tone, taking into account the surrounding environment, the scale of the buildings concerned and the local landscape context.

3.11 CULTURAL HERITAGE

3.11.1 Introduction

Cultural Heritage (Physical), in respect of a project, is assumed to include all humanly created features on the landscape, including portable artefacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area.

3.11.2 Baseline Cultural Heritage Assessment

As part of the documentary research, the following sources were examined from which a list of sites and areas of archaeological potential was compiled:

- Local historical and archaeological records relevant to the study area;
- County Development Plan for South Dublin County Council

From the Paper Survey, a list of archaeological sites and sites of archaeological interest were identified. Cultural Heritage Sites Surrounding the Development Site are shown in figure 3.11/1.

Table 3.11/1 List of Archaeological sites depicted in Figure 3.11/1		
SITE NO.	**ADDRESS/LOCATION**	**DESCRIPTION**
DU017 - 077	Red Cow, Naas Road	Earthwork, Possible site
DU022 - 002	Greenhills Road	Flat Cemetery

Figure 3.11/1: Cultural Heritage Sites Surrounding the Development Site

(1) Archaeology

The closest recorded archaeological site is **DU017-077---** which is classified as an earthwork site and is located approximately 0.5 km to the northwest of the proposed site in the townland of Red Cow. According to the files held by the Archaeological Survey of Ireland, it is likely that this site was destroyed during the construction of the Naas dual carriageway. There is a flat cemetery located adjacent to the Walkinstown Cross, at Greenhills Road. This site **DU022 – 002** is located approximately 2 km east of the proposed development site.

(2) History

There are no known traditions associated with the site or its immediate environs.

(3) Architecture

There are no protected structures within the vicinity of the site.

3.11.3 Environmental Impacts

(1) Archaeology

There are no identified sites of archaeological potential or interest located within the boundaries of the site or within its environs. Consequently, it is not envisaged that the development will have any negative physical impact on any such identified sites. Furthermore, it is not envisaged that the development will have any negative visual impact on any sites in the general environs of the development site as none of these sites, as listed in table 3.11/1, can be seen from anywhere within the development area.

Topsoil stripping, ground reductions as part of the construction of two buildings on site and general landscaping works have the potential of revealing hitherto unknown sites, features and artefacts of archaeological potential and interest. Furthermore, extant remains, whether or not previously identified and recorded, also have the ability to be damaged or destroyed.

(2) History

It is envisaged that the proposed development will not impact on features or events of historical interest.

(3) Architecture

In the case of this development, there are no structures of architectural interest, located within the boundaries of the site or within the defined study area. Consequently, it is not envisaged that the development will have any negative physical impact on any such identified sites.

3.11.4 Mitigation Measures

An archaeologist will be in attendance on site during any excavation phase of the construction works and will be empowered to stop work if any feature of archaeological importance is uncovered.

Given that the proposed site operations will not have any impacts on areas of cultural heritage other mitigation measures are not required.

3.12 MATERIAL ASSETS

This section looks at the effect of the facility on the worth or material assets of the locality through the following headings;

(1) The change affected on the urban structure/the change in the value of the property in the area;
(2) Effects to amenity areas and areas of natural beauty.

The positive effects of the facility (i.e. the provision of sustainable employment and improved road infrastructure) must be considered in conjunction with the detrimental effects, if any, on the environs.

The change affected on the urban structure/the change in the value of property

The urban structure of a locality may be adversely affected by a development which is either unhealthy or unsuitable, both in its location and/or magnitude i.e. the siting of chemical industry close to a school or a built up area.

The siting of this activity within the Ballymount Industrial Estate area is considered to be suitable for the following reasons:

- The waste recycling and processing facility does not require any major modifications to the existing telecommunications or electricity supplies to the area.

- The proposed development of the waste recycling and processing facility will reduce the need to transport larger volumes of waste greater distances for treatment. It will also be of benefit to business/industry in the area.

- The proposed development is bordered on all sides by roads and therefore is not overlooking or overshadowing any existing development.

- The development will contribute towards the consolidation of South Dublin as an industrial location and also help meet the objectives of both the national and regional waste management targets.

- It is unlikely that the proposed development will cause a decrease in adjoining property values, given that the area is already an industrial area and that the current property market is strong.

Effects to Amenity Areas and Areas of Natural Beauty

The waste recycling and processing facility site and the immediate surroundings are not designated as a Natural Heritage Area or a proposed candidate Special Area of Conservation (pSAC), nor is it designated under any of the other nature conservation or landscape designations currently used in Ireland.

In summary, it is contended that the material asset values will not be significantly affected by the facility as the environmental impacts (air, noise and water pollution, visual intrusion, traffic impacts) of the proposed activity are shown to be minimal.

3.13 INTERACTIONS OF THE FOREGOING

All environmental factors are inter-related to some extent. As defined in the Environmental Protection Agency 'Guidelines on the Information to be Contained in Environmental Impact Statements', a cumulative effect is defined as '*...the addition of many small impacts to create one larger, more significant impact*'. A synergistic impact occurs where *'the resultant impact is of greater significance than the sum of its constituents*'. Cumulative and synergistic effects are, therefore, those which result from the incremental effect of an action when added to other past, present, and reasonably foreseeable actions. The European Communities Environmental Impact Assessment (Amendment) Regulations, 1998, demand that an EIS describes the impacts and likely significant effects on the interaction between any of the following principal elements of the environment media :

- human beings
- flora
- fauna
- soil
- water
- air
- climate
- the landscape

Tables 1.1/1 and 1.1/2 in section 1 highlight the impacts and effects on interactions between these media and identifies the sections of the EIS where the interactions are addressed.

3.13.1 Human Beings: Air/Traffic/Landscape

Atmospheric and noise emissions from the waste recycling and processing facility site have the *potential* to impact on human beings in the vicinity of the site. Impacts from dust emissions have the potential of being the most significant impact of the waste recycling and processing facility. Mitigation measures to prevent the aforementioned impacts are given in Section 3.6.4: Air.

The waste recycling and processing facility will be constructed and shall operate in accordance with the BAT principle, thus reducing any *potential* impacts.

The visual impact of the facility has the *potential* to affect human beings. Mitigation proposals are outlined in Section 3.10: Landscape & Visual Impacts, which it is considered will ameliorate this and any future impacts.

3.13.2 Flora & Fauna: Soil & geology/Air

Minor impacts will be encountered by the flora and fauna due to the temporary loss of habitat within the facility. This habitat however, is not considered ecologically significant (refer to Section 3.2.2: Flora & Fauna/Baseline Ecological Study).