6. CLIMATE

6.1 Introduction

This Section describes the climate at the facility is based on meteorological data obtained from the Dublin Airport Meteorological Station (located approximately 25 km to the north of the site).

6.2 Meteorological Data

The climate in the area of Fassaroe can be described as mild and wet, with the prevailing wind direction from the south west. Average rainfall, temperature, humidity and wind speed and direction for the Meteorological Station at Dublin Airport is presented in Table 6.1. Detailed climatic information is contained in Appendix 2.

Table 6.1 Meteorological Data : Dublin Airport

Rainfall –	
Annual average	732.7 mm
Average maximum month (Dec)	75.6 mm
Average minimum month (July)	49.9mm
Temperature	
Mean Daily	9.6°C
Mean Daily Maximum (July)	18.9°C
Mean Daily Minimum (Feb)	2.5°C
Relative Humidity	
Mean at 0900UTC	82%
Mean at 1500UTC	72%
Wind (Knots)	
Frequency of calms	2.2%
Prevailing direction	South West
Prevailing sector	South West

The average annual rainfall at the site is 732.7 mm. The winds are predominantly from the south west sector.

6.3 Impact Assessment

The proposed changes to waste activities will not result in any impacts on the climate or microclimate at the site. The biowaste treatment plant will produce carbon dioxide, which is a green house gas. Under the Kyoto protocol the European Union aims to reduce the emissions of greenhouse gases by 8% below 1990 levels by the period 2008 - 2012. As a result Ireland has agreed to limit the increase in its net greenhouse emissions to 13% above 1990 levels by the period 2008 to 2012.

Carbon dioxide resulting from the bioconversion of organic waste is not considered a net contributor to greenhouse gas emissions, since the carbon is stored in the biomass for a limited number of years (short carbon cycle), whereas in the case of fossil fuels the carbon is stored for millions of years (long carbon cycle). Therefore, there will be no net contribution to greenhouse gas emissions.

7. TRAFFIC MOVEMENT

7.1 Introduction

This Section describes existing traffic conditions and includes an assessment of the relative level of impact the proposed changes in site activities are likely to have on the current site infrastructure and the local road network. Measures employed to address the management of traffic at the facility are also described.

7.2 Existing Conditions

7.2.1 General Location in Relation to Roads Network

The facility is approximately 350m west of the M11 motorway, that links north Wicklow with Dublin City. The road way leading to the site (Fassaroe Lane) is currently being realigned and upgraded to allow for third party development of land adjacent the sites boundary. The road works include a widening of the roadway leading to the site and the construction of a new roundabout close to the facilities entrance. The new roundabout will be used by vehicles entering and leaving the site and has been sized to accommodate future developments in the Fassaroe Lane area.

Access to the site is controlled by means of a traffic barrier operated by a weighbridge operator. The traffic barrier and weighbridge will be located approximately 35 meters from the main entrance, inside the site boundary.

7.2.2 Existing Traffic Flows

In order to assess the number of Heavy Goods Vehicle (HGV) trips associated with the current facility operations the average tonnages per vehicle of the different waste types delivered to the site were used. Operational data from the facility was used to determine the average tonnes per vehicle which was then divided into the annual wastes volumes permitted for each waste type.

The site will not operate on Sundays or Bank Holidays and accordingly estimates are based on a 300 day working year. It was assumed that vehicles bringing waste to the site for processing (import vehicles) leave empty and that vehicles arriving to take processed material from the facility (export vehicles) arrive empty. The import and export traffic volumes for the facility are shown on Tables 7.1 and 7.2.

Table 7.1 Existing Import Traffic Volumes

Waste Type	Average Tonnes / Vehicle	Annual Tonnages	Import Vehicles / Year	Import Vehicles/ Day
Commercial	6.3	69,500	11,031	37
Household	17.3	25,000	1,445	5
Construction & Demolition	7.9	35,000	4,430	14
Total				56 in 56 out/day*

*Vehicles enter full and leave empty

Table 7.2 Existing Export Traffic Volumes

Waste Type	Average Tonnes / Vehicle	Yearly Tonnages	Export Vehicles / Year	Export Vehicles/ Day
Commercial	20	69,500	3,475	11
Household	20	25,000	1,250	4
Construction & Demolition	20	35,000*	1,750	6
Total				21 in 21 out/day*

* Vehicles enter empty and leave full

The combined import and export traffic volumes for each day is seventy seven (77) vehicles in and 77 vehicles out. The hours of waste acceptance at the facility are from 07:30 – 19:00 Monday to Saturday or six hundred and ninety six (696) minutes per day which means that on average, one (1) vehicle enters and leaves the site every ten (10) minutes. This equates to approximately six (6) vehicles per hour entering and leaving the site.

7.3 Proposed Activities

7.3.1 Proposed Operations

The proposal to increase the volumes of waste accepted at the facility and the extension of the biowaste treatment plant will impact the volumes of traffic using the facility.

7.3.2 *Projected Traffic Flows*

As it is not proposed to alter the types of wastes accepted at the facility, it is not expected that the average waste volume per vehicle will change from current operations. The proposal to increase the overall volumes of waste will therefore cause a pro-rata increase in traffic delivering waste to the facility.

The proposal to increase the volume of biowaste treated at the facility may however mean that there will not be a pro rata increase in the number of vehicles taking materials from the facility. It can be expected that there will be a 60% reduction in the volume of material sent for biowaste treatment. For the purpose of the calculations it is assumed that 5,000 tonnes of waste from each of the Commercial and the Household waste streams will be used in the biowaste treatment process. As a result, only 4,000 tonnes out of 10,000 tonnes of material will be exported off-site in the form of finished product. The estimated future import and export traffic volumes for the facility are shown on tables 7.3 and 7.4.

Table 7.3 Proposed Import Traffic Volumes*

Waste Type	Average Tonnes / Vehicle	Expected Annual Tonnages	Import Vehicles / Year	Import Vehicles/ Day
Commercial	6.3	107,358	17,040	57
Household	17.3	38,600	2,231	7
Construction & Demolition	7.9	54,040	6,840	23
Total				87 in 87 out/day**

*Subject to Market Conditions
**Vehicles enter full and leave empty

Table 7.4 Proposed Export Traffic Volumes*

Waste Type	Average Tonnes / Vehicle	Proposed Annual Tonnages	Export Vehicles / Year	Export Vehicles/ Day
Commercial	20	104,358	5,217	17
Household	20	35,600	1,780	6
Construction & Demolition	20	54,040	2,702	9
Total				32 in 32 out/day**

*Subject to Market Conditions
** Vehicles enter empty and leave full

The proposed combined import and export movements are 119 vehicles in and 119 vehicles out per day. This equates to approximately one every 6 minutes or ten per hour. Under normal circumstances the average time required to pass through the weighbridge at the facility is less than 1 minute. The capacity of the weighbridge system is therefore in the region of 50-60 vehicles per hour in and out. Considering the weighbridge has a capacity of approximately 50-60 vehicles per hour there is ample capacity to avoid queuing under normal circumstances.

7.3.3 Operations Staff Related Traffic Attraction (Non-HGV)

There is currently some 120 people employed at the facility including both operations and administration staff including collection vehicle drivers based at the facility. Staff and visitors use the designated car park located to the east of the weighbridge. It is not expected that the proposed operations review will lead to a significant increase in employees.

7.4 Traffic Impacts and Mitigation

The proposed increase in the volume of waste accepted at the facility will increase the number of HGVs arriving and leaving the site from an estimated 77 per day to approximately 119 per day. This equates to a change from one vehicle every ten minutes to one vehicle every six minutes. It is not expected that the number of non HGV vehicles linked to staff and visitor movements will increase significantly.

The estimated increase in HGV traffic is not considered significant. The existing weighbridge has the capacity to allow increased traffic flows greater than the volumes proposed. The location of the traffic barrier and weighbridge (35m inside the site boundary) eliminates the possibility for HGV queues developing on to the main access road and roundabout. Also, the upgrade of Fassaroe Lane and the construction of the roundabout at the facility entrance will accommodate the proposed increases in traffic volumes.

8. GEOLOGY, HYDROGEOLOGY AND HYDROLOGY

8.1 Introduction

This Section describes the site ground conditions, aquifer status and surface water drainage system. It includes an assessment of the significance of the impacts of the existing facility and the proposed changes to waste activities.

8.2 Geology

The site geology and hydrogeology was established from a desk study of databases maintained by the Geological Survey of Ireland (GSI) and ground investigations at the site.

8.2.1 Geology

Information on the geology was derived from the GSI Sheet 16, The Geology of Kildare-Wicklow, and a search of databases maintained by the GSI and the reports on monitoring borehole installations at the facility.

Overburden

The soils and subsoils comprises sands and gravels, which are known to be up to 45 metres thick in the Dargle Valley. These sand and gravel deposits originate from Quaternary fluvio-glacial deposits, which have been extensively quarried for sand and gravel for use in the construction industry. Within the site much of the sand and gravel has already been extracted. The expose side slopes of the site are very steep and display sand and gravel deposits in a silty clay matrix.

Bedrock

The GSI data indicate that the subsoils are underlain by blue-grey slate, phylite and schist from the Maulin Formation. The Maulin Formation is part of the Ribband Group of Lower Palaeozoic Rocks, which are the oldest rocks in the Wicklow area.

8.2.1.1 Impacts

Given the size of the facility and the design of the site roads and paved areas within the site, the type of plant and equipment used in the waste activities will not result in significant vibration impacts either on-site or off-site.

8.3 Hydrogeology

The sand and gravel deposits in this part of County Wicklow are classified by the GSI as being a Locally Important sand and gravel Aquifer (**Lg**). Yields of up to 40 m^3/day have been recorded from groundwater wells in this Aquifer. The Aquifer Vulnerability rating i.e., vulnerability to pollution is considered to be High. The GSI indicate that the bedrock beneath the site is categorised as a Locally Important Aquifer, which is moderately productive only in local zones (**Ll**). The bedrock Aquifer Vulnerability, based on the GSI vulnerability rating, is considered to be Moderate to High.

Surface water run-off from the site is from west to northeast toward the Glenmunder River. Shallow groundwater flow is also expected to be generally from southwest to the east northeast. During low flow conditions it is possible that groundwater from the sands and gravels beneath the site contribute significantly to base flow in the River.

8.3.1.1 Groundwater Quality

A hydrogeological assessment of the facility was carried out in 1998 as part of the original application for a Waste Licence. The assessment included the installation of four groundwater monitoring wells (BH-1, BH-2, BH-3 and BH- 4), three of which were subsequently used for groundwater quality monitoring purposes. Boreholes BH-2 and BH-3 were positioned downgradient and to the north east and north respectively of the landfilled area. BH-4 was located upgradient of the fill area, but was in made ground to the south of the landfill. The fourth borehole (BH-1) was intended to serve as a monitoring point but was dry throughout the monitoring period.

In 2001 three additional groundwater wells (BH-5, BH- 6 and BH-7) were installed for monitoring purposes. BH-5 and BH-7 were replacement wells for the original wells BH-1 and BH-3. BH-4 was damaged during construction of a vehicle ramp at the site and was subsequently removed in February 2002. There are currently four groundwater monitoring wells (BH-2, BH-5, BH-6 and BH-7). BH-2 and BH-7 are downgradient and to the north east and north respectively of the landfill area. BH-5 is to the east of the fill area and downgradient of the on-site septic tank system. BH-6 is upgradient of the landfill.

greenstar conducts quarterly groundwater quality monitoring in the on-site wells. The monitoring includes a visual inspection, in situ measurements of groundwater level, pH, temperature and electrical conductivity and the collection of groundwater samples for laboratory analyses. The laboratory analysis includes ammoniacal nitrogen, chloride, dissolved oxygen, and total organic carbon (TOC), metals and non metals (boron, cadmium, calcium, total chromium, copper, iron, lead, magnesium, nickel, potassium, sodium and zinc), total cyanide, fluoride, List I and II Organic substances, mercury, sulphate, total alkalinity, total phosphorus/orthophosphate, total oxidised nitrogen (TON), residue on evaporation, phenols and faecal and total coliforms.

An interpretation of the monitoring results for the period 2001 to 2004 is presented below. In 2001 the monitoring confirmed the presence of elevated ammonia in BH-4 and BH-5 that had been detected in previous monitoring events. The ammonia levels fluctuated over the reporting period, with those measured in the fourth quarter lower those recorded in the third quarter. Elevated ammonia level were occasionally detected in BH-6, the upgradient well. The TOC levels detected in BH-4 and 5 remained elevated compared to the upgradient level in BH-6 and the other wells. The semi-volatile results confirmed the presence of low level hydrocarbon contamination in BH-4.

The 2002 monitoring programme confirmed the continuing presence of elevated ammonia in BH-5. The ammonia levels in BH-6, the upgradient monitoring well had reduced however the levels measured in BH-7 fluctuated. The TOC levels detected in BH-5 remained elevated compared to the upgradient level in BH-6 and were higher than expected for uncontaminated groundwater. The septic tank system upgradient of BH-5 is a potential source of the elevated ammonia and TOC.

The 2003 monitoring programme established that with the exception of conductivity levels at BH-5 and TON levels at BH-7, all the parameters monitored were either within or below the ranges previously measured. The monitoring in the first quarter of 2004 confirmed the presence of low levels of ammonia (0.3 mg/l) in BH-7 and the continued presence of elevated ammonia levels were detected in BH-5.

8.3.1.2 Groundwater Impacts

With the exception of the percolation area serving the septic tank and soakaways taking clean run off from roofs and paved areas there are no direct or indirect discharges to ground or groundwater at the facility. There has been no significant change in groundwater quality between 2001 and 2004. The monitoring has identified the presence of low levels of contamination in both the upgradient and downgradient wells. Apart from the impact on water quality in BH-5 which is attributable to the on-site septic tank system there monitoring has not identified any significant impact on groundwater quality associated with facility activities.

The biowaste treatment plant will be developed on an impermeable concrete slab. All leachate and contaminated run-off from process areas will be collected for recirculation in the process. Any surplus liquid will be collected and store in holding tanks prior to discharge to the foul sewer. Roof water from the reception building will be discharged to the existing surface water drainage system.

It is proposed to discharge the existing process waste water, surplus leachate from the biowaste treatment plant, and sanitary wastewater to the new foul sewer. The process wastewater, which is currently either sent off-site or directed to the on-site septic tank, will discharge via a petrol/oil interceptor to the sewer. Sanitary waste water will discharge directly to the foul sewer. Following the connection to the sewer the use of the septic tank will no longer be used. This should have a positive impact on groundwater quality.

All fuel tanks and oil storage compounds used on site are provided with adequate secondary containment to prevent spills or leaks from entering the surface water drainage system. These compounds will be used during the construction of the biowaste treatment area.

8.4 Hydrology

8.4.1 Catchment Area

The surface water drainage system in and around the site is dominated by the proximity of the nearby Glenmunder River at the north-eastern boundary. The Glenmunder ultimately drains to the River Dargle, which is a designated salmonid river.

8.4.2 Surface Water Drainage System

Surface water emissions from the site are generally restricted to that of surface water run-off from hardstanding and roofed areas after a rainfall event (seasonal emission). The on-site surface water drainage network consists of a series of underground drainage channels which divert storm water from roofed and paved areas to soakaways which ultimately drain (via shallow sub-surface flow) to the Glenmunder River.

8.4.2.1 Surface Water Quality

greenstar monitors water quality at four (4) locations (SW-1, SW-2, SW-3 and SW-4) on the stream. SW-1 is upstream of the site, SW-2 and SW-3 is on the site boundary and SW-4 is downstream of the site. The monitoring is conducted quarterly and includes in-situ and laboratory testing.

The monitoring parameters includes ammoniacal nitrogen, nitrite, BOD, COD, chloride, dissolved oxygen, electrical conductivity, pH, total suspended solids and total phenols, mercury, sulphate, total alkalinity, total phosphate/orthophosphate, total oxidised nitrogen, metals and non metals (to include boron, cadmium, calcium, total chromium, copper, iron, lead, magnesium, nickel, potassium, sodium and zinc).

An interpretation of the monitoring results for the period 2001 to 2004 is presented below. Throughout 2001 elevated ammonia and nitrite was detected in the up and downstream samples (SW-1 to SW-4). The ammonia levels were higher than those previously measured in the stream, however the nitrite levels were less than those detected in the 2nd Quarter of 2000. The cause of the elevated ammonia and nitrite levels could not be established, but the elevated levels in the upstream location confirmed they were not associated with on-site activities. The levels of calcium, magnesium, phosphorus, and zinc were higher in the upstream location, SW-1, than the downstream locations. The elevated levels in the upstream sample indicate that these parameters are not associated with facility activities.

The results of the 2002 monitoring programme indicated the relatively consistent chemical status of the river. Elevated ammonia and nitrite levels were detected in the up and downstream samples (SW-1 to SW-4). The presence of ammonia in the upstream location indicates an upstream source. Elevated nitrite levels occur intermittently in the stream and are attributable to an unidentified off-site upstream source.

The Agency conducted surface water monitoring at the facility on January 3rd 2002, and samples were collected from SW-1, SW-2 and SW-4. The range of parameters analysed included nitrite, dissolved oxygen, temperature, phenols, calcium, semi volatile organic compounds, magnesium, potassium and sodium The levels were within the limits set in the EPA Environmental Quality Standards (EQS) for Waters.

The surface water monitoring conducted in 2003 and it the first quarter of 2004 confirmed that water quality was generally consistent with previous monitoring events. A biological assessment carried out at SW-1 and SW-4 in 2003 assigned a Q-value of 3 - 4 to each location indicating slightly polluted conditions. However, the conditions were marginally better at the downstream monitoring point.

8.4.3 Surface Water Quality Impacts and Mitigation

There are no direct discharges to surface water from the site activities. There is an indirect discharge via the soakways that take clean run-off from the site. The monitoring has identified that water quality in the stream is generally satisfactory. There is evidence of occasional impacts associated with up stream sources, but no evidence that site activities have impacted on water quality.

The biowaste treatment plant will be developed on an impermeable concrete slab. All leachate and contaminated run-off from process areas will be collected for recirculation in the process. Any surplus liquid will be collected and store in holding tanks prior to discharge to the foul sewer. Roof water from the reception building will be discharged to the existing surface water drainage system.

All fuel tanks and oil storage compounds used on site are provided with adequate secondary containment to prevent spills or leaks from entering the surface water drainage system. These compounds will be used during the construction of the biowaste treatment area.

9. ECOLOGY

9.1 Introduction

This Section considers the ecology of the site and its surroundings. It assesses the likely impacts of the proposed scheme on ecological features (i.e. habitats, flora and fauna) within the facility and designated conservation sites in the surrounding area and also considers whether mitigation measures are necessary.

The assessment is based on an ecological study, incorporating an assessment of flora and fauna was undertaken at the site in 1998 as part of the original licence and the biological assessment of the Glenmunder River completed in 2003. Copies of the ecology report and the biological assessment are included in Appendix 3 and summarised below.

9.2 Existing Environment

The facility is not located within the boundaries of any designated sites. This includes sites of international importance, such as candidate Special Areas of Conservation (cSAC's), and Special Protection Areas (SPA's) for birds, and sites of national importance, such as proposed Natural Heritage Areas (pNHA's).

Four areas of habitat were distinguished in the site: -

1. Sand Cliffs.
2. Bare waste ground.
3. Scrub habitat in 'lower' quarry.
4. Aquatic habitat (fringing stream).

No species of regional, national or international importance were found. The only communities of note are the seasonal nesting sand martins on the sand cliffs along the site boundary and the scrub area in the 'lower' quarry near the Glenmunder River. The scrub area is covered with common species such as ash, bramble and dog rose. The flora and fauna of the 'waste land' is considered typical of these areas i.e. a range of pioneer plants, which can tolerate a range of soil types and conditions.

The ecological report categorises the site as a 'site of limited wildlife interest' in accordance with the surveying methodology used i.e. Phase 1 habitat survey (*sensu* Nature Conservancy Council, UK).

The biological assessment carried out at SW-1 and SW-4 in 2003 assigned a Q-value of 3 - 4 to each location indicating slightly polluted conditions. However, the conditions were marginally better at the downstream monitoring point.

9.3 Impact Assessment

The proposed increase in waste inputs will not require the provision of any additional infrastructure and the processing will not impact on any ecosystem within or outside the facility.

The biowaste treatment plant is in the area of the site described as 'waste ground' in the ecological survey. This area of the site is currently used to stockpile processed C&D material and is therefore constantly subject to disturbance and movement. An assessment of the impact of the proposed plant on the Glenmunder Stream is presented in Section 8.4 . The development of the biowaste treatment plant will not result in any impact on any significant ecosystem within or outside the facility boundary.

9.4 Mitigation Measures

As the proposed changes to site activities will not result in any ecological impacts mitigation measures are not required.

10. AIR

10.1 Introduction

This Section discusses existing air quality at the site and the likely impacts on air quality associated with the proposed development. *greenstar* conducts dust and landfill gas monitoring at the facility in accordance with licence conditions. The results of this monitoring are used to assess the impacts of the existing operations and proposed changes to site activities.

The airborne pollutants assessed include those that may be potential nuisance or have a potential health impact and include dust, bioaerosols, landfill gas and odours. Odours are dealt with in Section 11.

10.2 Dust

10.2.1 Existing & Proposed Activities

The existing and proposed activities are a potential source of dust, with the main sources being the access roads, waste processing, waste stockpiles and site development works. Dust monitoring carried out in compliance with licence conditions has identified occasionally high dust levels inside the property boundary. At present the Phase II transfer building is being constructed, the side slopes along the north-west boundary are being regarded, a gas way leave is being provides and there are road improvement works adjacent to the facility.

The proposed biowaste treatment system will not be a source of dusts. The moisture content of the biowaste material delivered to the facility (ca. 50%) and the moisture content of the material during all stages of the biowaste treatment process (40 to 70%) including mixing, residence in the in-vessel unit, maturation in the ASP and refining will prevent the generation of dusts.

10.2.2 Impacts

The bulk of the waste permitted for processing at the facility comprises commercial and household wastes (>70%) all of which will be processed indoors once the Phase II transfer station is built.

The remaining C&D wastes will continue to be processed outdoors leading to the potential for dust generation. While there will be an increase in the waste volumes the over all ratio of C&D and non-C&D wastes will remain generally the same.

Historical exceedences of the dust deposition limit for the site have been attributed to windblown material from the non vegetated side slopes and the on-going construction works at the facility.

It is considered that the current facility operations, including the external processing of C&D waste, do not contribute significantly to dust levels measured at the site and it is not expected that the proposed increase in waste volumes and the expansion of the biowaste treatment operation will cause a significant increase in dust generation. It is expected that once commercial waste processing is moved indoors, construction at the facility ceases and the vegetation is fully established on the side slopes dust will not be a significant issue at the facility.

10.2.3 Mitigation Measures

Access roads, vehicle manoeuvring and parking areas are paved. Waste delivery vehicles do not track across waste off loaded inside the buildings. In addition any material, which may inadvertently be dragged out of the transfer building by any vehicle will immediately be brushed back into the building *greenstar* cleans the access roads at a minimum of once per week and a bowser, maintained on-site, is used in dry conditions to dampen the access roads.

It is proposed to continue processing C&D waste externally in the north western area of the site. This is location is approximately 250m from the nearest occupied residence. Phases I and II of the new waste transfer building will screen the C&D processing area from the nearest residences along the eastern boundary of the facility. Waste is not processed during periods of high winds and the stockpiles of processed materials are maintained in a manner that minimises dust.

There is the potential for dusts to be generated during the off loading of waste deliveries to the biowaste treatment plant. Wastes will only be off-loaded in the reception building which will be provided with a negative pressure system and an air collection and treatment system. This will prevent the escape of dusts from the building. All delivery vehicles leaving the biowaste facility will be cleaned down before leaving the reception area, which will remove any miscellaneous debris.

The biowaste treatment process will comprise an in-vessel batch reactor for high-rate biological transformation and an ASP system for subsequent biomass curing and maturation. Process air from the in-vessel unit and the ASPs will be collected and treated in bio-filters which minimises the potential for dust emissions. The cured biowaste will have a relatively high moisture content that will minimise the potential for dust emissions during the screening process and wind blow from the finished product stockpiles.

10.3 Landfill Gas

10.3.1 Existing & Proposed Activities

Historically a portion of the site was operated as a landfill. The landfill of inert waste stopped in 2000 and it is not proposed to landfill any more waste. As a result of the use of the site for landfill, landfill gas monitoring is conducted on a monthly basis in the gas monitoring wells GS-01, GS-05, GS-06, GS-07, GS-08, GS-09, GS-11, groundwater monitoring wells BH-2, BH-5, BH-6 and BH-7 and leachate boreholes L-01, L-02 and L0-3. The nearest buildings to the filled area are the Transfer Station and the site offices.

The monitoring has established that small volumes of landfill gas are being generated at the facility. Carbon dioxide levels in excess of the licence trigger limits have been detected in the majority of the monitoring wells. Slightly elevated methane levels have very occasionally been detected in three of the monitoring locations. Monitoring in the site buildings has not detected the presence of landfill gas.

10.3.2 Impact Assessment

The landfill gas monitoring programme has identified that carbon dioxide is being generated at the site in relatively low levels, but that methane is not significant. It appears that some biodegradable waste was historically deposited at the site. It is not possible to quantify the volume of such waste, but based on the low levels of gas generation it is likely to have been relatively small. The monitoring data indicates that the gas generation is in the final phase and that methanogenic conditions do not prevail.

Carbon dioxide is a greenhouse gas. Under the Kyoto protocol the European Union aims to reduce the emissions of greenhouse gases by 8% below 1990 levels by the period 2008 - 2012. Ireland has set a target of limiting the increase in its net greenhouse emissions to 13% above 1990 levels by the period 2008 to 2012. It is not possible to quantify the annual emissions of carbon dioxide to the atmosphere. However, as biodegradable wastes are no longer deposited at the site the volumes of carbon dioxide produced will gradually decrease over time and the landfill gas will not contribute to an increase in carbon dioxide emissions.

10.3.3 Mitigation Measures

Although the gas levels are very low and will decrease with time and the monitoring programme has never identified the presence of gas inside any of the buildings, greenstar has as a precautionary measure, incorporated landfill gas control measures into to the design of the new buildings.

10.4 Bioaerosols

10.4.1 Existing & Proposed Activities

Bioaerosols (airborne microorganisms typically <5 um in diameter) present a potential health impact to workers and the general public. The materials recovery and transfer activities are not a source of bioaerosol generation, but biowaste treatment is a recognised source.

The majority of bioaerosols generated during the biowaste treatment process occur during the mechanical pre treatment (blending) and the initial biowaste treatment stage. The reception building the in-vessel units and the ASPs will be will be equipped with air extraction and biofilter treatment of process air (Ref. Section 11). During the blending, operators will wear respiratory protective equipment, i.e. facemasks. All mechanical equipment such as front-end loader will be fitted with air filters and the machine cabins will have a positive pressure environment.

10.4.2 Impact Assessment

The biowaste treatment system design incorporated air collection and treatment at the stages of the process most likely to generate bioaerosols, which will effectively minimise the risk of bioaerosol releases to atmosphere.

A recent study conducted by Cre (the Composting Association of Ireland) concluded that, based on a review of international literature, the general population is not at risk and that there is no clear cut evidence that either the public or workers at biowaste treatment facilities have been affected by bioaerosols. There are no Irish guidelines in relation to the management of bioaerosols at biowaste treatment facilities, however a UK guidance note indicates that there should be 250m between a biowaste treatment facility and an occupied residence. The nearest occupied residence is approximately 280m from the proposed plant location.

10.5 Mitigation Measures

As it is considered that bioaerosols will not be a significant issue at the facility, mitigation measures other than those described above, are not required.

11. ODOUR

This Section describes the assessment of the odour impact of the proposed changes in site activities. It identifies the significant potential sources of odour at the facility, assesses the impact and describes the mitigation measures.

11.1 Existing &Proposed Activities

Odour emissions are associated with the handling, sorting and transfer of both household and commercial waste due to its organic content. Emissions from handling and storage of dry recyclable material (i.e. plastics, glass, metals) and C&D waste are negligible. The current materials recovery and transfer operations are not a source of odour nuisance and the proposed increases in waste inputs will not result in any significant increase in odours. Biowaste treatment has the potential to be a source of odours when uncontrolled or unmanaged, due to the organic nature of the waste and the biowaste treatment process itself.

11.2 Biowaste Treatment Plant

There are three primary means of controlling odour emissions from the biowaste treatment process: -

- Management of the incoming material to prevent the development of anaerobic conditions;
- Temperature control, and
- Air emission treatment.

11.2.1 Materials Management

The biowaste material delivered to the facility may on occasion be partially anaerobic, due to storage at the point of production and transport. Provided the material is contained in a waste collection/transport vehicle this will not lead to adverse emissions. However, emissions may occur during unloading of the material and further handling. To minimise the impact of such emissions to the surroundings, all potentially odorous biowaste will be received and off loaded inside the reception building.

The blending of the incoming waste and addition of bulking agent will be carried out inside the reception building. The building area will be equipped with air ducts in the top of the roof, which will collect and direct the air to a biofilter. Since the reception building will be under slight negative pressure and the doors will only be open when waste is received, emissions via doors will be minimised.

The blending will ensure that the material: -

- Has the appropriate dry solids content and has an adequate porosity, to facilitate the aeration process and prevent the formation of anaerobic zones during the process. This will be achieved by mixing relatively dry and wet feedstocks, and if required, the adding of a structure material e.g. wood chips;

- Has the appropriate C/N-ratio to prevent excessive emissions of N-containing odour components. This will be achieved by mixing feedstock which is low in N-content with feedstock that has a higher N-content;

- Has a sufficiently low sulphur content. This will be achieved by diluting sulphur containing feedstock with other feedstock.

The initial stage of the biowaste treatment process is the most critical with respect to odour emissions, since easily biodegradable components e.g. sugars, proteins and fats are degraded at a high rate to produce gaseous by-products.

The initial stage will be carried out in completely enclosed in-vessel units applying a high aeration rate, thus ensuring the supply of sufficient oxygen to prevent the occurrence of anaerobic conditions. As the process proceeds, less easily biodegradable components will be degraded (e.g. cellulose structures) at a lower rate, reducing the risk of anaerobic conditions. All process air from the reception building, in-vessel biowaste units and the aerated static piles will be collected and treated in biofilters.

11.2.2 Temperature Control

Temperature sensors, linked to a central process control computer, will be used to measure the temperature in the in-vessel units. The computer control system will regulate the temperature by automatically increasing the aeration rate to the bed.

Due to the slow degradation in the maturation stage, temperatures will normally not rise above 65°C. If this occurs the temperature sensors will trigger an increase in the aeration rate to cool the maturating biomass.

11.2.3 Air Emission Treatment

The process air from the reception building, the in-vessel unit and the ASPs will be collected and treated in biofilters. The biofilters will consist of a large concrete box, in which a 1.5 m thick layer of coarse shredded wood chips will be placed, with a manifold and a system of air ducts on the bottom to ensure an even distribution of air.

The size of the biofilter will be designed and the composition of the filter medium selected to maximise treatment efficiency, which is primarily determined by the gas residence time within the filter bed. Ranges of 30 to 60 seconds are considered reasonable. The volume of the biofilters depends on the amount of process air to be treated. A minimum volume of 20% of the material being treated – 1538 m^3 – will be provided for the in-vessel units. For the ASPs, a volume of 12.5% of the volume of the biowaste material – 961 m^3 – will be provided.

The proposed biofilters can treat 100 - 150 m^3 process air per m^2 of biofilter per hour. The optimum operational ranges for the biofilters are presented in Table 11.1.

Table 11.1 Optimum Operational Ranges for the Biofilters

Parameter	Range
Filter Media	Bioactive but reasonably stable with organic content >60%. Porous and friable, >75% void volume. Resistant to water logging and compaction. Low fines content to reduce gas head loss. Free of residual odour. A specifically designed mix may be required.
pH	7 to 8.5
Temperature	15 °C to 45 °C
Moisture	50-70% range
Gas pre-treatment	Humidification to achieve near 100% gas humidity. Dust and bioaerosols should be removed to avoid media plugging.
Gas load rate	100 M^3 / M^2
Gas residence	>15 seconds
Media depth	>1M

The biofilters will be visually monitored each working day by *greenstar* staff. This will include a check on the moisture content and temperature.

Every 1 - 2 years, a portion of the biofilter material will be replaced by fresh material, in order to maintain the odour removal efficiency. Since biofiltration is a microbiological process, a sudden mechanical breakdown or failure of a complete biofilter is unlikely.

The odour removal efficiency of the biofilters is estimated at minimum 95%, which is based on biofilter operations at existing biological treatment facilities. The remaining 5% or less of the odour emissions are released via the biofilters into the atmosphere. It is not expected that these odour emissions will cause nuisance, since not only the quantity is reduced by a minimum factor 20, but also the type of odour changes during biofiltration to that similar to the media, e.g. wood, bark or finished product.

11.3 Impact Assessment

Biowaste treatment has the potential to be a source of odours. The proposed system is designed to collect and treat process air from all the stages of the biowaste treatment process where significant odours are produced. The proposed treatment system is robust, complies with BAT for the biowaste treatment industry and proven to be effective. The nearest sensitive receptor (occupied residence) to the biowaste treatment plant is approximately 280 m to the southeast. The prevailing wind direction is from the south west. The closest residence to the north east of the plant is more than 1 km away.

11.4 Mitigation Measures

The biowaste treatment system design incorporates effective odour control measures and the proposed location is remote from sensitive receptors. The odour control measures are described in detail in Section 11.2.

12. NOISE

12.1 Introduction

This Section includes an assessment of the existing and proposed noise sources at the facility and is based on the most recent annual noise survey conducted in compliance with the licence. The survey was carried out by AWN Consulting Ltd (AWN) to quantify the existing noise environment during a typical daytime period at the existing facility. AWN also completed an assessment of the impacts of the proposed operations on nearest noise sensitive locations.

12.2 Existing Conditions

The surveys were conducted generally in accordance with ISO 1996: 1982: *Acoustics – Description and measurement of environmental noise*. The full report of the most recent survey and the assessment of the impacts of the proposed changes in facility operations are presented in Appendix 4. The reports discusses the methodology used, present an explanation of the measurement parameters and the detailed assessment of predicted impacts and are summarised below.

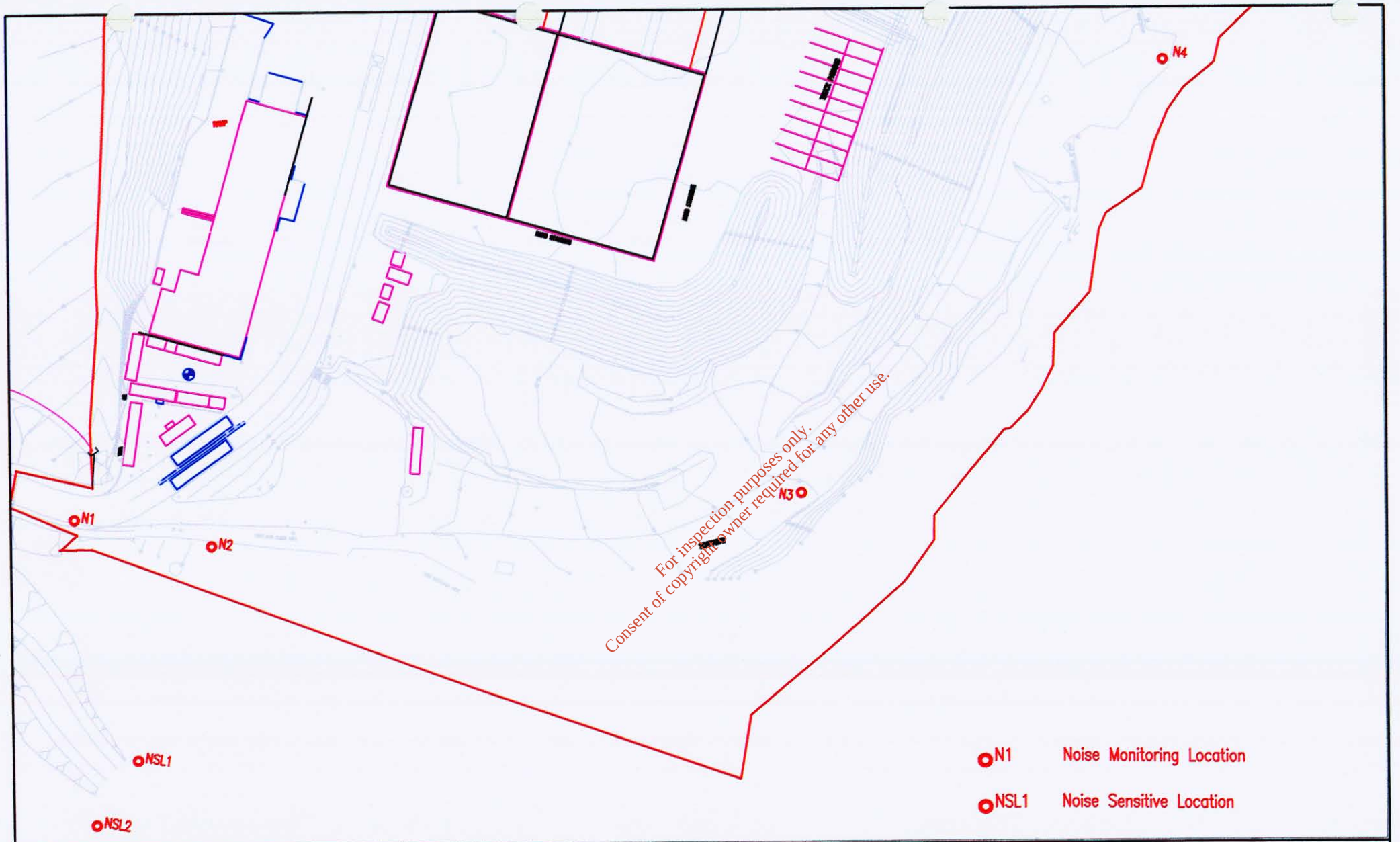
12.2.1 Measurement Locations

Measurements were conducted at four designated noise monitoring locations and two off-site nearest noise sensitive locations as shown on Figure 12.1.

Position N1 The N1 measurement position is located on the eastern boundary of the site. The location is alongside the access road to the facility, some 10m from the boundary wall of the site.

Position N2 The N2 measurement location is midway along the eastern boundary of the facility. The location is in close proximity to the existing car-park located at the facility and the site side of the earth berm.

Position N3 The N3 measurement position is located at a point on the north eastern boundary of the facility. The lands to the north of this location are undeveloped.



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CLIENT: GREENSTAR

FIGURE No.: 12.1

NOTE:

TITLE: Noise Monitoring Locations

SCALE: NTS

REV.: A

Position N4 The N4 noise measurement location is located at the furthest northern section of the waste transfer facility boundary. Again green field sites bound the site to the north of this location.

Position NSL1 The nearest noise sensitive location (a dwelling) is located beyond the eastern boundary of the site perimeter. A location was chosen in an adjacent field that was representative of the noise environment of the rear façade of this property. The location is in close proximity to the site entrance and car park.

Position NSL2 The next nearest noise sensitive location (a dwelling) is again located beyond the eastern boundary of the site perimeter, approximately 20 meters east then NSL1 and is representative of the noise environment experienced at properties on the far side of the road.

12.2.2 Survey Period

Measurements were conducted over the course of a single survey period as follows: -

- 11:45 hrs to 18:30 hrs on 18 May 2004.

During the survey the facility was in normal operation. There are no significant emissions of noise from the facility during night time periods. The weather throughout the survey period was dry with a slight breeze.

Position 1

The results of measurements conducted at Position 1 are presented in Table 12.1.

Table 12.1 Summary of Noise Results for Position N1

Time	iod	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			x	n			
12:53 – 13:23	Day	66	90	52	66	54	HGV movements in & out of site, construction noise
16:16 – 16:46		65	83	51	67	56	

Noise measurements at this location were dominated by HGV's and other traffic movements into and out of the site. Other passing traffic and noise associated with the adjacent construction site also influenced ambient noise levels. Also noted was some machinery noise from the facility, birdsong and aircraft passing overhead. Noise levels were in the range 65 to 66dB LAeq and 54 to 56dB LA90. No clearly audible tonal characteristics were noted.

Position N2

The results for the measurements conducted at Position N2 are summarised in Table 12.2 below.

Table 12.2 Summary of Noise Results for Position N2

Time	iod	Measured Noise Levels (dB re. 2x10-5 Pa)					Comments
			x	n			
13:27 – 13:57	Day	69	92	50	71	59	HGV movements within Greenstar site
16:49 – 16:19		72	96	44	75	55	

The noise environment at this location was dominated by HGV movements around the site with associated reverse alarms, body slap and occasional horn noise. During the first survey period a HGV was left idling near the measurement location. Also contributing to noise build up was a digger in operation on site (on-site construction plant). Noise levels were in the range 69 to 72dB LAeq and in the range of 55 to 59dB LA90. No clearly audible tonal characteristics were noted during the measurement periods.

Position 3

The results for the measurements conducted at Position N3 are presented in Table 12.3 below.

Table 12.3 Summary of Noise Results for Position N3

Time	iod	Measured Noise Levels (dB re. 2x10-5 Pa)					Comments
			x	n			
14:00 – 14:30	Day	48	61	41	49	44	HGV movements on site in distance
17:22 – 17:52		47	63	39	50	43	

HGV movements into, out of and around the site were audible in the distance during measurements conducted at this monitoring location. Construction noise from adjacent building site was also audible. As with previous location the operation of a digger was clearly audible. Noise levels were in the range 47 to 48dB LAeq and in the range of 43 to 44dB LA90. No clearly audible tonal characteristics were noted during the measurement periods.

Position 4

The results of measurements taken at location N4 are summarised in Table 12.4.

Table 12.4 Summary of Noise Results for Position N4

Time	iod	Measured Noise Levels (dB re. 2x10-5 Pa)					Comments
		a	ax	n	b	b	
14:36 – 15:06	Day	47	61	42	48	44	Water noise, Birdsong, Machinery in distance
17:54 – 18:24		45	62	37	48	38	

At this location the adjacent stream was the dominant source of noise during both periods. Machinery noise was just audible. Also noted were aircraft passing overhead and birdsong. Noise levels were in the range of 45 to 47dB LAeq and in the range 38 to 44dB LA90. No clearly audible tonal characteristics were noted during the measurement period.

Position NSL1

The results of measurements taken at location NSL1 are summarised in Table 12.5.

Table 12.5 Summary of Noise Results for Position NSL1

Time	iod	Measured Noise Levels (dB re. 2x10-5 Pa)					Comments
		a	ax	n	b	b	
11:48 – 12:18	Day	52	70	45	54	48	Local traffic, Construction noise, Machinery from site
15:13 – 15:43		65	79	46	72	50	

Noise at this location was dominated by construction noise from nearby site, machinery and HGV noise in operation on the *greenstar* site and HGV movements into and out of the *greenstar* site. During the second survey period a JCB was in operation in relatively close proximity to the measurement location and a car alarm was sounding from the *greenstar* site. Noise levels were in the range of 52 to 65dB LAeq and in the range 48 to 50dB LA90. No clearly audible tonal characteristics were noted during the measurement period.

Position NSL2

The results of measurements taken at location NSL2 are summarised in Table 12.6.

Table 12.6 Summary of Noise Results for Position NSL2

Time	iod	Measured Noise Levels (dB re. 2x10-5 Pa)					Comments
		a	ax	n	b	b	
12:19 - 12:49	Day	55	73	46	56	49	Local traffic, Construction noise, Machinery from site
15:45 - 16:15		65	85	56	68	59	

As with Location NSL1, the dominant sources of noise at this location were associated with the nearby construction site, machinery in operation at the *greenstar* site and HGV movements. The second survey period was dominated by a concrete truck being washed by power hoses approximately 15 to 20 meters from measurement location. Noise levels were in the range of 55 to 65dB LAeq and in the range 49 to 59dB LA90. No clearly audible tonal characteristics were noted during the measurement period.

12.3 Impact Assessment & Noise Predictions

The proposed increase in waste volumes for transfer operations will not result in any additional noise sources or changes in the type of processing plant methods. The proposed changes in the design and layout of the biowaste treatment plant will result in new noise sources and locations including air blowers for the in-vessel units and the ASP, and the operation of the loading equipment and trommel.

The assessment of the impact of the proposed changes is presented in the AWN Report in Appendix 4 and summarised in this section. Details of the noise sources included in the assessment are presented in Table 12.7 and the predicted noise levels at the noise sensitive locations is presented in Table 12.8.

Table 12.7 Noise Sources

Identification	Octave Band Centre Frequency (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
ASP Blower	82	92	98	102	104	100	92	82	108
Front Loading Shovel	84	98	101	104	103	101	94	86	109
Screen	46	51	57	71	76	75	71	64	80
Blower (x10 motors)	72	82	88	92	94	90	82	72	98

Table 12.8 Predicted Noise Levels at Noise Sensitive Locations

Assessment Location Ref.	Daytime Criterion dB(A)	Predicted Daytime Noise Level dB(A)	Night time Criterion dB(A)	Predicted Night time Noise Level dB(A)
NSL A	55	39	45	24
NSL B		41		23
NSL C		38		21

The assessment included for night time conditions as the air blowers in the biowaste treatment plant may be in use over a 24 hour period. However, the loading and screening equipment will not be operated at night time. The predicted levels at the noise sensitive levels are all significantly below the Daytime and Night time criteria set in the current Waste Licence and will not result in any adverse impact at the noise sensitive locations.

12.4 Mitigation Measures

The air blowers on the biowaste treatment plant will be provided with atmospheric side attenuators and this was taken into consideration in the assessment of the impacts. As the predicted noise levels associated with the proposed changes in facility operations are significantly below the criteria set in the current Waste Licence and there will be no adverse impact at noise sensitive locations additional mitigation measures are not required.

13. LANDSCAPE

13.1 Introduction

This Section describes the landscape and visual assessment to evaluate the potential impacts of the facility on the landscape and visual amenity. It comprises a landscape character assessment and a viewpoint analysis. The only proposed addition to the existing site infrastructure is the construction of the biowaste treatment area in the north-west corner of the site.

13.2 Methodology

The assessment was based on guidelines in the document 'Landscape and Landscape Assessment, Consultation Draft of Guidelines for Planning Authorities' published by the Department of the Environment and Local Government (June 2002). It is based on site inspections carried out in the spring of 2004, analysis of photographs, a review of Ordnance Survey maps and the proposed design of the biowaste treatment plant.

The study area was confined to that occupied by the existing facility. This area was defined based on the predicted visibility of the facility and the analysis of public viewpoints. The choice of viewpoints was influenced by the identification of private residences, key vantage points and the visibility of the existing buildings.

13.3 Landscape Character

13.3.1 Landform

The site is a former sand and gravel pit covering approximately 7.7 hectares. The pit was excavated into the hill towards the sites western and northern boundaries and was subsequently backfilled with inert materials to an approximate depth of 10 - 12 meters across much of the site while maintaining a buffer with the river flowing along the sites eastern boundary. The site is situated at an Ordnance Datum level of between 136 and 96 metres west to east. The topography slopes generally to the north east towards the river.

Cliffs ranging in height from 10 to 20 meters form the northern, western and south western site boundary. They are the remains of the sand and gravel face of the pit and have been profiled and seeded with grass. A plateau of fill material, which has been capped and in parts covered with hardstanding, extends east towards the Glenmunder River. The site then falls steeply towards the river marking what is assumed to be the edge of the previously backfilled areas. On the other side of the river the land rises steeply and is covered by scrub and brush.

13.3.2 Landcover

The site has been extensively developed and is currently covered by two waste transfer buildings, access roads, landscape mounds, materials processing areas, stock piles, processing plant, skips and trucks, hardstanding areas, car park, weighbridge, fuel storage and waste quarantine bunded area, vehicle maintenance shed, offices and toilet facilities for administrative staff.

13.3.3 Landscape Value

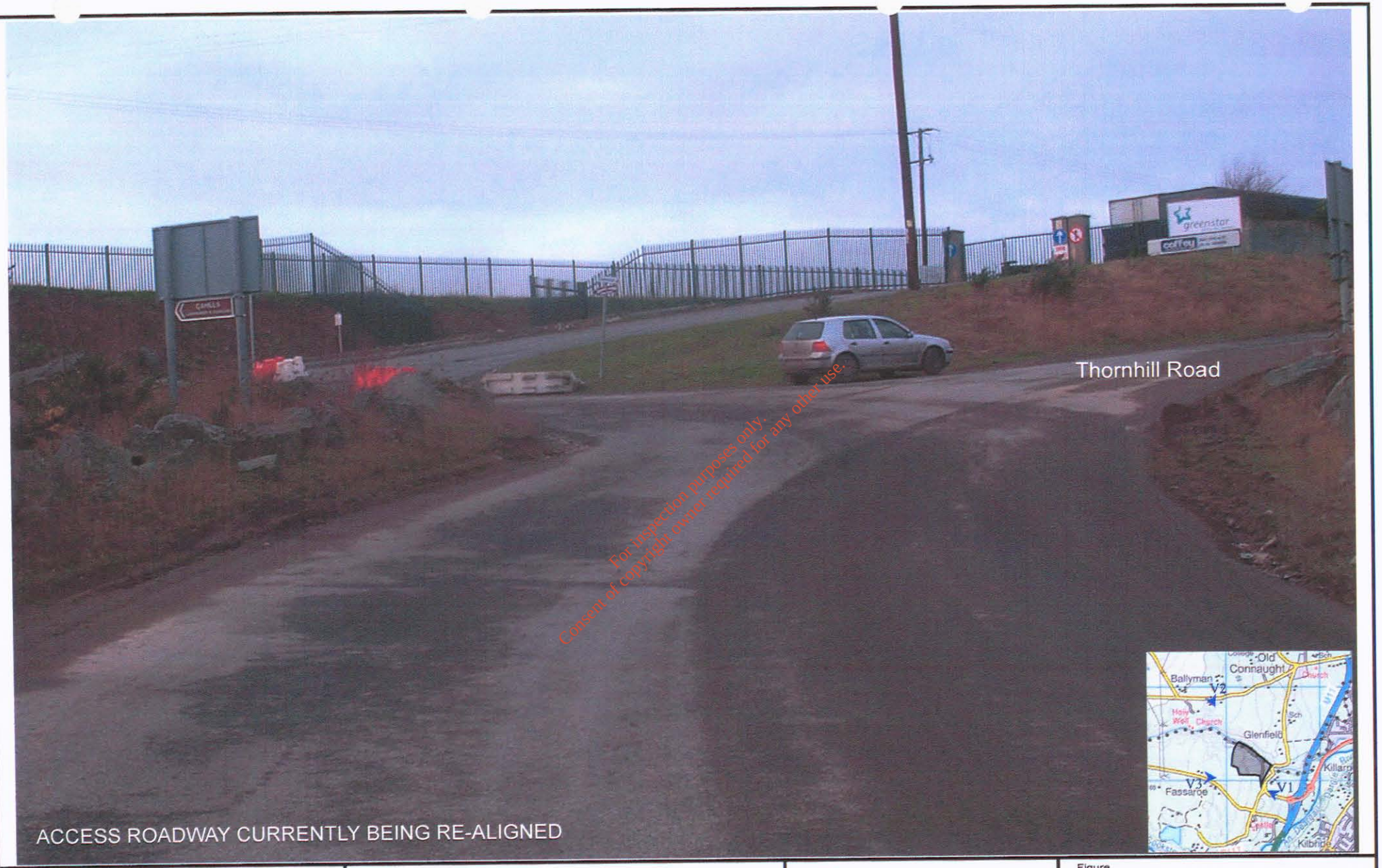
The landscape value was established based on the findings of other surveys (ecological, archaeological, human beings) conducted during the preparation of the EIS. The site is not in an area designated as of scenic or of special amenity importance. It is not designated as a Special Area of Conservation or Special Protection Area. There are no known significant archaeological, heritage or socio-cultural features on the site or adjoining lands.

13.4 Landscape Sensitivity

The sensitivity of the landscape to change is considered to be low. The proposed biowaste treatment facility will neither interfere with the existing landscape character nor eliminate a landscape value. The landscape character of the lands surrounding the site is changing as a result of on-going development works, including the construction of access roads at the southern boundary and a gas way leave along the south eastern boundary.

13.5 View Points

In general the facility is screened by its location in the worked out quarry and by steeply rising ground along the eastern boundary. The facility is partially visible from view points along Fassaroe Lane and a third class road to the north-west. The proposed biowaste treatment plant is located in an area of the site which is not visible from any public viewpoint. The locations of these viewpoint and views from these positions are shown on Figures 13.1 to 13.3.



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CLIENT
Greenstar - Fassaroe

TITLE
View Point 1 - Thornhill Rd

Details
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Figure
13.1

Scale
Not To Scale

Revision
A

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CLIENT
Greenstar - Fassaroe

TITLE
View Point 2 - From North

Details
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Figure
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Scale
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CLIENT

Greenstar - Fassaroe

TITLE

View Point 3 - Fassaroe Lane

Details

O.S. Licence Agreement number AR 0038702

Figure

13.3

Scale

Not To Scale

Revision

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13.6 Impact Assessment

The proposed changes to the facility activities including the provision of the biowaste treatment plant will not have any significant effect on the landscape of the area. The biowaste treatment plant will be located in the north west corner and will not be visible from any public viewpoint.

13.7 Mitigation Measures

Although the proposed changes to the facility activities will not impact on the landscape character, *greenstar* is committed to completing extensive landscaping works at the facility in accordance with the Restoration and Aftercare Plan submitted to the Agency. The proposed reclamation and restoration programme will bring the level of the partially filled area of the site up to the formation level of the transfer buildings.

Following capping it is intended that the restored areas will be landscaped to form park land around the transfer station buildings and biowaste treatment area. The landscaping will include a combination of grassed areas and plantings with shrubs native to the area.

14. HUMAN BEINGS

14.1 Introduction

This Section assesses the impacts of the proposed changes in facility activities on the human population in the area. It describes the economic activity, social consideration, land uses and, health and safety aspects and assesses the significance of the impact of the proposed changes. Where potential impacts are identified that have been assessed in other Sections of the EIS references to those Sections are provided.

14.2 Existing Environment

The land uses in the surrounding area consist of a mixture of agricultural, commercial, quarrying and residential use. Third party development works are currently under way to the south of the site. The nearest private residences are located along the county road to the south east of the site. There are approximately 11 residences within 500 m of the site, with the closest being approximately 20 m from the south eastern site boundary. There is a sand and gravel quarry approximately 400 m to the south west of the site operated by Roadstone which is now mainly used as a brick and block depot. The nearest residential property to the proposed biowaste treatment area is more than 280 m away to the southeast.

14.3 Human Health

The facility will accept only non-hazardous wastes. The organic fraction of the waste will be treated in the biowaste treatment plant in in-vessel units and Aerated Static Piles. The risk of airborne particulates and gases from the site activities are considered to be negligible. While the biowaste treatment operations will generate bio aerosols these are not a cause of concern in terms of impacts on the health of facility personnel or the general public (Section 11).

14.4 Socio-Economic Activity

The development of the biowaste treatment plant will not impact the economic activities currently taking place in the surrounding area. It is considered unlikely that the proposed changes will stimulate additional development nor will they reduce the potential for the expansion of economic activities in the area. The proposed changes are in keeping with existing and proposed land use patterns and will not result in the loss of amenities or rights of way.

14.5 Environmental Nuisance

It is recognised that individuals and organisations in proximity to waste processing facilities that accept and treat organic wastes will have concerns over possible environmental nuisances including odours, litter, vermin and pests. *greenstar* recognises these concerns and measures to address them have been incorporated into the proposed facility design. The facility will be operated in a manner that will either eliminate or minimise the risk of environmental nuisance. The proposed mitigation measures concerning environmental nuisances are described in detail in Sections 5, 9, 10 and 11.

14.6 Impact Assessment

It is considered that the proposed development will have a neutral impact with imperceptible consequences for Human Beings.

15. CULTURAL HERITAGE

15.1 Introduction

This Section describes the Cultural Heritage value of the facility and assesses the significance of the proposed changes to site activities. An assessment of the Cultural Heritage of the site and surrounds was carried out in 1998 as part of the original licence application. A copy of the assessment is included in Appendix 5 and it forms the basis of this assessment.

15.2 Study Methodology

A number of sources were consulted in the preparation of the assessment which include: -

- The sites and Monuments records (SMR) for Co. Wicklow.
- The topographical files of the National Museum of Ireland.
- The Ordnance 6" maps for Co. Wicklow.
- The 1:30,000 vertical aerial photographic survey of Ireland by the Geological Survey of Ireland.
- The County Development Plan prepared by Wicklow County Council.
- Documentary sources in Wicklow County Council.

In addition to the desk study a field survey of the facility and surrounding area was conducted at the site and surrounds.

15.3 Development Works

The only proposed changes to the site infrastructure are the proposed biowaste treatment plant and the connection to the foul sewer. The plant will be located on previously backfilled areas of the site. The works will not require either the digging of trenches or foundations into previously undisturbed land or the stripping of previously undisturbed topsoil. The connection to the foul sewer will be limited to excavation of trenches and laying of sewer lines.

15.4 Archaeological and Historical Background

There are no archaeological monuments recorded within the site nor were any monuments detected during field walking. There are a number of monuments, however, recorded in the vicinity of the site, the closest of which are listed below.

Table 15.1 Monuments in the Vicinity of the Site

SMR No.	Townland	Monument Type	Distance & Location
SMR: 007-026	Fassaroe	Cross	300m South
SMR: 007-027	Fassaroe	Towerhouse	600m South
SMR: 007-024	Fassaroe	Grave	750m Southwest
SMR: 007-029	Kilbride	Church	1.1km Southwest
SMR: 007-030	Kilcroney	Church	1.25km Southwest
SMR: 008-001	Rathbride	Ecclesiastical remains	1.6km East
SMR: 007-023	Monastery	Tumulus	1.2km ESE

The later prehistoric and medieval archaeology of the general area is considered typical of the region as a whole with enclosures, churches and castles dotting the rural landscape. There are eight individual monuments which can be broadly classified as 'ecclesiastical remains' located within 2.5 km of the site. The closest of these are two churches located in the townlands or Kilbride and Kilcroney approximately 1.1 km and 1.2 km southwest of the site. Evidence of later medieval settlement in the area of the site includes a towerhouse located approximately 600 m south and a similar site in the townland of Oldcourt, approximately 2.4 km east of the site.

No megalithic tombs are known to exist in the immediate area of the site although a number do exist across the border in Co. Dublin. These include wedge tombs at Laughanstown and Shankill and Portal tombs at Brennanstown, Kilternan and Ballybrack and a possible megalithic site at Parknasillogue some 2.8 km west of the proposed development site.

15.5 Impact Assessment

15.5.1 Archaeological Impact

There are no recorded monuments located within the boundaries of the proposed development area nor were any sites detected during field walking. There will be no direct impact on any of the known archaeological sites recorded in the SMR listed in Table 15.1.

There are no archaeological sites visible from the development area, therefore there will be no visual impact on any surrounding archaeology.

15.6 Mitigation Measures

Since there are no archaeological features at the site and it is not proposed to disturb previously undisturbed ground, no mitigation measures are required.

16. MATERIAL ASSETS

16.1 Introduction

This Section describes the material assets on and in the environs of the facility and presents an assessment of the impacts of the proposed changes to the facility activities. Where potential impacts are identified that have been assessed in other Sections of the EIS references to those Sections are provided.

16.2 Amenities

The facility is in an area currently being developed for commercial purposes and its immediate environs do not have a significant leisure amenity potential. The Glenmunder River which is to the north-east of the facility and forms the sites eastern boundary, is not used by anglers and is not a designated salmonid river. The stream does however drain to the River Dargle, which is a designated salmonid river. The proposed change in facility activities will no not impact negatively on the Glenmunder River (Ref. Section 8.4).

16.3 Infrastructure

The proposed increase in wastes processed at the facility will result in increases in traffic associated with the facility operation. The impact of this increase in traffic is assessed in Section 7.

16.4 Agriculture

The facility will not have any impact on agricultural land use in the area. The site has been in operation as a sand and gravel quarry since 1947 and subsequently as a landfill and transfer station.

16.5 Natural Resource Consumption

There are no non-renewable resources within the site that will be affected by the proposed developments. The proposed biowaste treatment plant will be located in an area of the site previously backfilled and currently subject to disturbance.

Table 16.1 presents an estimate of the resources proposed for use on site in the first year of revised operations.

Table 16.1 Resource Consumption

Resources	Quantities
Diesel	277,343 litres
Hydraulic and Engine Oil	5825 litres
Disinfectant (concentrate)	3 litres
Truck Wash Detergent	2281 litres
Electricity	13,600 KWH
Antifreeze	261.25 litres

17. INTERACTION OF THE FOREGOING

17.1 Introduction

Previous Sections have described the impacts associated with the proposed changes to facility activities and proposed mitigation measures. This Section discusses the significance of the actual and potential effects of the proposed changes arising from interaction between relevant receptors. Only those receptors between which there is an identifiable actual or potential relationship are addressed.

17.2 Human Beings / Water

The aquifer beneath the site is not a regionally important aquifer and is not used locally as a source of groundwater supply. The site design includes for control measures to prevent direct or indirect discharges to groundwater. Sanitary and process waste water will discharge to the new foul drainage system and the use of the septic tank will stop.

Surface water emissions comprise surface water run-off from hardstanding and roofed areas after a rainfall event (seasonal emission). The surface water drainage network consists of a series of underground drainage channels, which divert storm water from roofed and paved areas to soakaways, which ultimately drains to the Glenmunder River.

All fuel tanks and oil storage compounds used on site have been provided with adequate secondary containment to prevent spills or leaks from entering the surface water drainage system. It is proposed to use these compounds during the construction and operation of the biowaste treatment plant.

17.3 Human Beings / Air / Odour

The existing and proposed site design and method of operation incorporates measures to effectively mitigate the potential air/odour impacts. The nearest sensitive receptors including residential properties are approximately 280 m from the proposed biowaste treatment plant. It is considered that the residual impact on Human Beings due to the proposal to increase the volumes of waste processed will be imperceptible.

17.4 Human Beings / Landscape

The proposed development will change the existing site layout but will not be visible to people from any public viewpoints. The site layout, including the proposed capping and landscaping plan, has been designed to minimise the visual impact of the facility and fit in with the existing landscape character.