SECTION 3:
ENVIRONMENTAL IMPACTS AND REMEDIAL MEASURES

3.1 HUMAN BEINGS

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 project is that the local population experience no diminution in quality of life. All the potential effects of a project on the environment affect human beings. Therefore, any potentially significant impacts on humans resulting from a project must be comprehensively addressed. Air quality, water quality, noise and landscape impacts affect human beings directly while ecological and road traffic impacts affect human beings in a more indirect manner.

3.1.1 Human Beings in the Existing Environment

The existing Clean (Irl) Refuse & Recycling Ltd. site is located at Cree within the Kilrush rural area in County Clare, c.14km north of Kilrush and c.38 km southeast of the town of Ennis. The site is situated within the Ballinagun West townland. The main access to the site via a local road west (c.0.8km) off the R483 Kilrush to Quilty road. The proximity to the small village of Cree is c 1.4km. The site is bounded to the east and west by roadways leading to Cree and Doonbeg, respectively. The southern perimeter of the site is surrounded by agricultural fields. Houses in the area are privately owned and land uses surrounding the site primarily include agricultural uses, mainly the grazing of livestock. There is no industrialised activity in the vicinity of the site.

The population of the surrounding area is consistent with the rural setting, with the area characterised by one off housing and ribbon development along the nearby roadways. There are 13 residences within 500 m of the site (Figure 3.1.1 overleaf and as map C(IRL)WL-21 in Attachment 2) and a total of 22 houses located along the local road on which the Clean (Irl) Refuse & Recycling Ltd. is sited. Dwellings closest to the site (2) are located on the northwest side (c.126m from centre of site) and the northeast (c.195m from centre of site). These properties are currently under ownership of family of the Directors of the Clean (Irl) Refuse & Recycling Ltd. The area is characterised by farming with livestock grazing within the surrounding fields. There has been no significant increase in population in the immediate area in recent years, with only a few new houses built in the area.

The recreational areas in the vicinity of the site are mainly beaches and small coastal villages, with White Strand beach which is the closest recreational area at approximately 5km from the site in Cree. The closest town with legally defined boundaries is Ennis located c. 38km from the site in Cree.

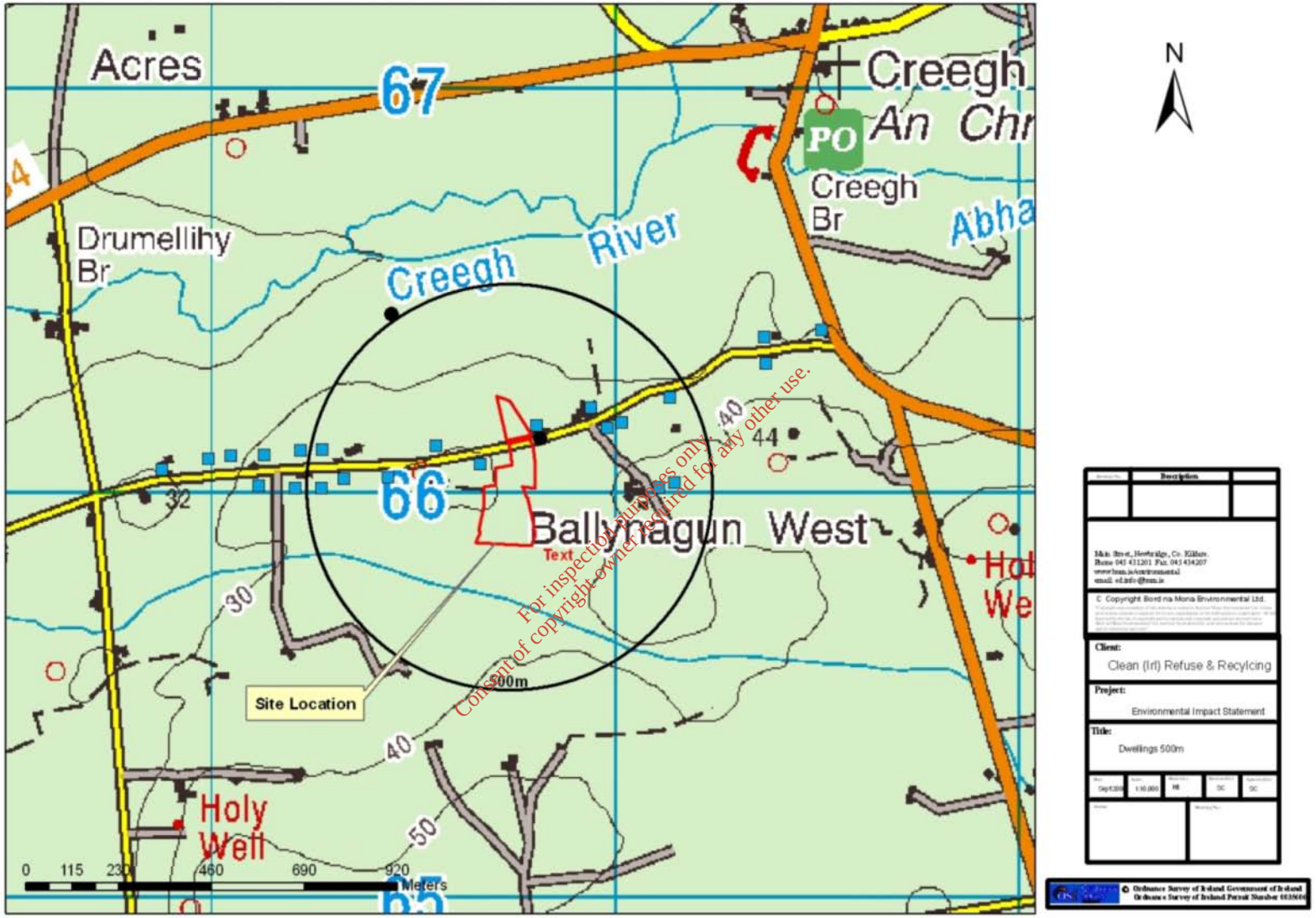

Figure 3.1.1 Dwellings within 500m of Site (NTS)

3.1.1.1 Population Characteristics

The Central Statistics Office Census published to date in 2006 reported that all Counties within Munster increased their population between 2002 and 2006 with Co. Cork and Co. Waterford amongst the fastest growing counties, at 11.4% and 9.2%, respectively. Cree, covering an area of 2,040 ha, has a low population which is typical of low density housing across Co. Clare's west coast rural setting. Clare County also defined in terms o Aggregate Town and Aggregate Rural areas. An aggregate town is a cluster of inhabitants with a population of 1,500 or over, otherwise populations residing in all areas outside clusters of 1,500 or more inhabitants is classified as belonging to the aggregate rural area. Populations under the Census 2006 show that 43,391 persons in Co. Clare live in an aggregate town area equating to 39.1%. Therefore 60.9% of the population of County Clare area living in aggregate rural areas.

Clean (Irl) Refuse & Recycling Ltd. at Cree is located within the Kilrush rural area. Private households in Cree total 157 as listed under the Census 2006 for 458 persons. Table 3.1.1 shows the 2006 populations statistics for County Clare, Kilrush rural area and this electoral area.

Table 3.1.1. Census 2006 Principal Demographic Results for Co. Clare, Kilrush Rural Area and Cree Village

Geographic Area	Persons 2002	Persons 2006	Male 2006	Female 2006	Actual Change 2002-2006	% Change 2002-2006
Clare County	103,227	110,950	56,048	54,902	7,673	7.4
Kilrush Rural Area	10,344	10,739	5,674	5,065	395	3.8
Cree (ED-081)	453	458	232	226	5	1.1

The most recent data available for Cree (2006) reported an estimated population of 458 persons which showed an increase of 1.1% from figures in 2002. The projected population increase for the mid-west region is given as 1.0% per annum up to the year 2021 (CSO 2005: Regional Population Projections 2006 – 2021).

Age profiles for the Cree area show that the highest population is in the age group 45-49 years (10%). The population is divided across all age groups with the greatest trend in the grouping from 0-19 years at 31%, indicating that the households are family units with young children contributing to the population. Also in the grouping of 35-59 years there is a greater population than the adjoining age brackets at 24%.

As the Clean (Irl) Refuse & Recycling Ltd. facility is located in Cree, it is necessary for the collection vehicles to travel to areas outside of Cree for commercial and domestic waste collections. The facility currently operates under Waste Collection Permits for:

- Co. Clare
- Co. Limerick
- Limerick City,
- Co. Kerry.
- Co. Offaly.

Services within these areas are conducted on alternate days of the week as per the collection blue-green bin alternating schedule. The transport of collected waste is carried out at times during the day in local areas, particularly the Kilmihill route, so that trucks are contraflow to the normal flow of traffic during peak commuting times and hence not adding to road traffic volumes. The demographic to which Clean (Irl) Refuse & Recycling Ltd provide their services stretches across Co. Clare, through Limerick City and County to County Kerry. Table 3.1.2 shows which areas are currently serviced by the waste collection service in these permit collection areas and their respective populations under the Census 2006 published to date.

Table 3.1.2

Geographic Area	Persons 2002	Persons 2006	Male 2006	Female 2006	Actual Change 2002-2006	% Change 2002-2006
Ennis Town	18,830	20,142	9,877	10,265	1,312	7.0
Kilrush Town	2,699	2,657	1,352	1,305	-42	-1.6
Ballyvaghan Rural Area	2,622	2,690	1,267	1,423	68	2.6
Corrofin Rural Area	3,102	3,309	1,712	1,597	207	6.7
Ennis Rural Area	26,043	28,622	14,519	14,103	2,579	9.9
Ennistimon Rural Area	9,482	9,792	4,968	4,824	310	3.3
Killadysert Rural Area	4,193	4,502	2,343	2,159	309	7.4
Kilrush Rural Area	10,344	10,739	5,674	5,065	395	3.8
Scarriff Rural Area	6,600	6,747	3,415	3,332	147	2.2
Tulla Rural Area	5,814	6,681	3,376	3,305	867	14.9
Limerick City	54,023	52,539	25,698	26,841	1,484	-2.7
Limerick No1 Rural Area	50,547	57,105	28,871	28,234	6,558	13.0
Newcastle Rural Area	26,610	22,267	11,374	10,893	1,657	8.0
Rathkeale Rural Area	13,798	14,511	7,363	7,148	713	5.2
Listowel Town	3,589	3,901	1,863	2,038	312	8.7
Tralee Town	20,375	20,288	9,886	10,402	-87	-0.4

Bin collections for commercial and domestic are carried out on a weekly basis and each waste collection truck has a predefined route on a given day. An example of a typical week, based on current services is shown in Figures 3.1.2 to 3.1 7. Figure 3.1.2 illustrates all commercial and domestic waste collection routes on regional and local roads in the mid west of Ireland for any given week.

Figure 3.1.2 Example of Monday Route

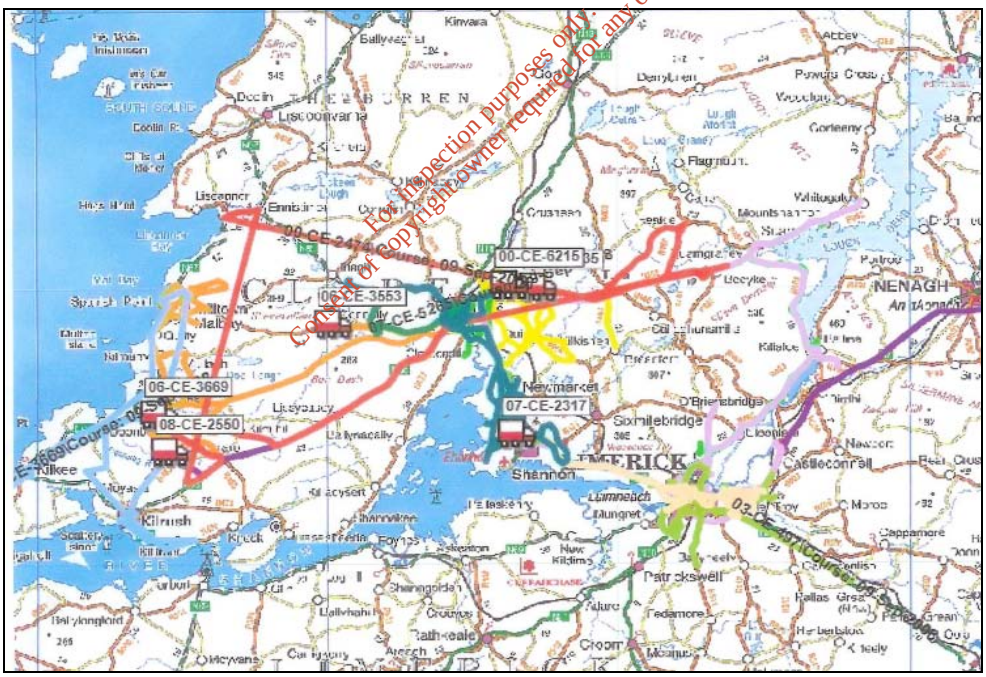

Figure 3.1.3 Example of Tuesday Route

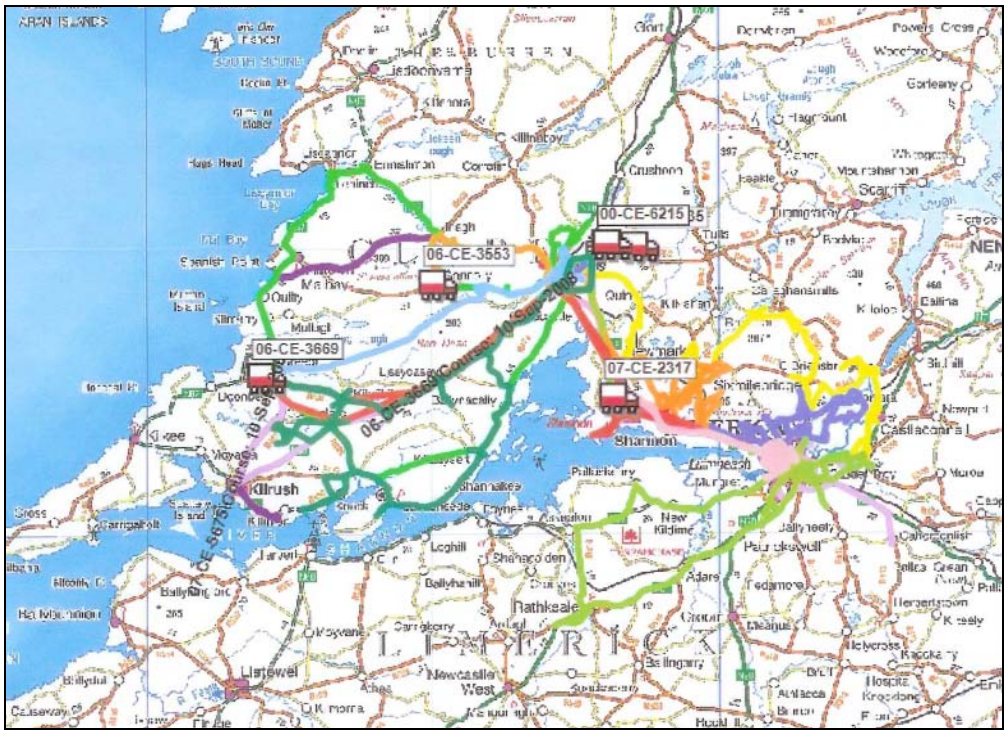

Figure 3.1.4 Example of Wednesday Route

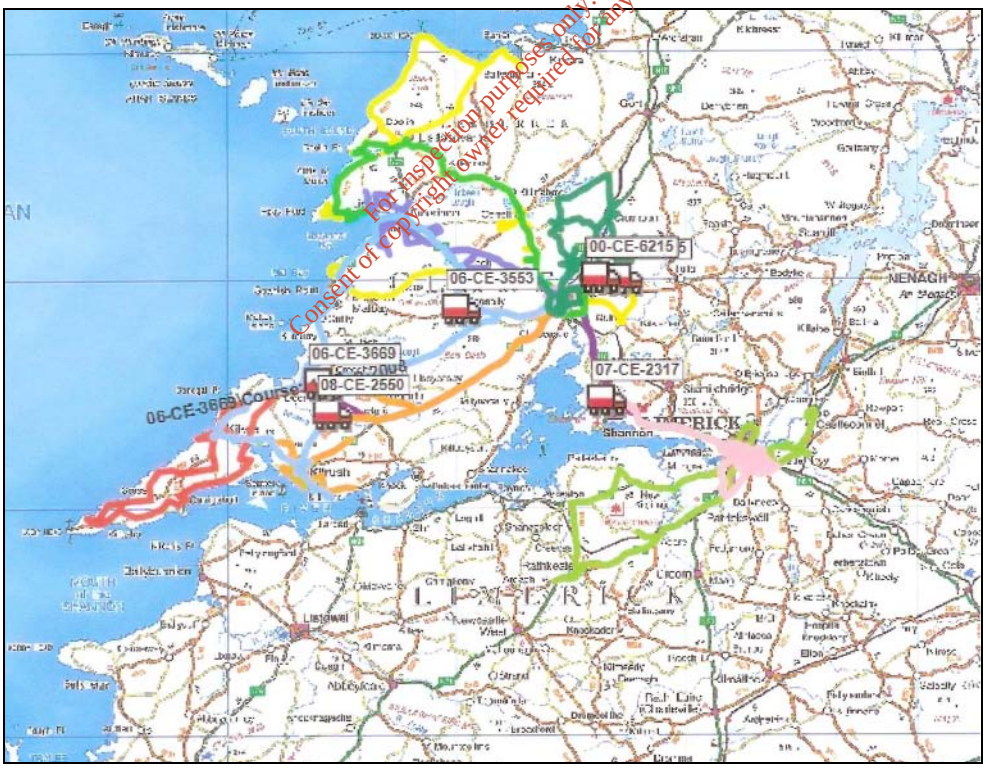

Figure 3.1.5 Example of Thursday Route

Figure 3.1.6 Example of Friday Route

Figure 3.1.7 Example of Saturday Route

3.1.2 Impacts on Human Beings

The site is located within a rural area with residential housing located along the roadways. Impacts of the existing development and operations, proposed development include the construction phase (temporary basis) and the operational phase of the proposed development. Issues relating to the potential impacts which may affect the residences in the area relating to noise, air quality, water quality, views and traffic impacts are dealt with, in detail, in the specific sections of the EIS and summarised below.

3.1.2.1 Noise

Noise is an identified form of pollution and if uncontrolled can cause nuisance or a deterioration of amenities and quality of human life. The potential impact of the existing and proposed development on noise levels within the area is described in Section 3.7, Noise. In summary, noise levels from existing on-site activities have been established through a noise monitoring programme under the current Clare Co. Co. Waste Permit 002/07/WPT/CL. This data has shown that activities undertaken at the site during night time hours between 7.00a,m. to 8.00 a.m. prior to daytime hours 8.00 a.m. to 10.00 p.m. are elevated over the stipulated limit of 45db at the closest noise sensitive location (c. 126m).Activities identified to create noise during the night time period included the starting up of waste collection trucks and the ballistic separator are giving rise to the exceedence of the limit. Mitigation has been put in place to reduce activities between 7.00a.m. and 8.00a.m. However, it has been decided not to operate the waste sorting plant prior to 8.00a.m.to ensure the limit is not exceeded. Historical data has shown that the site can operate within the limit of 55 dbA during day time under normal daily operations.

Noise levels associated with the temporary construction phase would not result in significant impacts to the ambient noise environment. Traffic associated with the delivery of materials, such a shed cladding may potentially increase vehicular movements and include delivery of structural and building materials to the site by HGVs. To this end, mitigation measures can be developed to reduce these levels significantly such as a phased construction of buildings, planning material delivery times to reduce impact on residents in the area. The operational phase of the biostabilisation units will have no significant impact on noise levels of the ambient environment given that the units are in-vessel and the loading associated with the process will be performed with plant machinery inside the buildings. Traffic movements are predicted to not increase significantly in relation to the coming on-line of brown bin waste collection service, increasing truck movements to approximately 10-

12 per week (week on week off) between the collection of biodegradable waste and the transport of biostabilised waste to the assigned destination. The greatest increase of traffic will be related to the increase in tonnages of C&D waste.

3.1.2.2 Air Pollutants

A variety of air pollutants have known or suspected harmful effects on human health and the environment. In many similar developments, the potential primary air pollutants of concern are derived from combustion (power/heat generation or motor vehicle traffic) and fugitive emissions (dust). A detailed discussion of impacts to air quality resulting from the proposed project are given in Section 3.6 Air, and are summarised below.

*Combustion and traffic derived primary pollutants***.**

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. 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 traffic movements as a result of the proposed development are predicted to be minimal at the nearest sensitive receptor and therefore, it is unlikely that they would cause any adverse human impacts at this point.

Fugitive Emissions

The proposed project includes a number of mitigation measures to reduce dust generation and abate fugitive dust emissions. Dust generation will be minimised by good working practices during both the construction and operational phases of the development. The proposed project which includes larger development phases Biostabilisation Plant, Biomass Recovery Plant, extension to existing processing sheds, will be developed in a number of phases thus limiting the extent of any exposed areas at any one time.

3.1.2.3 Water Quality

The receiving water environment within the vicinity of the development consists of a number of surface water bodies and the underlying groundwater (Locally Important Aquifer).

All foul water generated on-site will continue to be discharged to an on-site wastewater treatment plant that discharges high quality effluent to a percolation area. Nutrients and bacteria are removed from the effluent by the treatment plant to levels such that the effluent has minimum impact on the receiving environment.

Surface water run-off from hardstanding areas will pass through oil interceptors prior to discharge to the north and south drainage ditches and ultimately into the River Cree. All potentially contaminating materials will be stored in secure fully bunded areas thus reducing the potential for accidental spillages to the water bodies on site.

Based on the assessment in Chapter 3.5 Hydrogeology and aquifer potential, it is not envisaged that the abstraction of water from surface waters or groundwater, will lead to any significant impact on the receiving waters or the underlying aquifer as water is a requirement for waste processing activities at the facility.

Overall it is considered that the development is not expected to result in significant adverse impacts on water quality or quantities.

3.1.2.4 Landscape and Visual

Land use in the vicinity of the project site is predominately agricultural with a number of residences located along the nearby roadways. As discussed in Section 3.8 Landscape and Visual Impacts, the existing processing sheds have been constructed with full planning permission and the proposed C&D waste storage building, timber storage building will be constructed such that the apex of these proposed shed will be at a lower height or inline with the existing structures. The maximum height of the biostabiliation plant will be at 1.2m above the highest existing building. The flue of the Biomass Recovery Plant will cause a visual impact however, mitigation measures will be put in place to reduce the visual intrusion. The proposed skip storage area will have earthen berms created to conceal skips that may be stored at this area. Existing railway sleepers at the east perimeter and earthen berms at the west perimeter have been constructed in such a manner as create minimum visual intrusion on the existing residents and road users, which would reduce long-term visual impacts.

3.1.2.5 Traffic

A Traffic Impact Assessment (TIA) was conducted to determine potential impacts to the surrounding roadway network resulting from traffic associated with the construction and operational phases of the proposed project (refer to Section 3.8 Traffic).

The proposed development will increase the level of traffic movements on the local road network relative to the increase in tonnages proposed. However, due to the nature of the business, the traffic generated will be intermittent and the volume will be dependent on customer requirements. A number of mitigation measures were proposed to alleviate potential impact points.

3.1.3 Mitigation Measures

Mitigation measures for the control of potential impacts from the proposed development are detailed in the proceeding sections of this EIS. It is not considered that any specific mitigation measures are required for the impact to human beings, other than the mitigation measures detailed elsewhere in this EIS. Clean (Irl) Refuse & Recycling Ltd. intend to operate the proposed development in line with best practice and continue their open door policy with the local community.

3.2 FLORA & FAUNA

3.2.1 Introduction

This chapter assesses the potential impacts of waste processing activities on the flora and fauna at the Clean (Ireland) Refuse & Recycling Ltd. site at Ballingun West, Cee, Co. Clare and its environs. The 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. A summer site assessment was carried out in 2008 in conjunction with a desk study. The survey was undertaken to provide baseline data on the existing ecology in the area, and to assess the potential impacts, if any, the continued operations may have on the local flora and fauna.

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 (as amended 1998 & 2005),
- Wildlife (Amendment) Act, 2000, and
- Relevant Protection Orders, including the 1999 Flora Protection Order.

3.2.2 Description of the Receiving Environment

The site is located 1.4km southwest of Cree and c.14km north of Kilrush, Co. Clare. There are two main land uses in the area around the site, agricultural and residential, as well as small scale plantation forestry. There are a number of private dwellings (22) located along the local road running between the existing south boundary and proposed new boundary to the north. The agricultural land use is characterised by farming with fields in the area mainly used for cattle grazing. There are no SACs, SPAs, NHAs or pNHAs located within the immediate vicinity (2km radius) of the Clean (Ireland) Refuse & Recycling Ltd. site. While land use is dominated by improved agricultural land, many of the fields surrounding the facility are characteristically unimproved, poor, wet agricultural fields which are not appropriate for

cattle grazing or pasture. Such fields fall under the habitat classification under the Heritage Council's 'Guide to Habitats in Ireland' of Wet Grassland (GS4) which is a common habitat in Ireland, particularly in the west. This is the habitat most likely to be impacted by the proposed development. The fields in the surrounds of the Clean (Ireland) Refuse & Recycling Ltd. facility are dominated by Soft Rush *(Juncus effusus),* Yorkshire Fog *(Holcus lanatus)* and Grasses *(Poa spp.).*These conditions are ideal for Sitka Spruce Forestry, which is common in the area. Plate 3.2.1 shows a typical field of this type in the environs of the facility.

Other habitats observed in the vicinity (<2km) of the facility included a conifer plantation to the south, as shown in Plate 3.2.2 overleaf. Species most likely to be found here, which are common to plantations in Ireland, are Sitka Spruce *(Picea sitchensis*), Larches *(Larix spp.)* and common Alder, (*Alnus glutinosa*). The plantation is surrounded by infrequent broad leafed trees scattered in hedgerows across the landscape.

Landscaping at the southern and eastern boundaries of the facility has recently taken place (planted 2008) with saplings of Alder *(Alnus glutinosa)* and Scarlet Willow *(Salix alba)* planted on the sloping Earth Banks (illustrated in the Habitat Map C(IRL)Wl-11 in Attachment 3).

Plate 3.2.1 Poor, wet agricultural fields in surrounding area looking northwest.

Plate 3.2.2 Conifer Plantation located south of the facility looking northwest

3.2.3 Study Methodology

An ecological survey, consisting of both a desk-top and field survey, was undertaken of the site and the environs which entailed:

- Identification of the habitat types present in accordance with Heritage Council Guidelines, and 'A Guide to Habitats in Ireland', (The Heritage Council, Fossitt, 2000),
- Establish the presence or absence of species, both flora and fauna, present in each habitat type,
- Identification of candidate SPA's, SAC's, NHA's and proposed NHA's in the area,
- Consultation with 'Landscape Character Assessment of County Clare 2004' (Ref 0002267) undertaken by Environmental Resources Management in association with ERA-Maptec Molas Julie Martin Assoc and Gina Johnson on behalf of the Heritage Council,
- Reference to County Clare Heritage Plan 2003-2007 'Spot The 101 Habitats and Species in Co. Clare' under the Local Biodiversity Action Plan.
- Nomenclature followed Webb (1996) for higher plants, and Hubbard (1984) for the identification of grasses. The fauna study involved recording animals and birds sighted or heard during the survey.

3.2.4 Special Areas of Conservation, Natural Heritage Areas (including Proposed) and Special Protection Areas.

Nature conservation within European Community

Two major pieces of European legislation on nature conservation and the designation of site 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), the annexes of which were amended as part of the environment chapter in the Treaty of Accession 2003.

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).

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 Co. Clare

The proposed site is located in County Clare which has a rich heritage of habitats containing a wide range of plants and animals. Habitats in the county range from limestone in the Burren, to Sea Cliffs at the Cliffs of Moher to raised and blanket bogs. In addition, Clare is internationally notable for habitats such as turloughs, limestone pavement and orchid–rich grassland and for many species such as Pine martens, butterflies, moths and Lesser horseshoe bats. On overview of the nature conservation areas are shown overleaf in Figure 3.2.1 and in map C(IRL)WL-20 in Attachment 2.

Special Areas of Conservation (SAC)

There are 3 SAC'c located within 10 km of the proposed development site, detailed in the table below:

Habitat Type	Site code	Site Name
Bog	0000070	Tullaher Lough & Bog (SAC 002343)
Sand Dunes	00250	Carrowmore Dunes (SAC 002250)
Open Marine Water, Sand Dune Systems, Sea Islets and Bays	001021	Carrowmore Point To Spanish Point & Islands (SAC 001021)

Natural Heritage Areas (NHA) and Proposed Natural Heritage Areas (pNHA)

There is one relevant NHA designation within 10 km of the site, which is detailed in the table below:

Habitat Type	Site Code	Site Name
Bog	002400	Cragnashingaun Bogs (NHA 002400))

There are four proposed NHAs located within the 10km area of the site and are detailed in the table below:

Habitat	Site code	Site Name
Bog	0000070	Tullaher Lough & Bog
Marsh	001007	White Strand Carrowmore Marsh
Open Marine Water, Sand Dune Systems, Sea Islets and Bays	001021	Carrowmore Point To Spanish Point & Islands
Open Marine Water, Sea Islets and Bays	004182	Mid-Clare Coast

The pNHA White Strand Carrowmore Marsh lies c.3km west of the proposed site and is the closest habitat with a proposed designation, while Carrowmore Dunes (SAC 002550) is the closet designated site to the facility. The site synopsis for Carrowmore Dunes (SAC 002550)

is attached in Attachment 6. There is no site synopsis available for the proposed NHA. A study was undertaken in 1998 on behalf of the Heritage Council for the 'Assessment of the Scientific Interest of the Dune System at White Strand, Doonbeg'. This study details that the dune area comprises approximately c.30% of the Carrowmore Marsh/White Strand, the proposed NaturalHeritage Area (pNHA), and the total area of the pNHA has also been selected as a proposed Candidate Special Area of Conservation (pcSAC) to be included in the Natura 2000 network. The site was previously classified as an Area of Scientific Interest (ASI) of National Importance (Code number 66/Clare) (Anon., 1981) and is the most southerly dune system in Co. Clare. The pNHA is described in the assessment as follows:

'The sand dune area is just over two kilometres in length, up to 500 metres in width and is confined between two rocky headlands in Doughmore Bay. The entire site is fronted by a picturesque sandy beach, with narrow bands of shingle in places. The sand dunes reach a height of over 20 metres and are visually dominated by *Ammophila arenarial.* Behind the high dune area there is a zone of flat dune grassland, dominated by low-growing species such as *Festuca rubra* and *Plantago lanceolata*. To the east of these flat areas, there are areas of improved grassland, periodically inundated wet grassland and freshwater marsh/ reedswamp, the largest example of which is Carrowmore Marsh (in the south-east of the study area). Bird life is likely to be of interest in these wetter portions of the site. At the time of survey, Lapwing (*Vanellus vanellus*) and Whooper Swan (*Cygnus cygnus*) were noted in these areas.

Special Protected Areas (SPA)

There is one SPA located within the 10km area of the site and are detailed in the table below:

Habitat	Site code	Site Name
Bog	0000070	Tullaher Lough & Bog

3.2.5 Flora and Fauna Habitats and the Existing Environment

The site and immediate surrounding area features a number of habitat types as classified in 'A Guide to Habitats in Ireland', published by the Heritage Council. The project site includes both the existing area and the proposed area for the expansion of the Clean (Ireland) Refuse & Recycling Ltd. facility. The site is currently a mixture of hardstanding and hardcore at various areas across the site, with vegetation colonised predominantly at the boundaries. The surrounding land is a mixture of one-off housing and fields; with hedgerows, chain & link fencing or low-rise stone walls defining land and property boundaries. The dominant habitat identified at the site is the artificial surface in terms of the greatest area however, the habitat with the greatest variety of wild flowers and grasses, was the Earth Banks or 'earthen berms' which define sections of the boundary for the site. The area for the expansion of the site,

where it is proposed to be a hardstanded skip storage area, is located on an agricultural well drained field which is common to the immediate surrounding area at the north of the local roadway. This piece of land is currently soil stripped, with existing habitats in the hedgerows at the east and north remaining unaffected. Earthen berms have been introduced for screening and boundary purposes and will eventually be colonised with species typical throughout the Irish countryside. None of the plant species or habitats recorded are rare or endangered. A full floral species listing is illustrated in Attachment 4 and a Habitat Map C(IRL)WL-11 for the site is included in Attachment 3..

Habitat types relevant to the existing area and proposed expansion area of the site include:

(i) Hedgerows (WL1)
(ii) Earth Banks (BL2)
(iii) Drainage Ditches (FW4)
(iv) Buildings and Artificial Surfaces (BL3)
(v) Refuse and Other Waste (ED5)

(i) Hedgerows (WL1)

The Heritage Council describes hedgerows as linear strips of shrubs, often with occasional tress, that typically form field or property boundaries where most hedgerows originate from planting, and many occur on raised banks of earths that may be derived from excavation of associated Drainage Ditches. Hedgerows occur only at sections of the boundary of the facility and are well established on the west (as shown in Plate 3.3.) and east perimeter of the existing site area and east of the proposed skip storage area. The hedgerows at the facility are typically 2-3 metres high, with several species extending into each other including creeping plants and shrubs. Specifically Bramble (*Rubus fruticosus* agg.), Common Gorse *(Ulex europaeus),* Japenese Rose *(Rosa rugosa)* and Willow *(Salix capria)* were present. Plate 3.3.3 shows the hedgerows at the western boundary of the facility. Spear Thistle *(Cirsium vulgare),* Meadow Buttercup *(Ranunclus acris*) and Lesser Buredock *(Arctium minus)* were identified at the edges of the hedgerows on the Earth Banks.

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Hedgerows are also very common in the surrounding environs which are typical of the Irish Countryside with trees occasionally scattered through the hedgerows. Species that are likely to be found in hedgerows in the environs of the facility are woody perennial species such as Hawthorn *(Crategus monogyna),* Ash *(Fraxinus excelsior),* Elder *(Sambucus nigra),* and Blackthorn *(Prunus spinosa)* and may be typically found amongst shrubs common to the south and west of Ireland such as Fuschia *(Fuschis magellanica).*

Plate 3.3.3 Hedgerows at the west perimeter of site looking north

(ii) Earth Banks (BL2)

Earth Banks are prevalent at the site and are commonly a type of field boundary in many parts of Ireland. Whilst Earth Banks may be constructed from local materials such as peat, earth, gravel or stone, the Earth Banks at the facility are constructed from stripped materials within the site (topsoil, subsoil), hardcore and inert rubble. These Earth Banks are referenced to as earthen berms throughout this environmental impact assessment.

Earthen berms are a dominant physical feature at the existing area of the site (west, south and east) and also of the proposed skip storage area (north, west and south) and vary from 2-3 metres in height (Plate 3.2.4 below). Whilst providing a habitat for flora and fauna, the earthen berms also serve several purposes from visual impact to noise mitigation measures. In areas where the earthen berms have been relatively undisturbed, the areas are gradually re-colonising with Grasses *(Poa spp.),* Sedges *(Carex spp.)* and Dock Leaf species *(Rumex obtusifolius, R. conglomeratus, R. crispus),* Creeping Thistle (*Cirsium arvense*), Meadow Vetchling *(Lathyrus pratensis),* Corn Spurrey *(Spergula arvensis) and* Fairyflax *(Linum catharticum).*

Plate 3.2.4 Re-colonising Earth Banks at southern boundary of site looking west

(iii) Drainage Ditches (FW4)

This category of classification under the Heritage Council's guide to Habitats in Ireland includes linear water bodies or wet channels that are entirely artificial in origin, and some sections of natural watercourses that have been excavated or modified to enhance drainage and control the flow of water. There is one modified Drainage Ditch located in the area of the proposed site at the skip storage area, surface water drains across the fields to the north (c.0.8km). Vegetation being dense in areas and mainly consisting of Sedges *(Carex.spp),* Grasses *(Poa spp).,* Rushes *(Juncus clongomeratus, J. effuses)* which becomes mixed with Earth Bank and Hedgerow habitat also established at this location. Plate 3.2.5 illustrates the north drainage ditch. Also, falling into this classification is a Drainage Ditch located at the southeast corner of the facility which originates from fields to the east and runs west along the fields to the south of the facility and ultimately drains into the River Cree. The flow is generally low even during seasonal fluctuations and has become overgrown with vegetation typical of Drainage Ditches with rushes *(Juncus spp.),* small sedges (*Carex flascca, C. hirta, C. ovalis*) and Yorkshire-fog *(Holus lanatus)*. Plate 3.2.6 illustrates the south Drainage Ditch.

Plate 3.2.5 North Drainage Ditch looking south

Plate 3.2.6 South Drainage Ditch looking east

(iv) Buildings and Artificial Surfaces (BL3)

The category includes all buildings (domestic, agricultural, industrial and community) other that derelict buildings, it also includes areas of land that are covered with artificial surfaces of tarmac, cement, paving stones, bricks, blocks or Astroturf. The concrete hard standing area specifically adjacent to the weigh bridge and administration offices was inhabited by species such as Dock Leaf species *(Rumex obtusifolius, R.conglometatus, R.crispus),* Groundsel *(Senecio vuldaris),* and Common Dandelion *(Taraxacum officinale* agg.*).* Plate 3.2.7 shows species growing at areas of concrete.

Plate 3.2.7 Plant species colonising hardstanded pathway at north of facility.

(v) Refuse and Other Waste (ED5)

Waste piles at the facility comprised of construction and demolition waste are located at the southeast of the facility. The waste is added to or reduced by volume as required and is therefore routinely disturbed. As a result of this activity, little or no re-colonisation of plant species has occurred and also considering the inert nature of the waste which does not support higher species plant life. No particular specimens were observed directly on the C&D stock pile, however areas to the bottom of the C&D stock pile where mixing with Earth Banks has taken place saw infrequent species such as Common Ragwort *(Senecio jacobaea),* Grasses *(Poa spp.)* and Creeping Thistle *(Cirsium arvense).* Plate 3.2.8 shows the C&D waste pile with little vegetation.

Plate 3.2.8 C&D waste pile at southwest of site

Hedgerows (WL1), Earth Banks (BL2) and Drainage Ditches (FW4) habitats observed at the facility are also well established around the surrounding environs as these are commonly found in the Irish Countryside. Habitats also identified in the environs of the Clean (Ireland) Refuse & Recycling Ltd. site and confirmed under the Kilmihill Farmland Landscape Character Assessment undertaken by ERM in 2004 on behalf of the Heritage Council are:

(vi) Conifer Plantation (WD4)
(vii) Marsh (WS1)
(viii) Treelines (WL2)
(ix) Scrub (WS1)
(x) Broadleaf Woodland (WD1)
(xi) Wet Grassland (GS4)
(xii) Stonewalls and Other Stonework (BL2)

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. There was no fauna directly observed during the site survey. However, given the rural location of the site, it is probable that visitors to the site may include animals that are typical of the Irish countryside such as

Hedgehog (*Erinaceus europaeus*), Pygmy Shrew (*Sorex minutus*), Fox (*Vulpes vulpes*), Brown Rat (*Rattus norvegicus*), and Wood Mouse (*Apodemus sylvaticus*). No species protected under the Wildlife Act 1976 and Wildlife (Amendment) Act 2000, such as the Badger (*Meles meles*) or Bat species were observed during the site visits, nor was there any evidence of their possible presence noted.

Avifauna

Measures in place at the existing waste transfer facility to prevent birds scavenging requires all wet waste storage to be enclosed and processed within a specified time period. Bird species identified in the area of the proposed development included Rooks (*Corvus frugilegus*) and Hooded Crow *(Corvus cornix)*. A number of other species that are indigenous to Co. Clare are likely to be visitors in the area are Robin (*Erithacus rubecula*), House Sparrow (*Passer domesticus*), Skylark (*Alauda arvensis*), Swallow (*Hirundo rustica*) and Seagulls *(Larus occidentalis)* may travel c. 4km from the coast inland to the site. Birds of Prey present in Co. Clare include Peregrine falcon *(Falco pergrinus)* and the Barn Owl *(Tyto alba)* which could be potential visitors to the site. The Hen Harrier *(Circu cyaneus*) is a ground nesting species, known to be in particular woodland areas in the county, and although possible, it is unlikely that it would be a likely visitor.

3.2.6 Conservation value of existing site

The habitats encountered on the site are common and typical throughout Ireland. The site has experienced significant development over the years since activities at the facility commenced in 1984. There will be no alteration to habitats for the proposed development on the existing area of the site as this will occur only on hard standed process areas. A section of the earthen berms may be cut back to increase the surface area at the rear of the site for the construction of the proposed Biostabiliation/Sterilization Plant and this will not significantly impact the habitat. Although the development at the proposed skip storage area at the north of the site will constitute a permanent change of habitat type, none of the habitats recorded are of high conservation value.

3.2.7 Evaluation of Flora and Fauna

Details of the existing and proposed operations have been outlined in Section 2 of the Environmental Impact Statement.

Flora recorded during the survey at the site and its environs recorded plant species which are common and widespread throughout Co. Clare and indeed Ireland. There were no protected species recorded. The dandelion *(Taraxacum gotlandicum)* is formally protected by 1980 Order and is classified as vulnerable under the Red Data List of Irish Plants however, only common dandelion (*Taraxacum officinale)* was identified at the site.

There were no bird species recorded at the site which are listed in Annex 1 of the Birds Directive, nor were there any Red or Amber list species observed in the area proposed for development.

3.2.8 Predicted Impacts

It is unlikely that existing and proposed operations at the site will have any significant impact on either the pNHA at White Strand Carrowmore Marsh which lies c.3km west of the proposed site, or the designated SAC of Carrowmore Dunes (SAC 002550) which is the closest designated area to the site. Existing berms will remain in place and there will be no significant impact on the established habitats at the boundary Earth Banks. There will be no alteration to the Hedgerows at the boundary sections and the habitat will therefore be conserved. The site section which has been soil stripped for the skip storage will overtime become naturally inhabited by species and fall into the classification of Buildings and Artificial Surfaces (BL3) habitat when the phased hard standing (see Habitat Map C(IRL)WL-11 in Attachment 3) has been completed. Considering the habitat being lost is species poor and is commonplace throughout the country; it is considered to be of low ecological value.

Mitigation Measures

The following mitigation measures should be employed in order to minimise the effects the development of the specific site area in relation to the development of the skip storage:

- The development of the area should not encroach or impact upon the drainage ditch or hedgerow at the east of the proposed area (see Site layout Plan C(IRL)WL-02 in Attachment 3.
- Earthen berms created and planted with native tree and shrub species
- Existing landscaping around the boundary of the facility shall be maintained through regular inspection and replacement planting of species or individual plants that may die off .

3.3 SOIL AND GEOLOGY

3.3.1 Introduction

This section of the Environmental Impact Statement assesses the predicted impacts of the proposed developments at Clean (Irl.) Refuse & Recycling Co. Ltd on the underlying soils and geology of the site. This includes an assessment of the predicted environmental impacts of the development during construction and operational phases.

3.3.2 Methodology

This assessment comprises of a desk-based study of the relevant documents as detailed below:

- Ordnance Survey of Ireland;
- Geology of Shannon Estuary Geological Survey of Ireland (GSI; 1999) Sheet 17;
- Geological Survey of Ireland web based database;
- National Parks & Wildlife web based database;
- Teagasc Soil Classification.

Site investigation works were carried out by Bord na Mona Environmental Ltd entailing the collection of 4 no. soil samples for quality analysis purposes and these are referenced in this assessment.

3.2.3.1 Existing Environment

3.2.3.2 Site Description

The site is located within south-eastern region of County Clare at Grid Reference 102728N, 165969E. The topography of the study area is generally undulating with elevations ranging from between 30 to 40 m OD (Ordnance Datum). The proposed site covers an area of c3.0ha and is currently operating as a waste transfer facility under a waste permit from Clare County Council. The site is accessed via the county road way off the regional road R484. The proposed facility is located on both sides of the county road way with waste acceptance and processing occurring in the area to the south of the roadway, and the storage of skips only within the extended northern section.

The site operates under a waste permit from Clare County Council (Ref: 002/07/WPT/CL). Operations will remain similar to that currently operating on the site

with increases to the volume of wastes being accepted at the facility and associated changes to infrastructure.

3.2.3.3 Soil

The soils of the area are classified as Gleys (An Foras Taluntain (1964) Ireland General Soil Map). These soils are characterised as poor drainage with groundwater close to the surface. The area is identified as *Bog* in the GSI 6-inch old bedrock series.

Much of the site is covered in hardstanding. A soil quality sampling programme was carried out by Bord na Mona Environmental Ltd in August 2008 to determine the quality of the soil within the existing working areas. Soil samples were collected from 4 no. subject areas as shown in figure 3.3.1. The soil samples were submitted to Alcontrol Laboratories for analysis and a copy of the results are given in Tables 1 & 2 overleaf.

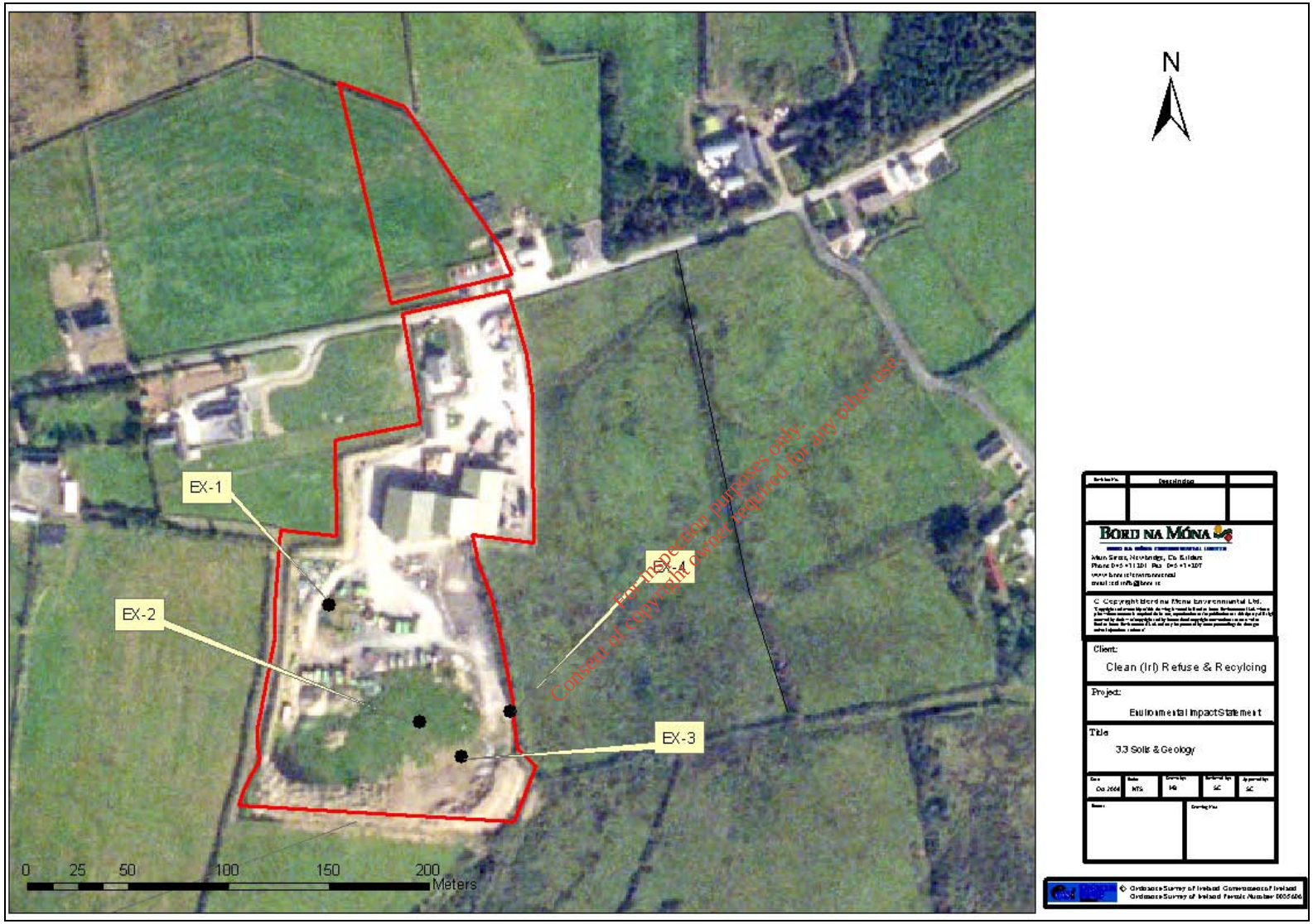

Figure 3.3.1 Locations of Soil Sampling

Table 3.3.1 Soil Quality Results						
Parameter	**Unit**	**EX-1**	**EX-2**	**EX-3**	**EX-4**	**Limit**
Diesel Range Hydrocarbons (DRH)	mg/kg	<1	<1	<1	<1	50/5000[3]
Mineral Oil	mg/kg	<1	<1	<1	<1	50/5000[3]
Cadmium*	mg/kg	<0.004	<0.004	<0.004	<0.004	1/1400[2]
Chromium*	mg/kg	<0.01	<0.01	<0.01	<0.01	130/5000[2]
Copper*	mg/kg	0.10	0.23	0.65	0.28	36/190[3]
Lead*	mg/kg	<0.01	<0.01	<0.01	0.28	450/750[2]
Molybdenum*	mg/kg	<0.01	0.01	<0.01	0.06	3/200[3]
Nickel*	mg/kg	0.09	0.07	0.08	0.12	50/5000[2]
Selenium*	mg/kg	0.05	0.06	0.05	0.07	35/8000[2]
Zinc*	mg/kg	0.14	0.39	1.57	0.13	140/720[3]
Dissolved Organic Carbon*	mg/kg	<20	39	91	67	
Chloride*	mg/kg	17	24	39	21	
Fluoride*	mg/kg	1	1	1	3	500[3]
Sulphate*	mg/kg	47	180	1271	294	0-2000[4]
Natural Moisture content	%	11.4	15.6	25.6	13.3	
TOC	%	<0.2	0.8	1.5	0.8	
Total Dissolved Solids	mg/kg	350	1080	2140	350	
Phenols	mg/kg	<0.1	<0.1	<0.1	<0.1	0.05/40[3]
Antimony*	mg/kg	0.02	0.02	0.02	0.03	3/15[3]
Arsenic*	mg/kg	0.02	0.02	0.02	0.03	20/500[2]
Barium*	mg/kg	1.47	2.08	2.53	1.79	160/625[3]
Mercury*	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	8/480[2]
Total PAHs	mg/kg	<0.001	<0.001	<0.001	0.276	1/40[3]
Total 6 PAHs	mg/kg	<0.0016	<0.0016	<0.0016	<0.0016	1/40[3]
Total 10 Dutch PAHs	mg/kg	<0.001	<0.001	<0.001	0.199	1/40[3]
Total PCBs[1]	mg/kg	<0.001	<0.001	<0.001	<1	
BTEX	ug/kg	<0.01	<0.01	<0.01	<0.01	0.01/1[3]
Organics[1]	mg/kg	<0.001	<0.001	<0.001	See below	

*CEN 10:1 Leach

[1] For a full suite of parameter refer to attached

[2] UK Contaminated Land Exposure Assessment (CLEA 2002) limits [plant uptake/industrial]

[3] Dutch [Target/Intervention] Values for soil remediation

Fluoride given as target only (differentiation by clay content)

BTEX: lower limit for benzene applied

DRH: limit for mineral oils applied

[4] Indicator limit only taken from Kelly indices for uncontaminated sites

As part of this assessment, the soil sample results are compared to common soil quality values used in Ireland for contaminated land issues. These include the following: (i) UK based CLEA limits for sites with plant uptake and the higher limit for industrial sites, (ii) the Dutch Ministry of Housing, Spatial Planning and Environment limits for target and intervention values, and (iii) for comparison purposes only the Kelly indices used historically for contaminated gas works. As shown above there are no levels within the samples taken above their respective contaminated limits. The presence of minor PAHs and organics were detected in EX-4.

Table 3.3.2 Organic Compounds detected in EX-4

Parameter	**EX-4 ug/kg**
Phenanthrene	24
Anthracene	8
Fluoranthene	30
Pyrene	29
Benzo(a)anthracene	31
Chysene	22
Benzo(b)+Benzo(k) Fluoranthene	35
Benzo(a)pyrene	17
Indeno(123cd)pyrene	14
Dibenzo(ah)anthracene	10
Benzo(gh)anthracene	21
Coronene	5

Whilst levels of PAHs were detected in the soil sample EX-4, levels are low and within the Dutch Target and Intervention values. The results were also compared with the EPA 2002 document "Towards Setting Environmental Quality Objectives for Soil; Developing a Soil Protection Strategy for Ireland – A Discussion Document". All results detected lie within the typical range for trace elements in non-polluted agricultural soils in Ireland for elements given.

3.2.3.4 Quaternary Geology

The Quaternary geology (subsoil) is described as glacial till which derived during the last glaciation period to affect this area from 73,000 to 10,000 BP (before present). The sediments were deposited through the action of a glacier moving south/south-westerly from the east Galway, north Clare region (referred to as the Central Dome) across the western area of Ireland depositing a blanket of glacial tills. These glacial tills contain the clasts of the bedrock over which the glacier travelled. The Teagasc subsoil map describes the deposits as "*Till derived chiefly from Namurian Rocks*" and "*Peat*"·.The·subsoil·map·Figure·3.3.2·is·shown·overleaf.

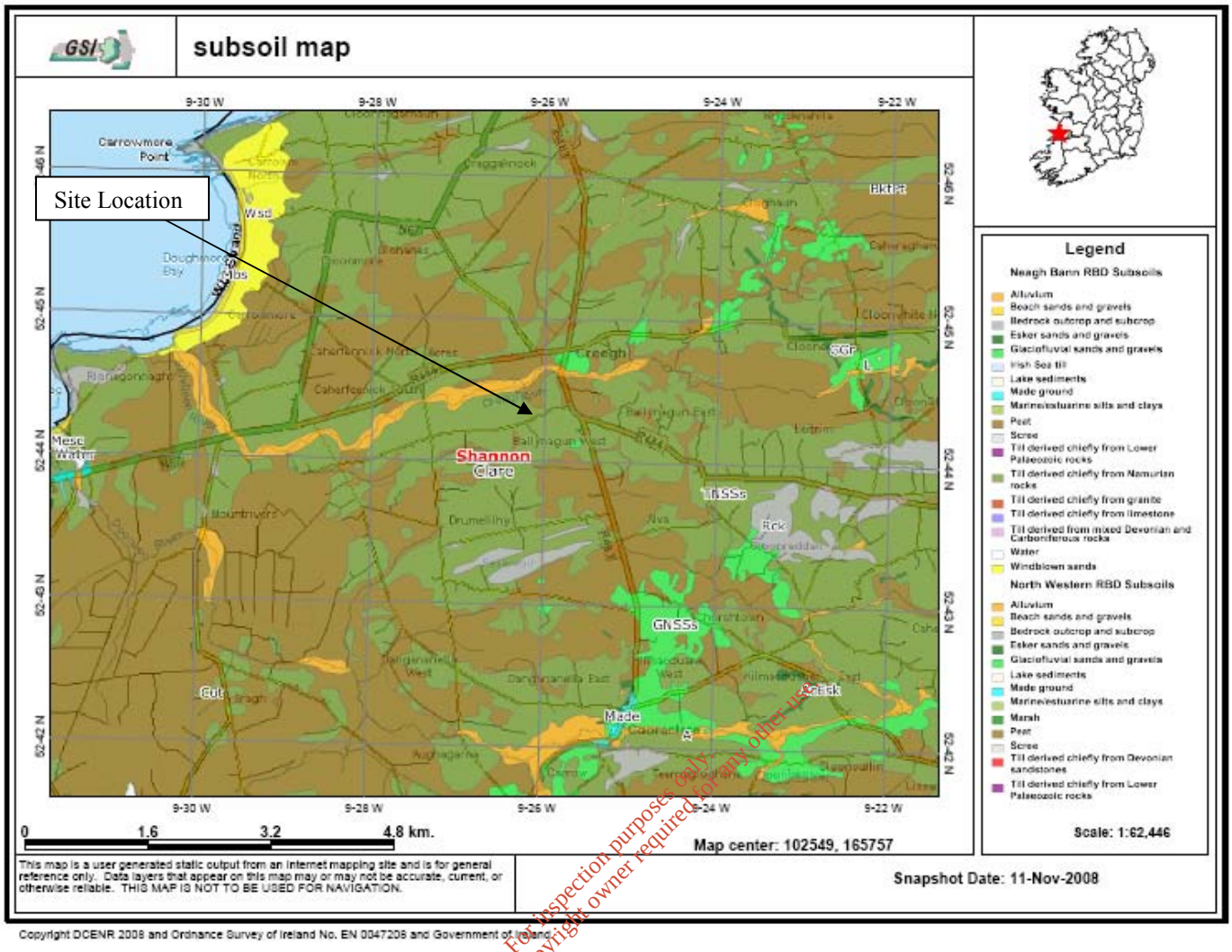

Figure 3.3.2 Subsoil Map of the Clare showing site location

The permeability characteristics of glacial tills varying ranging from moderate to low. It is expected that permeability rates of the underlying sediments are low given the development of gley soils in the area.

A trial pit was excavated on the site as part of the site suitability assessment for the onsite wastewater treatment plant to a depth of 1.90 m bgl (below ground level). It is reported that the soils are described as "*mottled, pale brown to straw in colour, with gravel and cobble sized material in a clay silt/sand matrix*". The permeability of the sediment was low with a "T" value of 40 reported.

3.2.3.5 Bedrock Geology

The bedrock geology underlying the site is identified by the GSI as "*Namurian Sandstones*" of the Gull Island Formation (GI). The formation is dominated by siltstone with 20% sandstone. Structurally, syndepositional faults occur within the formation. These rocks make up part of the upper section of the Shannon Group of Namurian rocks.

3.3.4 Potential Impacts of Proposed Developments

The facility currently operates as a waste transfer station under a permit with the Local Authority. It is proposed to increase the volumes of waste being accepted and processed at the facility. In addition to the waste types currently accepted to the facility for processing, Brown Bin Waste, Municipal Solid Waste and End of Life Vehicles will be gradually introduced as part of the proposed expansion of activities at the site.

The site is not identified as a geological heritage site and therefore there will be no impact on the geological heritage.

Due to the nature of the facility, there is the potential for any exposed subsurface to become contaminated from leachate generated within the waste material as it is accepted and processed at the facility. Mitigation measures and best practises operations, as detailed below, will be carried out on site to ensure there are no negative impacts on the underlying subsurface.

Due to the movement of vehicles and machinery on site and the storage of hydrocarbons there is a potential for accidental spillages and/or leakages of potentially polluting materials which could have a negative impact on the underlying subsurface. Mitigation measures and best practice operations, as detailed below, will be carried out on site to ensure there are no negative impacts on the underlying subsurface.

3.3.5 Proposed Mitigation Measures

In order to ensure the proposed developments at the Clean (Irl) Refuse & Recycling Ltd. facility do not have a negative impact on the receiving geological environment, a series of mitigation measures have been adopted as detailed below.

- All potentially polluting substances (such as hydrocarbons) will be stored in properly bunded areas in accordance with best engineering standards and environmental guidelines which will include the hydrocarbons stored when End of Life Vehicles have been depolluted. There are currently two fuel tanks (motor diesel c.3,000l and agricultural motor diesel c. 1,500l) which are located within the fuel storage shed on the site.

- Spillage kits will be located throughout the facility, particularly in the areas of fuel storage and machinery or plant maintenance. Any refuelling of equipment/vehicles on site will be carried out within designated areas which will be fully contained to prevent the ingress of any spillages to the subsurface.

Chemicals (from quarantine of materials) will be stored within designated areas which are fully contained.

- A new bunded hydrocarbon storage area will be introduced under the proposed development as outlined in Section 2.0 Description of the Site and Proposed Development, and will provided the same level of protection as is currently proposed for the existing fuel bund storage.

- All machinery and plant equipment will be/are regularly serviced and maintained to prevent any incident leakages of potentially polluting hydrocarbons.

- Waste accepted and processed through the facility will be/is carried out within designated areas. Any leachate runoff from the waste in the Biotstabilistaion Plant will be/is directed through the leachate collection system to the underground leachate storage tank on site. The foul waters is temporarily stored within this tank for subsequent collection by a licensed haulier for discharge in the Clare County Council's waste water treatment plant in Lisdoonvarna under agreement with the local authority. There should be no leachate generated from the dry recyclables and wetwaste will be diverted from the main reception hall in the processing buildings to the Biotstabilistation Plant, where a leachate management plan will be in place.

- Baled dry waste will be either stored in covered areas or managed such that the bales are not stored in the open for extended periods. All glass will be contained in covered units. The majority of the site is covered with hard standing and hardcore areas and any waste activity is carried out in these areas only. The hardstand cover prevents the ingress of any polluting substances into the substance and a surface water monitoring programme will continue to ensure any contamination is detected at the earliest stage possible. .

- The facility currently operates under a waste permit from the local authority and will operate under the conditions of an EPA Waste Licence. The conditions of these licence will ensure that the underlying geological subsurface will be protected.

3.4 HYDROLOGY

3.4.1 Introduction

The proposed site is located within the River Creegh sub-catchment, which is in turn located within the Mal Bay hydrometric area (hydrometric area no. 28). The hydrometric area is described as the surface catchment drained by all streams entering tidal water in Malbay between Gerorge's Head and Black Head, Co. Clare. The immediate environs are characterised by drainage ditches which ultimately drain into the River Creegh (River Code 28C02) approximately c0.8km north of the proposed site boundary. The only other significant river in the area is the Doonbeg River which is c. 4.2km south of the facility. The most recent River Quality Survey (2003) classes the River Creegh at the Creegh Bridge with a Q Value of 3-4 which denotes a river of intermediate water quality with transitional conditions in relation to the quality derived from the presences of specific macro invertebrates.

There is no direct discharge into a river or stream from the facility. There are however, two outfalls from the facility which indirectly discharge surface water into field ditch drains, as shown in Figure 3.4.1 overleaf. Due to the topography of the Clean (Ireland) Refuse & Recycling Ltd. site, surface water drainage occurs at both the northern and southern sections of the site as defined by the gradient of the site. The Surface Water Management Plan in Attachment 1 illustrates the directional flow of surface water collected at the site for the northern and southern outfalls.

The northern drainage ditch runs parallel east of the employee car park and proposed site skip storage area, which connects with further drainage ditches located in adjoining fields north of this area. Surface water drains into the two drainage ditches via dedicated NSB-D bypass separators. The facility is currently permitted by Clare Co. Co. to discharge 150m3/day to surface waters in total..

The southern drainage ditch located at the southeast corner of the facility originates from adjoining fields to the east and flows in a westerly direction across field boundaries, draining into a small tributary southwest of the facility (c.140m). This stream is the closest surface water body to the site. The stream flows firstly in a westerly, then northerly direction into the River Creegh, which is located at the closest point, approximately c0.8m north of the facility as shown overleaf, and included as C(IRL)WL-14 in Attachment 2. The River Creegh then joins the Skivileen River and flows into the sea at Rinnagonnaght Strand at Doughmore Bay shown in Figure 3.4.2 and included as C(IRL)WL-15 as in Attachment 2. Figure 3.4.3 shows the estimated catchment area for the River Creegh, which is included as C(IRL)WL-16 in Attachment 2.

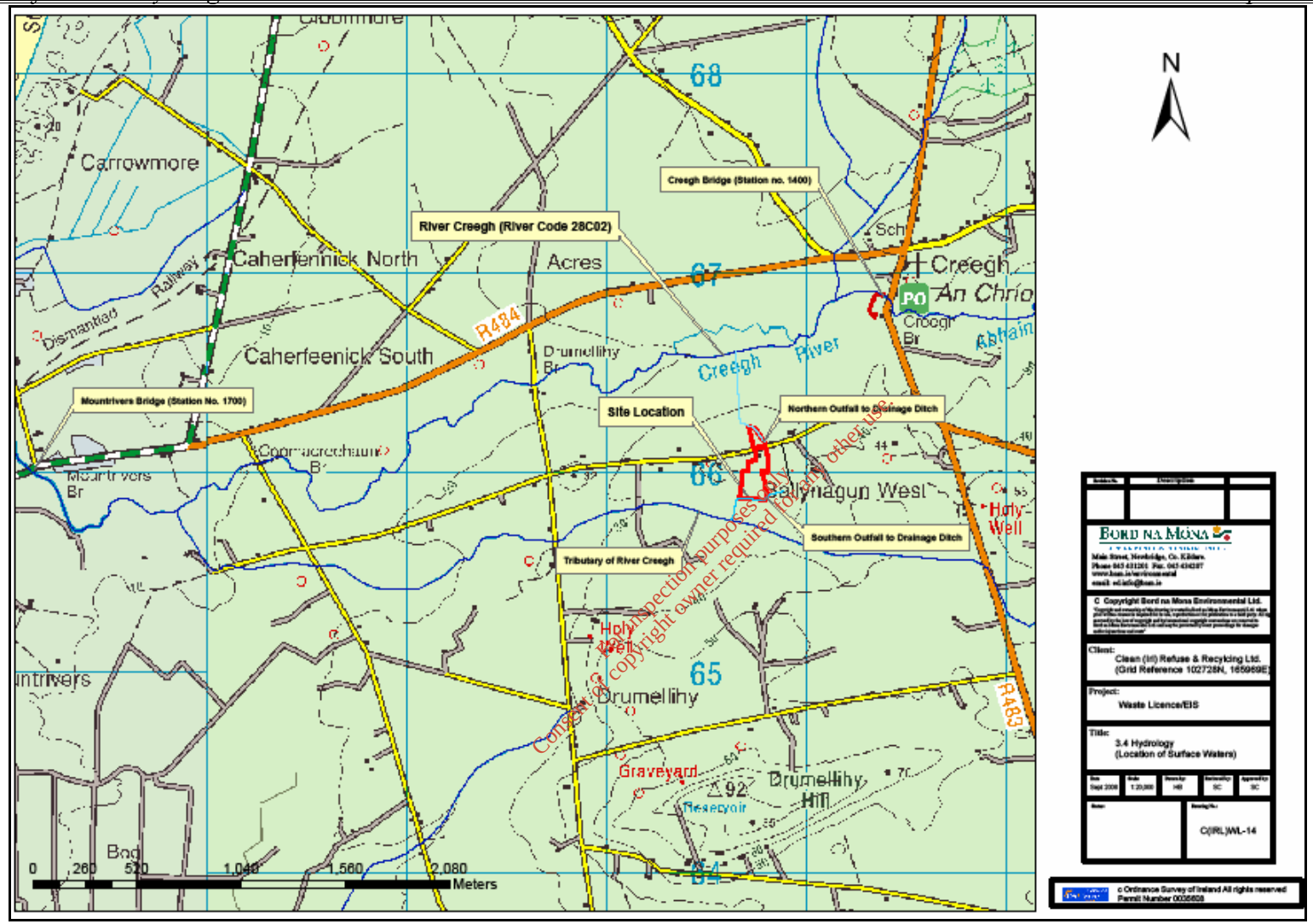

Figure 3.4.1 Location of Surface Waters (NTS)

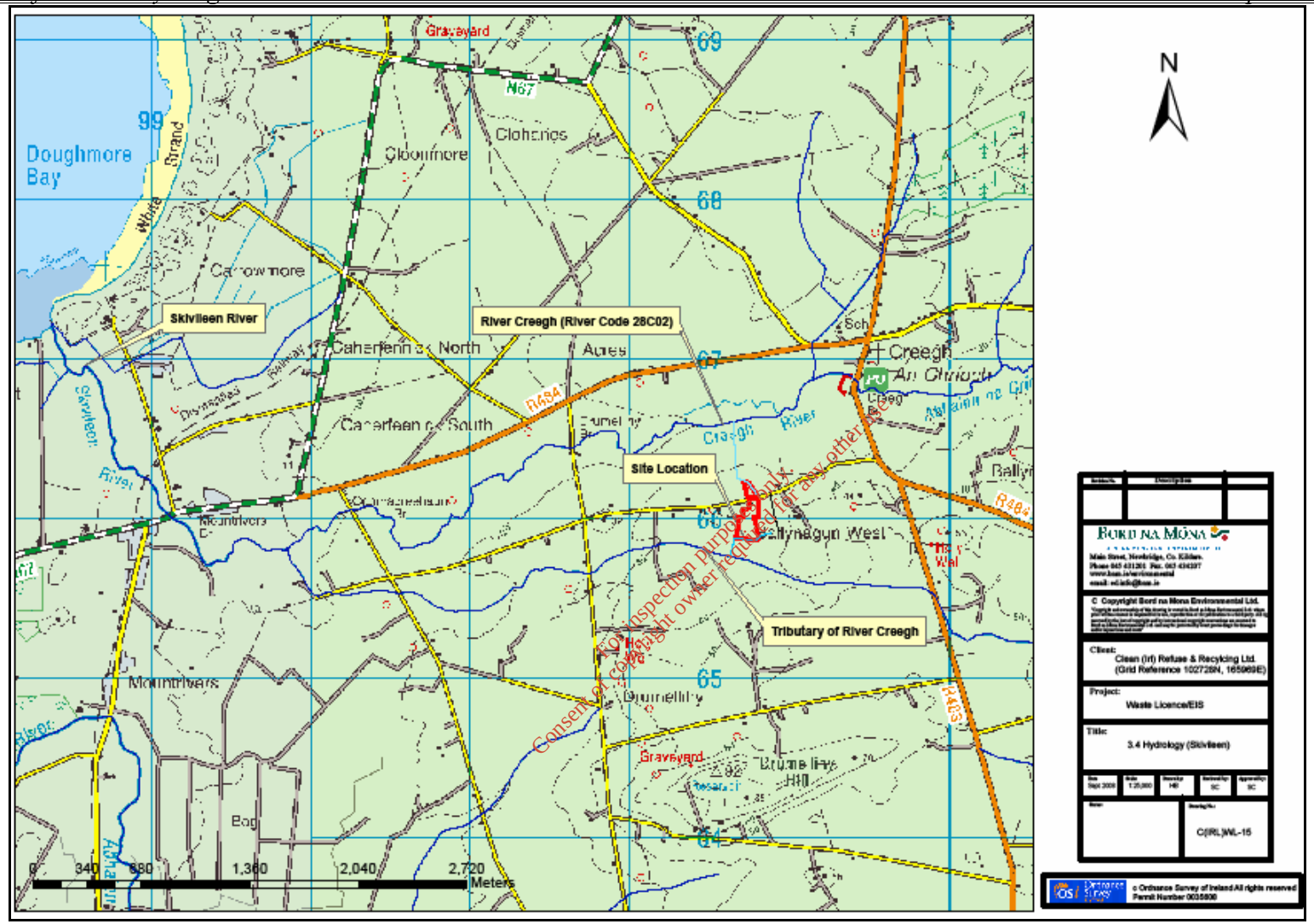

Figure 3.4.2 Location of Skivileen River(NTS)

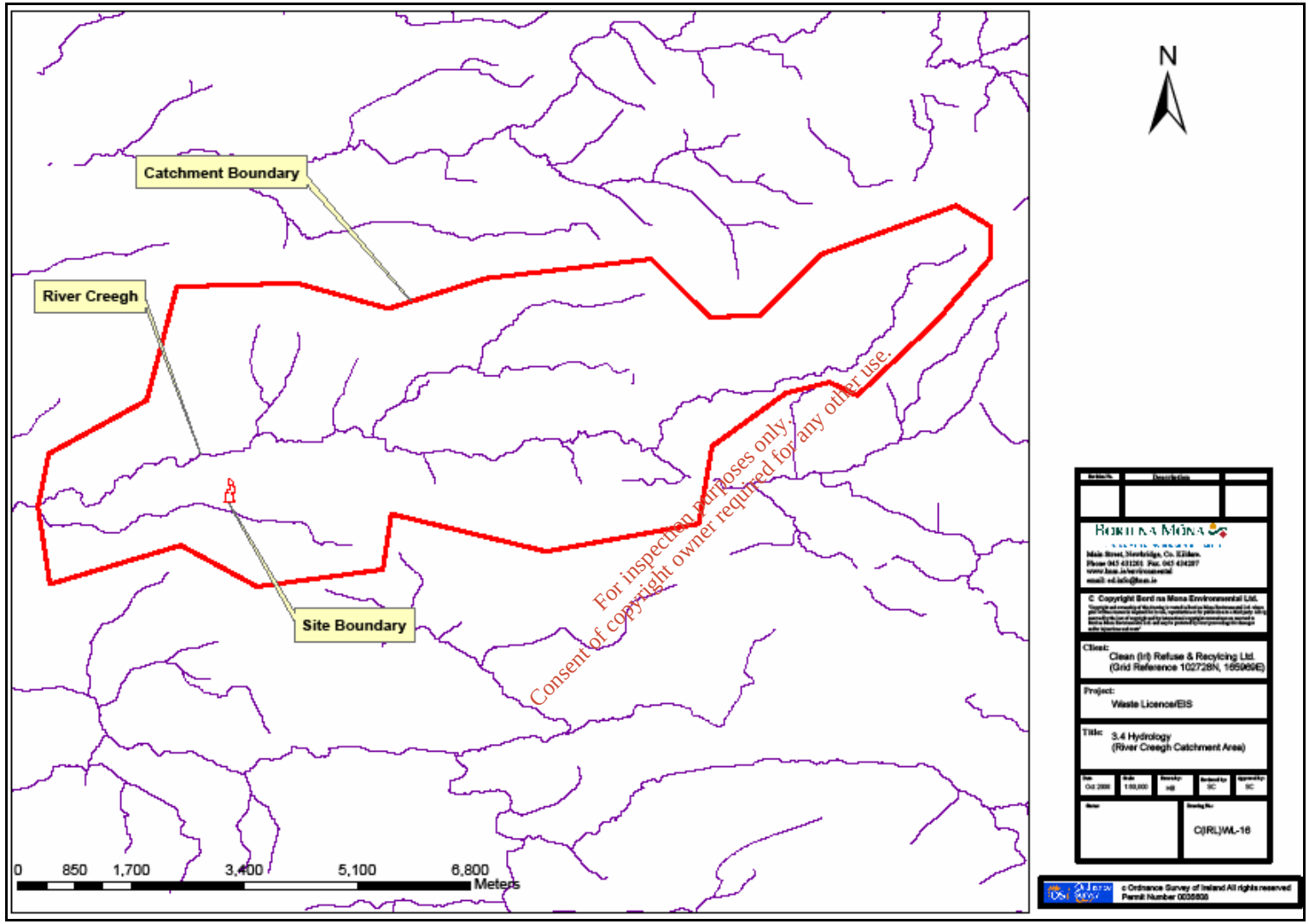

Figure 3.4.3 River Creegh Catchment Area (NTS)

In compiling this chapter, due regard was given to relevant legislation pertaining to surface water ecology and quality. This included:

- European Communities (Quality of Salmonid Waters) Regulations, 1988 (SI No.293 of 1988),
- EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, 1989 (SI No. 294 of 1989)
- Local Government (Water Pollution) Act 1977 (Water Quality Standard For Phosphorus) Regulations, 1998 (SI No. 258 of 1998)
- EU Water Framework Directive, 2000.
- European Communities (Water Policy) Regulations, 2003 (SI No. 722 of 2003)

3.4.2 Description of the Prevailing Hydrological Conditions

A baseline water quality assessment was carried out in September 2008. The objective of the baseline assessment was to assess the existing nature and quality of surface waters in the vicinity of the waste facility.

Shannon Regional Fisheries Board.

The Creegh River rises near Kilmihill and flows westerly through Creegh, merging with a tributary of the Creegh and flows 15 miles downstream into the sea as the Skivileen River, see Attachment 2. The Skivileen River is a designated Salmonid River. The Shannon Regional Fisheries Board describes the Creegh River as having a Grilse (summer salmon) and sea trout run. Presently angling for salmon and trout is prohibited under the Conservation of Salmon and Sea Trout BYE-Law No. C.S. 293, 2007 (Closed Rivers) as prescribed by the Department for Communication, Energy and Natural Resources. This BYE-Law is in effect since 21st December 2007 and is a Wild Salmon conservation measure introduced by the Government to help the restoration of Salmon stocks in the Creegh River and downstream in the Skivileen River.

European Union Water Framework Directive

The EPA has assigned the WFD status for the River Creegh, as possibly at risk of not achieving high status. It is currently assigned a Q Value of 3-4 (EPA 2003) denoting intermediate/slight pollution status. The immediate area in the townland of Ballingun West is protected under the Water Framework Directive 2000 for RPA drinking water GW (groundwater). There are no Habitat Rivers, Beaches, Nutrient Sensitive Rivers, Drinking Water Lakes or Species SPA protected under the Water Framework Directive

2000 in the vicinity of the Clean (Ireland) Refuse & Recycling Facility Ltd.

The following sources of information were used in the baseline surface water assessment:

- Clare Co. Co. Environmental Monitoring Results
- The national river quality survey managed by the Environmental Protection Agency (EPA).
- Analysis of surface water samples taken in the vicinity of the site for key chemical parameters.

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 guideline limit values for some parameters, 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 guideline limit values specified in the latter regulations are to be used for indicative purposes only. In addition to the above legislation, The Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorus) Regulations, 1998 S.I. 258 of 1998 provide for a systematic approach to alleviating the environmental problem of eutrophication, and sets phosphorus levels and biological values for rivers and lakes.

3.4.3 Baseline Surface Water Quality

Clare Co. Co. Baseline data on River Creegh

Clare Co. Co. have undertaken monitoring of the River Creegh from 2001 to 2007. Physiochemical analysis was conducted on river samples taken at Creegh Bridge (station no. 1400) and Mountrivers Bridge (station no. 1700) by Clare Co. Co. sampling technicians on a quarterly basis. During 2002, the physiochemical quality of the River Creegh could not be assessed by Clare Co. Co. due to foot and mouth restrictions in place. From 2005 onwards Clare Co. Co. have undertaken to monitor rivers by biological monitoring as opposed to physiochemical monitoring. Tables 3.4.1 and 3.4.2 show the results of Clare Co. Co. River Creegh monitoring programme

Table 3.4.1 Creegh Bridge Chemical Results 2001-2004: Clare Co.Co. Creegh River Monitoring Programme

Date	Ammonia mg/l (N)	BOD mg/l O2	Chloride mg/l Cl	Colour (Hazen units)	Conductivity uS/cm @ 25°C	Dissolved Oxygen % Saturation	Nitrates mg/l NO3-N	Nitrites mg/l NO2-N	Ortho-phosphate mg/l PO4-P	pH units	Temperature °C
21/02/2001	0.13	4.5	-	125	-	94.0	-	-	-	7.3	7.9
30/05/2001	0.03	2	-	150	-	96.0	-	-	-	7.5	15.3
30/08/2001	0.03	2	-	175	-	113.0	-	-	0.09	7.4	14.5
22/11/2001	0.03	2	-	100	-	94.0	-	-	0.07	7.1	10.3
05/02/2003	0.05	2	43	70	211	94.8	0.7	0.001	0.04	6.9	4.7
15/05/2003	0.03	2	34	100	189	96.7	0.1	0.001	0.01	7.4	10.9
17/09/2003	0.04	2	34	70	219	107.7	0.3	0.005	0.01	7.6	15.1
26/11/2003	0.09	3	31	175	163	107.6	0.2	0.001	0.02	6.6	6.4
06/05/2004	0.03	3	40	85	183	112.9	0.5	0.001	0.07	7.4	9
30/06/2004	0.06	2	33	125	209	102.2	0.64	0.001	0.04	7.2	15.4
02/09/2004	0.05	2	32	150	203	88.0	0.6	0.001	0.02	7.2	14.3
27/10/2004	0.09	2	27	150	177	90.0	0.3	0.001	0.03	7.4	8.9
Average	*0.055*	*2.375*	*34.25*	*122.92*	*194.25*	*99.74*	*0.42*	*0.0015*	*0.04*	*7.25*	*11.06*

Table 3.4.2 Mountrivers Bridge Chemical Results 2001-2004: Clare Co.Co. Creegh River Monitoring Programme

Date	Ammonia mg/l(N)	BOD mg/lO2	Chloride mg/l Cl	Colour (Hazen units)	Conductivity uS/cm @ 25°C	Dissolved Oxygen % Saturation	Nitrates mg/l NO3-N	Nitrites mg/l NO2-N	Ortho-phosphate mg/l PO4-P	pH units	Temperature °C
21/02/2001	-	-	-	125	-	94.2	-	-	-	7.2	8.2
30/05/2001	0.03	2	-	150	-	90.0	-	-	-	8.2	15.3
30/08/2001	0.03	2	-	150	-	110.0	-	-	0.16	7.7	14.7
22/11/2001	0.03	2	-	100	-	97.0	-	-	0.05	7.4	10.6
05/02/2003	0.05	2	46	70	232	98.8	0.6	0.001	0.02	7.2	4.7
15/05/2003	0.03	2	44	100	201	98.3	0.1	0.001	0.01	7.7	11.6
17/09/2003	0.05	2	40	70	235	108.0	0.1	0.004	0.01	8.0	16.4
26/11/2003	0.08	3	36	175	191	105.1	0.5	0.001	0.05	6.8	6.2
06/05/2004	0.03	2	41	100	193	110.7	0.5	0.001	0.01	7.6	8.9
30/06/2004	0.25	2	34	150	212	103.5	0.73	0.001	0.02	7.6	16.3
02/09/2004	0.05	2	34	175	220	86.8	0.4	0.001	0.04	7.4	14.8
27/10/2004	0.08	2	26	125	195	88.4	0.1	0.001	0.03	6.9	9
Average	*0.064*	*2.09*	*37.625*	*124.2*	*209.875*	*99.23*	*0.379*	*0.001*	*0.04*	*7.46*	*11.39*

A comparison of these results was made with legislation relevant to surface waters namely, the European Communities (Quality of Salmonid Waters) Regulations, SI. 293 of 1988 and the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, S.I 294 of 1989. The results from the Creegh Bridge monitoring location (upstream of the facility) have normal pH, conductivity and chloride for surface waters. BOD has been consistently been below the guideline value of <5mg/l, as has Ammonia (0.82mg/l). Figure 3.4.3 illustrate the trend for low concentration parameters which would be good indicators of the quality of the river. Nitrate and Nitrites are at low concentrations. The ortho-phosphate limit for clean surface waters of 0.03mg/l set out in the Phosphate Regulations 1998, has been exceeded on several occasions ranging from 0.09-0.01 mg/l. These fluctuations in this parameter may be due to agricultural run-off and seasonal variations in drainage ditch flows discharging into the River Creegh.

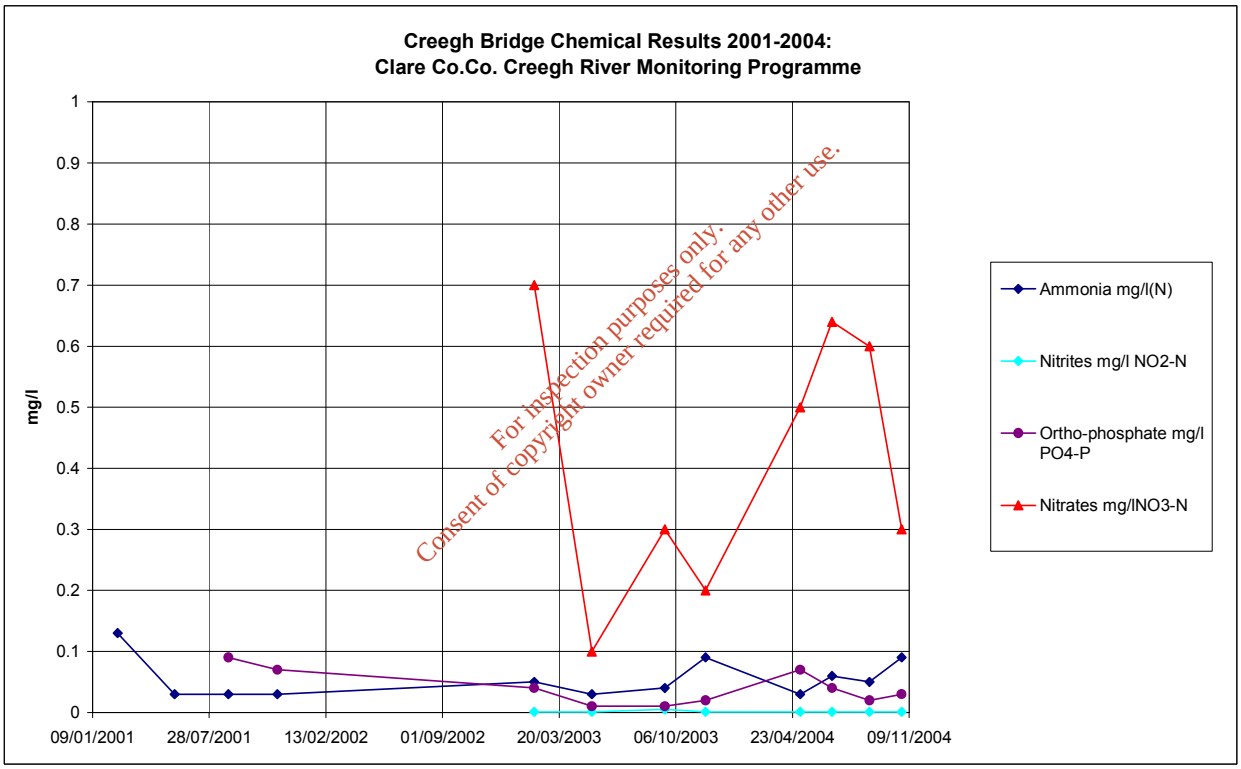

Figure 3.4.3 Creegh Bridge Results

The results recorded for Mountrivers Bridge, which is located downstream of the discharge of the facility, also show good quality with ammonia, nitrate, nitrite and BOD all showing similar trends to that of Creegh Bridge station. pH, Conductivity and Chloride are normal for surface waters. Again, as with Creegh Bridge station, ortho phosphate results have fluctuated over the monitoring period and range from 0.01-0.16 mg/l. Comparison of the average results of Tables 3.4.1 and 3.4.2 show the quality at these stations are similar, and there has been no evidence of polluting materials impacting on the quality of the surface waters upstream and downstream of the facility. Figure 3.4.4 shows the trends for the parameters with the lower concentrations.

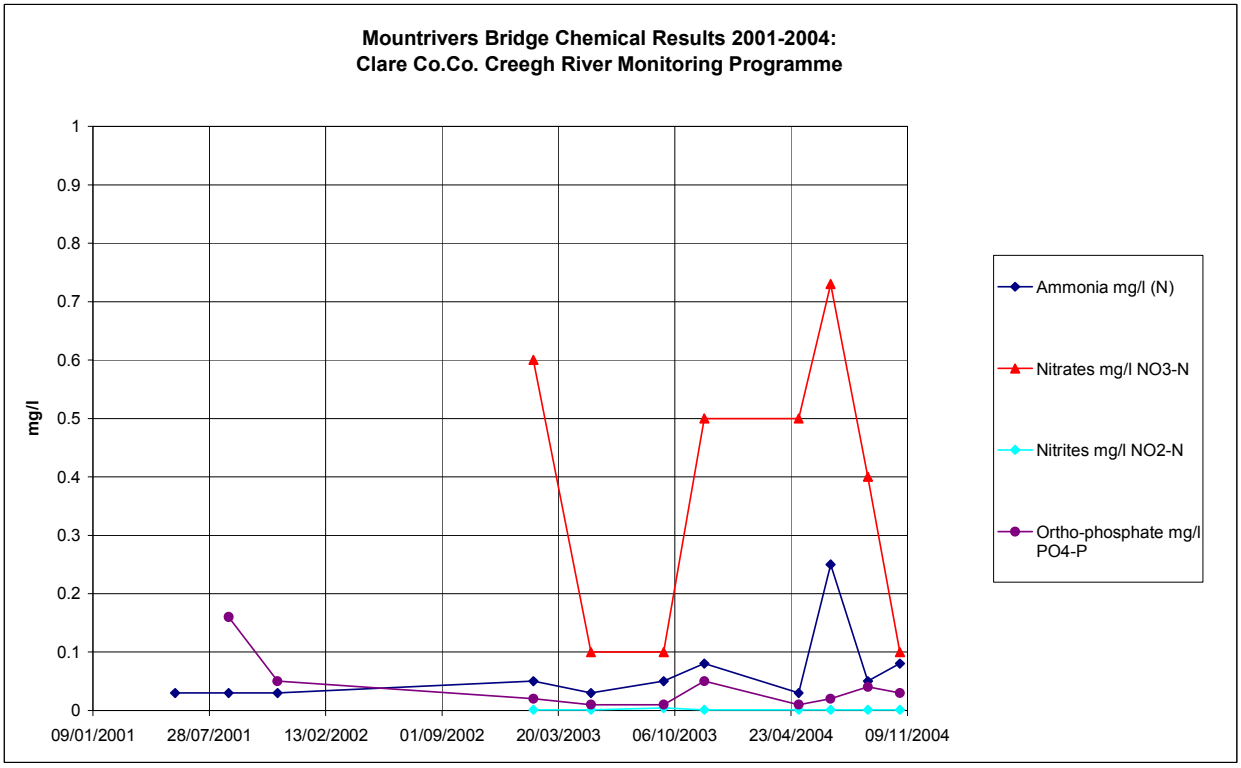

Figure 3.4.4 Mountrivers Bridge

The succeeding years 2005-2007 have been assessed with biological monitoring and the classifications of the rivers are provided in Table 3.4.3 below.

TABLE 3.4.3 BIOLOGICAL ANALYSIS RESULTS FOR RIVER CREEGH AND MOUNTRIVERS BRIDGE (Q-RATING[1]) CLARE CO.CO. RESULTS

Year	Creegh Bridge	Mountrivers Bridge
2005	4	3-4
2006	3-4	3-4
2007	3-4	3-4

A Q rating of 3-4 indicates slightly polluted conditions at both locations. As the Mountrivers Bridge is downstream of the facility's discharge points and Creegh Bridge the results indicate the discharge is not having a significant negative impact on the River Creegh.

[1] A Q-rating of 5 indicates pristine conditions, a Q-rating of 4 indicates clean conditions, a Q-rating of 3-4 indicates slightly polluted conditions, a Q-rating of 3 or 2-3 indicates moderately polluted conditions and a Q rating of 2, 1-2 or 1 indicates seriously polluted conditions.

EPA baseline data on River Creegh:

The River Creegh is the receiving water for the drainage ditch at the north of the site and for the tributary stream at the south of the site. The River Creegh (River Code 28C02) is monitored by the EPA at a number of monitoring stations. The Bridge at Creegh (station No. 1400) is located approximately 1km upstream of the discharge of the tributary stream while approximately 3 km downstream of this discharge point is the Mountrivers Bridge monitoring station (station no. 1700). Both chemical and biological quality results are available for both monitoring stations on the River Creegh. Table 3.4.4 provides biological quality results for both locations for between 1988 and 2003, as published by the EPA

TABLE 3.4.4 BIOLOGICAL ANALYSIS RESULTS FOR RIVER CREEGH AND MOUNTRIVERS BRIDGE (Q-RATING[2])

Year	Creegh Bridge	Mountrivers Bridge
1988	4	4-5
1991	4	4
1997	4	4
2000	4	4
2003	4	3-4

It would appear that, with reference to previous Table 3.4.3 which details more recent results of biological monitoring at these stations by Clare Co. Co., the quality of the surface water at the Bridge at Cree has deteriorated from a Q rating of 4 (EPA 2003) to a Q rating of 3-4 (Clare Co. Co. 2007). However, it would be more prudent only to draw a comparison of results within the same monitoring programme of either Clare Co.Co. and the EPA. .

Tables 3.4.5 and 3.4.6 overleaf provide a summary of the chemical analysis for the EPA monitoring stations.

[2] A Q-rating of 5 indicates pristine conditions, a Q-rating of 4 indicates clean conditions, a Q-rating of 3-4 indicates slightly polluted conditions, a Q-rating of 3 or 2-3 indicates moderately polluted conditions and a Q rating of 2, 1-2 or 1 indicates seriously polluted conditions.

TABLE 3.4.5 GENERAL CHEMICAL ANALYSIS RESULTS FOR RIVER CREEGH AT CREEGH BRIDGE from 1995-2003

Parameter	No. of samples	Range of Minimum Values	Range of Median values	Range of Maximum Values
pH (pH units)	17	6.6-6.7	7.0	7.6-8.0
Conductivity (µS/cm)	17	121-131	159-189	210
Total Ammonia (as N mg/l)	14	0.01-0.03	0.03-0.04	0.07-0.61
Oxidised Nitrogen (as N mg/l)	11	0.2-0.7	0.7-1.1	1.0-1.3
Temperature (°C)	16	5-7	11-13.7	14-17.5
Ortho-Phosphate (mg/l as P)	17	0-0.01	0.02-0.04	0.07-0.14
Chloride (mg/l Cl)	16	14-28	30-37	39-41
BOD (mg/l O_2)	17	0.5-1.3	1.3-2.3	2.8-5.4
Colour (Hazen)	17	85-100	113-150	225-250

TABLE 3.4.6 GENERAL CHEMICAL ANALYSIS RESULTS FOR RIVER CREEGH AT CREEGH BRIDGE from 1995-2003

Parameter	No. of samples	Range of Minimum Values	Range of Median values	Range of Maximum Values
pH (pH units)	17	6.6-6.7	7.0	7.6-8.0
Conductivity (µS/cm)	17	121-131	159-189	210
Total Ammonia (as N mg/l)	14	0.01-0.03	0.03-0.04	0.07-0.61
Oxidised Nitrogen (as N mg/l)	11	0.2-0.7	0.7-1.1	1.0-1.3
Temperature (°C)	16	5-7	11-13.7	14-17.5
Ortho-Phosphate (mg/l as P)	17	0-0.01	0.02-0.04	0.07-0.14
Chloride (mg/l Cl)	16	14-28	30-37	39-41
BOD (mg/l O_2)	17	0.5-1.3	1.3-2.3	2.8-5.4
Colour (Hazen)	17	85-100	113-150	225-250

Quality of the River Creegh:

EPA monitoring results indicate that the River Creegh is of good quality, both chemically and biologically. As shown in Tables 3.4.4 to 3.4.6, the biological quality of the river has consistently been good, while the chemical analysis results are generally within the applicable limits. The quality of the Creegh River at Mountrivers Bridge has deteriorated in the 2003 results from a Q-rating o 4 to a Q-rating of 3.4. The Creegh Bridge monitoring station demonstrated that the Q-rating has remained consistent at Q4 since 1988. The range of maximum values for ortho-phospate for both monitoring locations ranges from 0.07 to 0.14mg/l, which exceeds the ortho-phosphate limit of 0.03mg/l set out in the Phosphate Regulations 1998 and indicates moderate to heavy pollution however, the median values for both monitoring location range from 0.02mg/l to 0.04 mg/l indicative of slightly polluted waters.

Baseline data from surface water sampling in the area of the site:

Surface water discharges from the site are currently monitored under the remit of the following current permit and licence as prescribed by Clare Co. Co.

- Waste Permit 002/07/WPT/CL (issued on 27th June 2007 under the Waste Management Acts, 1996-2005 and the Waste Management (Permit) Regulations, 1998)
- W.P.162 Local Government (Water Pollution) Act. 1977 and 1990. Licence to Discharge Trade or Sewage Effluent to Waters (granted 29th November 2007).

Environmental monitoring was carried out at the facility from the following monitoring stations over a year on a quarterly basis on 19th December 2007, 13th February 2008, 28th May 2008 and 31st July 2008. It should be noted that the upstream and downstream of the south discharge SW2 is in a drainage ditch and the flow was generally very low with overgrown vegetation present. This presented difficulties in abstracting samples upstream and downstream of the discharge point. Figure 3.4.1 outlined earlier in this chapter shows the location of the outfalls at the site. Plate 3.4.1 and Plate 3.4.2 illustrate the sampling locations for monitoring of surface water discharge from the Clean (Ireland) Refuse & Recycling Ltd. site. Table 3.4.4 provides description of the sampling locations for the accumulation chemical baseline data of surface water discharges from the site.

Table 3.4.7 Sampling Location Descriptions

Ref	Description
SW1 (a)	Discharge North-end of Facility
SW2 (a)	Discharge South-end of Facility
SW2 (b)	Upstream of discharge SW2
SW2 (c)	Downstream of discharge SW2

Plate 3.4.1 South Drainage Ditch looking east

Plate 3.4.2 North Drainage Ditch looking south

Tables 3.4.8 to 3.4.11 show the chemical data results for the four monitoring periods carried out over a year in 2007/2008.

TABLE 3.4.8 SURFACE WATER SAMPLING RESULTS 19TH DECEMBER 2007					
SAMPLING LOCATIONS					
Parameter	**SW1 (a) (Discharge)**	**SW2 (a) (Discharge)**	**SW2 (b) (Upstream)**	**SW2 (c) (Downstream)**	**Guideline**
pH (pH Units)	7.6	7.2	6.4	7.0	*6 – 9*
Conductivity (µS/cm)	773	670	475	462	1000
COD(mg/L)	19	10	112	74	40
BOD(mg/L)	6	<2	<2	<2	*5*
Ammonia as N(mg/L)	**2.19**	0.59	0.75	0.25	*0.82*
Suspended Solids (mg/L)	**102**	23	**34**	25	*25*
Total Phosphorous (mg/L)	0.2	0.14	2.05	0.18	-
Oils/Fats/Greases (mg/L)	15	10	9	33	*Note 4*
Mineral Oils (µg/L)	<10	<10	<10	<10	*Note 4*
DRO'S (µg/L)	<10	<10	<10	<10	*Note 4*

TABLE 3.4.9 SURFACE WATER SAMPLING RESULTS 13TH FEBRUARY 2008					
SAMPLING LOCATIONS					
Parameter	**SW1 (a) (Discharge)**	**SW2(a) (Discharge)**	**SW2 (b) (Upstream)**	**SW2 (c) (Downstream)**	***Guideline***
pH	7.7	6.9	6.6	6.8	*6 - 9*
Conductivity (µS/cm)	721	741	323	415	*1000*
COD(mg/L)	**62**	22	**130**	**128**	*40*
BOD(mg/L)	4	<2	<2	2	*5*
Ammonia as N (mg/L)	**1.46**	0.61	0.08	0.22	*0.82*
Suspended Solids (mg/L)	**111**	17	<5	<5	*25*
Total Phosphorous (mg/L)	0.17	0.18	0.16	0.19	-
Oils/Fats/Greases (mg/L)	<1	2	22	<1	*Note 4*
Mineral Oils (µg/L)	<10	<10	<10	<10	*Note 4*
DRO'S (µg/L)	<10	<10	<10	<10	*Note 4*

Note 1: Limits shown in italics are from the European Communities (Quality of Salmonid Waters) Regulations, SI. 293 of 1988

Note 2: Limits shown in standard type are from the European Communities (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations, S.I 294 of 1989. (Limits for A1 and A3 waters)

Note 3: Values in bold are in excess of guideline/limit values

Note 4: The Salmonid Waters Regulations require that petroleum products must not be present in such quantities that they form visible film face on the surface of the water or form coatings on the beds of water-courses or lakes. No Film was visible on the surface of the water nor no odour detected from the water at any of the sampling locations.

TABLE 3.4.10 SURFACE WATER SAMPLING RESULTS 28TH MAY 2008					
	SAMPLING LOCATIONS				
Parameter	**SW1 (a) (Discharge)**	**SW2(a) (Discharge)**	**SW2 (b) (Upstream)**	**SW2 (c) (Downstream)**	***Guideline***
pH	7.3	7.1	7.2	7.1	*6 - 9*
Conductivity (µS/cm)	**1067**	538	657	539	*1000*
COD(mg/L)	**333**	*41*	**382**	25	*40*
BOD(mg/L)	**263**	2	**69**	2	*5*
Ammonia as N (mg/L)	**5.5**	0.76	0.24	0.75	*0.82*
Suspended Solids (mg/L)	**134**	**116**	**740**	**138**	*25*
Total Phosphorous (mg/L)	0.32	0.13	4.3	0.11	-
Oils/Fats/Greases (mg/L)	<1	4	13	66	*Note 4*
Mineral Oils (µg/L)	<10	<10	<10	<10	*Note 4*
DRO's (µg/L)	**401**	<10	<10	<10	*Note 4*

TABLE 3.4.11 SURFACE WATER SAMPLING RESULTS 31ST JULY 2008					
Parameter	**Location**				**Limits**
	SW1 (a) (Discharge)	**SW2(a) (Discharge)**	**SW2 (b) (Upstream)**	**SW2 (c) (Downstream)**	***Guideline***
pH	7.5	7.2	6.7	7.1	*6 - 9*
Conductivity (µS/cm)	**1276**	**1184**	462	**1009**	*1000*
COD(mg/L)	86	**42**	90	106	*40*
BOD(mg/L)	**37**	3	3	19	*5*
Ammonia (mg/L) as N	**3.5**	0.52	0.36	0.72	*0.82*
Suspended Solids (mg/L)	**70**	**40**	**94**	**652**	*25*
Total Phosphorous (mg/L)	0.44	0.43	5.7	10.4	-
Oils/Fats/Greases (mg/L)	7	30	1	22	*Note 4*
Mineral Oils (µg/L)	<10	<10	<10	<10	*Note 4*
Diesel Range Organics (µg/L)	<10	<10	<10	<10	*Note 4*

Note 1: Limits shown in italics are from the European Communities (Quality of Salmonid Waters) Regulations, SI. 293 of 1988

Note 2: Limits shown in standard type are from the 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 guideline/limit values

Note 4: The Salmonid Waters Regulations require that petroleum products must not be present in such quantities that they form visible film face on the surface of the water or form coatings on the beds of water-courses or lakes. No Film was visible on the surface of the water nor no odour detected from the water at any of the sampling locations.

Figures 3.4.1 and 3.4.2 graphically show the concentrations of parameters during the monitoring period. pH and conductivity have been omitted from the graphs for scaling purposes. The pH discharge from the north of the site (SW1) ranges from 7.3 to 8.3 pH units, while the range for the south discharge is from 6.9 to 7.2 pH units. The conductivity of the northern discharge ranges from 529 µS/cm to 1276 µS/cm and the conductivity of the southern discharge ranges from 538 µS/cm to 1184 µS/cm over the one year period.

North Discharge to Surface Waters (SW1)

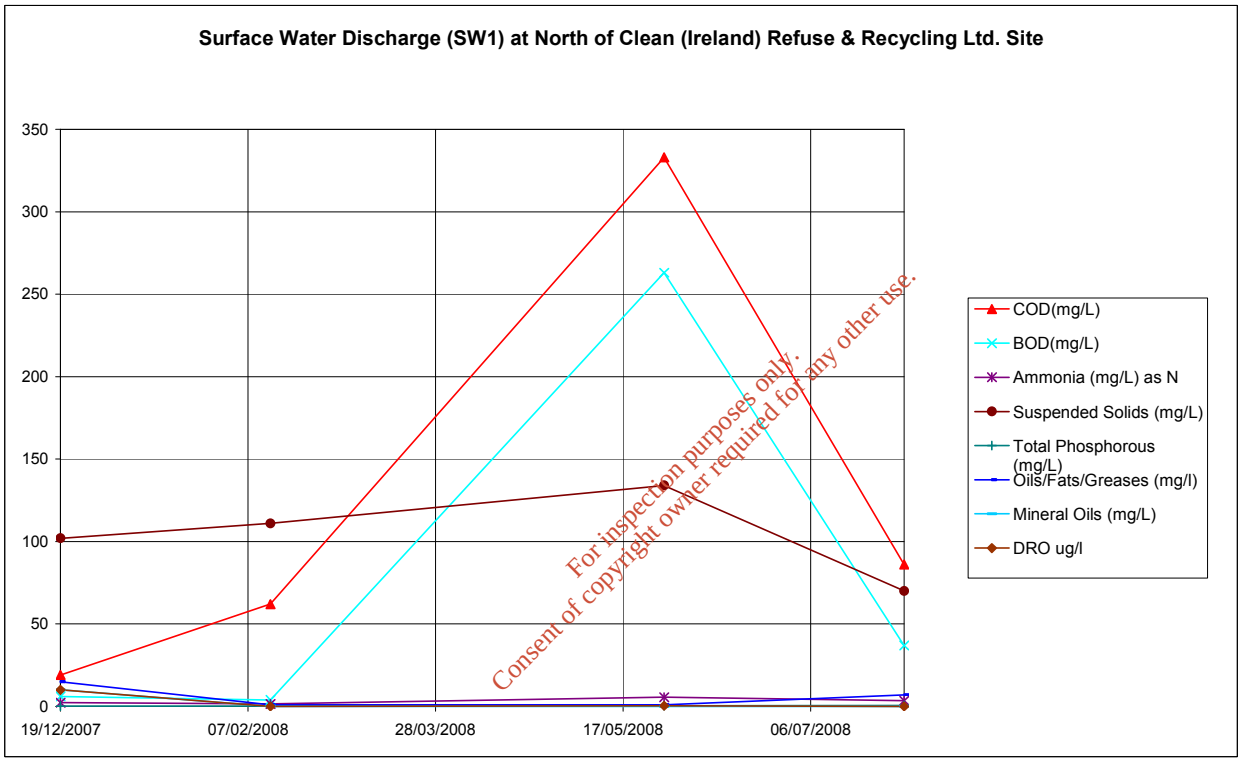

Figure 3.4.5 SW1 North Discharge Results

The results obtained for the north discharge (SW1) show increased suspended solids, BOD and COD compared to that of natural surface waters. This can be attributed to yard activities, including bin washing, dust generation, infrequent brushing of yard followed by prolonged rain event. Although the majority of the existing site area in the yard immediately north of the processing sheds is hardstanded, the areas to the northwest and west of the existing site has a hardcore surface, which is susceptible to creating surface wash-off with suspended solids. Ammonia, which was at a higher concentration and above the guideline in December 2007 has decreased significantly since the completion of a section of hardstanding within the northern surface water drainage area of the site. Ammonia levels in the discharge have been consistently below the guideline for ammonia in surface waters under the European Communities (Quality of Salmonid Waters)

Regulations, SI. 293 of 1988. Total phosphorus has no stipulated limit; however, the values obtained over the annual monitoring programme as low and ranges from 0.2mg/l to 0.44mg/l.

Oils, Fats and Greases have been detected in the range <1 to 15mg/l for this sampling location. The facility has also routinely monitored Mineral Oils and Diesel Range Organics (DROs) given that hydrocarbons are used on site and are stored on site in a designated bunded area. All results for the period show that there has been one recorded DRO at 401 µg/l at SW1 (a) in Q1 2008. There has been no reported incident on site which could be linked to this and the analytical laboratory recorded the result as an 'unknown pattern detected' as the compound was not common to the DRO or Mineral Oils compounds used in the screening programme.

South Discharge to Surface Waters (SW2)

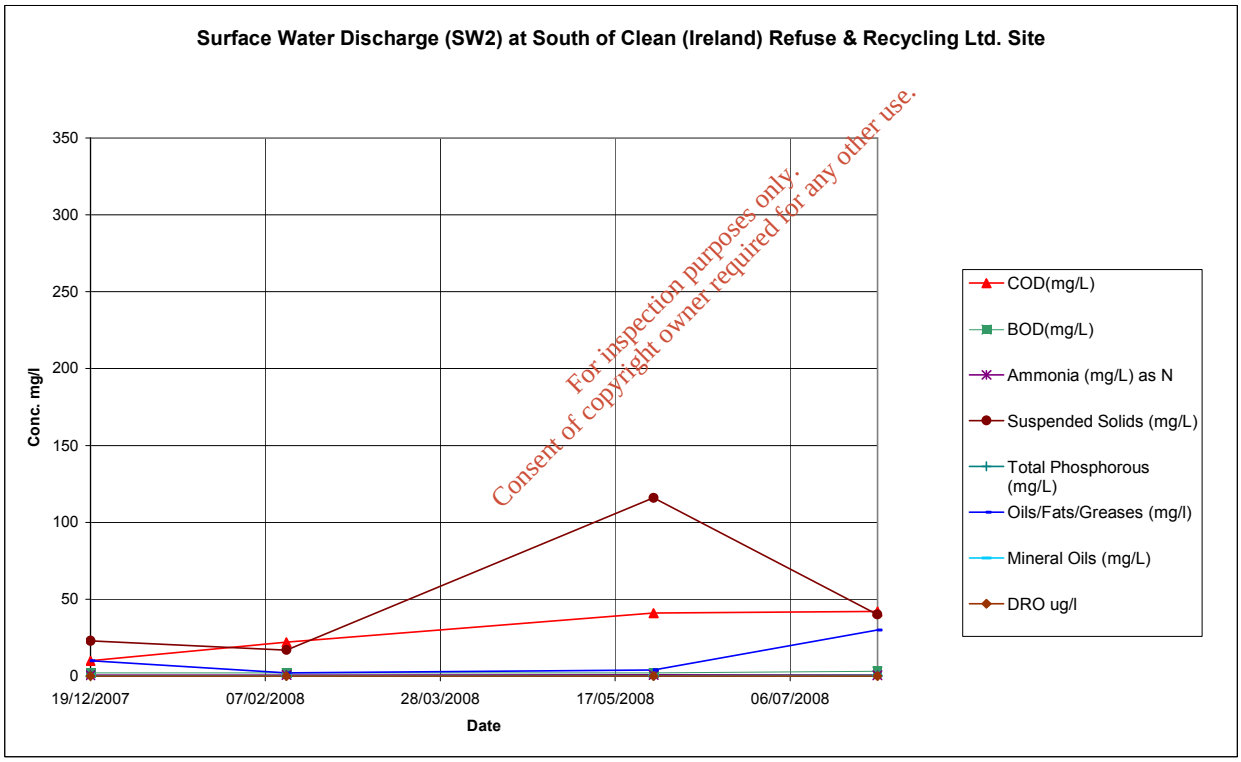

Figure 3.4.6 SW1 South Discharge Results

The quality of the discharge from the south of the site is of better quality than that of the north section. This may be due to a lower volume of surface water which drains across the surface area of the south end of the site. The current condition of the south-end of the site is generally hardcore with a section completed adjacent to the trommel. The suspended solids of the discharge range from 17mg/l to 116mg/l, however in the three monitoring events in 2008 all results have been below 40mg/l, which is still deemed to be above the legislative limit of 25mg/l. COD has been satisfactory and levels recorded were

around the legislative limit of 40mg/l while BOD has not exceeded 3mg/l during the period. Ammonia results range from 0.52mg/l to 0.76mg/l and reside below the guideline of 0.82mg/l. Total Phosphorus concentration is similar to the discharge at the north of the facility and did not exceed a maximum concentration of 0.43mg/l. There was variance noted in the Oils, Fats and Greases results ranging from 2mg/l to 30mg/l. Mineral Oils and DRO's were not detected during the acquisition of baseline data.

3.4.4 Environmental Impacts

The greatest potential impact for surface waters in the vicinity of the site arises from the management of leachate, surface water drainage design, the appropriateness of surface covering, and the handling and storage of raw materials on site.

Leachate

Leachate is generated when water comes into contact with waste, irrespective of the waste type or the severity of the contamination and it must be handled as non-clean water and managed accordingly. There is no leachate generated directly from wetwaste, compostable waste or dry recyclables, as waste tipping and processing is only conducted within covered and hardstanded areas in the waste processing buildings. Notwithstanding this, there are potentially several sources of leachate generation currently at the facility.

Wheelie Bin Wash

Wheelie bins washing currently takes place at a hardstanded designated area located at the eastern perimeter of the facility; washings are directed into the eastern surface water drain running parallel to the east perimeter in a northerly direction. While emptied wheelie bins generally would not contain any contaminating material, and in particular the blue bins (household dry recyclables), there may be waste residue in the green bins (household wetwaste) which could give rise to biodegradable waste entering the surface water drains. This in turn can cause increased Suspended Solids, COD and BOD in the discharge from the site.

Truck Wash

Truck washing which involves power-hosing of the sides of the vehicles and the wheel areas is carried out as required in a hardstanded designated area in front of the waste processing building adjacent to the Fuel Storage Bund. Washings, which mainly contain dust and grit from road travel, drain onto the hardstanding area and ultimately into the surface water drain at the northern section of the site. This activity would be intermittent and most likely increases during the winter months depending on the road conditions.

Wheel Wash

There currently is no wheel wash facility at the site. There are two potential scenarios arising from this: within the boundary of the facility and on public roadways. Firstly, the activity of waste vehicles moving across sections may potentially result in waste residues being transferred onto the surrounding hardstanding areas which are dedicated for the drainage of surface water only. Rainwater contact with any waste residue may generate leachate, which in turn drains into the surface water drainage system. Secondly, unwashed wheels exiting the facility could potentially contain waste residue thereby giving rise to the generation of leachate once water comes in contact with the vehicles. This may in turn combine with surface water wash-off on public roads and enter into road drains which may discharge into surface water bodies.

Baling of Wetwaste

The wetwaste processing unit is located at the most easterly side of the Waste Processing Building. Wetwaste is segregated into a tipping hall and processed in the adjacent wetwaste processing section. Currently, the bailing of wetwaste is conducted with the movement of plant exiting the tipping hall over the hardstanded area and then re-entering the wetwaste processing section. This activity of moving in and out of the sections is potentially giving rise to residual waste on plant tyres being transferred onto the surrounding hardstanding area which is dedicated for the drainage of surface water only. Rainwater coming into contact with any residual wetwaste can potentially generate leachate, which in turn drains into the surface water drainage system.

Biostabilisation Plant

Leachate will be generated in the reception hall and curing area of the Biostabilisation and Sterilization Building particularly, with the tipping and moving of waste on the reception hall floor. In the event that this leachate is not managed under controlled procedures therein lies the potential to impact on the receiving surface water environment.

Stockpiled Waste

Construction and Demolition Waste and Timber Waste are currently stockpiled in open spaces in the southern section of the site. Rainwater coming into contact with this waste can potentially generate leachate which may in turn enter the surface water drainage system. Hardstanding of the areas is not complete as such, and rainwater runoffs from these stock piles are coming in contact with the existing hardcore at the site.

End of Life Vehicles

The storage of End of Life Vehicles at the facility will vary depending on market demand for the activity. However, long term storage of vehicles exposed to the elements can potentially give rise to heavy metals should vehicles or scrap be retained for such a length of time that rusting may occur. Metals may then enter the surface water drainage system and potentially impact on the discharge quality of the surface water from the site.

Skip Storage

As above, the long term storage of skips in the proposed skip storage area at the north of the facility can give rise to metal generation should skips be allowed to deteriorate. Giving the close proximity to the drainage ditch, there is potential for an impact should poor management of skip quality occur.

Surface Covering and Drainage Design

The existing surface covering at the facility is a mixture of hardstanding and hardcore. Certain sections of the area to the north of the waste processing buildings are hardstanded, including the weighbridge area. The strip of area at the east of the waste processing buildings, adjacent to wetwaste tipping hall is also hardstanded. The gradient of the hardstanding is in keeping with the originally designed Surface Water Management Plan as attached in Attachment 3 The west and southwest and the south of the site is predominantly hardcore which is c. 2-3ft deep. As all the surface water at the site is currently not managed under directional flows by gradient design of the surface covering, the surface water wash-off from the hardcore may give rise to high suspended solids and enter the surface water drains on site which could potentially impact on the receiving waters. There is also the potential that in the event of a fire at the facility, fire-fighting water that may contain contamination could be discharged to the surface water drainage system.

Handling and Storage of Raw Materials

There are a number of plant and equipment on site that require refuelling and also there is the use of lubricants and hydraulic fuels on site. Currently, Hydrocarbons include motor diesel (c. 3,000 litres), Agricultural Motor Diesel (c.1,500 litres), Hydraulic Oil (c.1,000 litres), Engine Oil (c.1,000 litres) and Waste Oil (barrel c. 400 litres). Imprudent storage and handling of such oil-based materials and fuels can result in uncontrolled discharges that can significantly impact on the receiving environment.

3.4.5 Mitigation Measures

The facility presently has mitigation measures in place to reduce the impact on the receiving environment including two silt/oil interceptors, bunded fuel storage with an integrity testing programme and a phasing programme of hardstanding across the site.

There are several proposed measures for the proposed upgrade of the existing infrastructure of the site. These mitigation measures include the management and minimisation of the volume of leachate generated, a Surface Water Management Plan, a hardstanding phasing plan, and enclosing stockpiles of waste currently stored in the open.

Wheelie Bin Wash/Truck Wash/Wheel Wash

There is a two phase plan for this activity. Firstly, a proposed area for a wheelie bin, truck and wheel wash area will include a leachate holding tank and will located at the east perimeter to the front of the north face of the waste processing buildings relatively close to the weighbridge as shown on Site Layout Plan Ref C(IRL)WL-02 in Attachment 3. A contained area for wheelie bin and truck wash activities will minimise the interaction with the hardstanded area across the site and reduce the leachate production and the potential for entering the surface water drains. There water supply for the washing activities may be sourced from the rainwater harvested on site which will in turn reduce the volume of surface water diverted from the site. There will be no abstraction from surface waters.

It is estimated that the volume of leachate generated per week from wheelie bin washing would be 2.5m^3 (based on power washing a maximum of 100 wheelie bins per day using 4-5 litres of water per bin). As there is no public sewer servicing on the site, all washings will be contained in a sump and pumped to an over ground leachate holding tank with a capacity of c.6m^3. It is proposed to relocate the truck washing activity to this central location and washings will be collected and managed as per the wheelie bin washing process. Leachate will be collected and then removed from the facility by a tanker and disposed of appropriately by an approved waste contractor.

Secondly, on completion of the Biostabilisation Plant, all wheelie bin washing will take place in the tipping building, where washings can be recycled into the compostable waste and the activity will no longer take place at the north of the site as described above. The water supply will be taken three 30m^3 rain harvesters at the southwest of the facility collecting roof water from the Biostabilisation Plant. This is part of the leachate management program for the facility.

Baling of Wetwaste

To reduce the impact of the current movement of waste vehicles around this area, measures will be put in place to modify the existing ramp connecting the wetwaste tipping hall and processing unit which will permit the direct movement between these two sections. In addition to this, full containers will be used indoors eliminating the requirement for baling of waste on the hardstanding area external to the waste processing buildings. It is also envisaged on completion of the Biostabilisation-Sterilization Building and validation of the process, the majority of wetwaste and MSW(municipal solid waste) will be diverted to this process at the south of the facility. Baled waste that would be the source of leachate if rainwater should come into contact with it, will be stored in indoors.

Biostabilisation Plant

Leachate will be generated in the reception hall and curing area of the Biostabilisation and Sterilization Building. All leachate within the Biostabilisation building will be self-contained due to the proposed design of the floor area and building. An underground leachate tank will have a capacity such that all leachate generated from the floor area may be stored. Under the proposed procedure for this process on site, a weekly (or as required) wash down of the hard standed floor of the reception hall will be carried out. The leachate may be recycled as a liquid to dampen the feedstock, depending on 'wetness' of the waste streams. As the leachate system will be self contained and if it is managed appropriately, there is no will be no potential for this leachate generated from this activity to enter the site surface water drainage system and therefore enter the surface water bodies.

Stockpiled Waste

It is proposed as part of the upgrade of the facility to construct extensions to the south end of the existing waste processing buildings. The area at the south-west of the processing buildings is currently used for C&D waste storage and C&D waste processing. The construction of a designated building for the housing of C&D waste will eliminate contact between rainwater and the stockpiled C& D waste. This will reduce the potential for the generation of leachate.

The area at the south-east of the processing buildings is used for the shredding of wood products. The activity currently takes place on a dedicated hardstanding area. The construction of a designated building to enclose all of the processes associated with timber shredding including stockpile storage and sorting, loading hopper, conveyor belt, shredding and storage of shredded timber (wood chip) will eliminate contact between rainwater and the waste wood products during processing and

storage at the facility as will the C&D waste mitigation measure which will significantly reduce any potential impact on the receiving environment.

Inclusive of this category is waste glass. This is presently contained in glass bunkers in covered concrete bunker units. As part of the proposed development, these glass bunkers will be relocated to another area, where all glass will be covered to reduce the potential of leachate generation.

End of Life Vehicles

It is proposed that the End of Life Vehicles will be stored as prescribed by environmental procedures under an Environmental Management System for the facility. The duration of storage of such End of Life Vehicles will be limited to prevent any impact on the receiving environment.

Skip Storage

The proposed skip storage to north of the existing employee car park will be constructed in a two phase hardstanding plan. Each phase will be hardstanded such that the surface water drainage will be diverted to surface water drains and discharge through the dedicated bypass separator in place. The potential for run-off from this area to discharge directly will be eliminated. The facility proposes to only store skips of good condition in this area, and a programme to replace deteriorating skips will be put into practice, thus reducing the potential for the production of metals from rusting of stored skips.

Surface Covering and Drainage Design

The proposed development includes the installation and operation of an extended surface water drainage system addressed under a Hardstanding Phasing Plan and a Surface Water Drainage Plan, see drawing C(IRL)WL-19 attached in Attachment 3. On completion of the plans the entire surface area of the facility will be hardstanded and designed to divert surface water to the existing north and south discharges locations via dedicated NSB-D bypass separator for oil and silt removal. There will be no significant increase in the volume of surface waters discharged from the existing site as the site is already covered with hardstanding and hardcore. There will be an increase in the surface water discharged on completion of the proposed skip storage area however, the location at the north of the facility has been evaluated and holds sufficient capacity to manage this extra volume of surface water. The management of surface water at the facility when completed will reduce any potential impacts laid out previously.

Water dowsing is executed during the dry summer months to prevent dust generation and the impact on sensitive receptors. Yard activities will incorporate brushing at this time to reduce the concentration of particles collected in the surface water run-off from the facility and potential for impact on the environment.

There currently is no firewater retention for contaminated firewater on site and a FWRA (Firewater Risk Assessment) has not been conducted. The facility holds a fire truck on site with 800litres tank of clean firewater. It is envisaged on granting of a Waste Licence, the site will be assessed for an appropriate firewater management plan, which may include a firewater retention facility. In the interim, training on fire extinguishers, the fire truck and Emergency Response Procedure CIR20-103 has been executed.

Handling and Storage of Raw Materials

The fuel and oils are stored on site. Control mechanisms that will be put in place to protect against such discharges are preventative in nature and ensure significant protection for both groundwater and surface water resources. The tank/drums are stored within a fully reinforced concrete bunded area that conforms to the standard bunding specification (BS8007-1987) and is integrity tested. A paved area is provided around the storage tanks for fuel dispensing. Spill kits are in place at critical locations around the site to reduce the potential impact on any spills. Training by employees on Emergency Response Procedure CIR20-103 will ensure a rapid response to any incidents. The location of the surface water drain is at a sufficient distance such that a spill will not directly enter a shore and procedures will be put in place to routinely inspect the oil interceptor chambers and record any observations.

In the event any hydrocarbon enters the surface water from the site, it will be contained in the NSB-D bypass separator. Interceptors will be cleaned out by an approved waste contractor in the event of the retention of a hydrocarbon in the chamber. In addition to this, an ongoing monitoring programme will include screening for mineral oils and diesel range organics in the surface water samples. Should either of these parameters be detected, the facility will carry out an incident investigation and apply corrective actions.

3.5 HYDROGEOLOGY

3.5.1 Introduction

This section of the Environmental Impact Statement assesses the predicted impacts of the proposed developments at Clean (Irl.) Refuse & Recycling Co. Ltd on the underlying hydrogeological conditions of the site. This includes an assessment of the predicted environmental impacts of the development during construction and operational phases.

3.5.2 Methodology

This assessment comprises of a desk-based study of the relevant documents as detailed below:

- Geological Survey of Ireland web based database;
- Environmental Protection Agency (EPA) web based database;
- Met Eireann web based database;
- Water Framework Directive – Shannon River Basin District.

Bord na Mona Environmental Ltd carried out groundwater quality analysis as part of previous investigations on site and these are referenced in this assessment.

3.5.3 Existing Environment

3.5.3.1 Groundwater Recharge & Flow

Groundwater recharge in the area is through diffuse sources as there are no point sources identified within the area. (There are no karst features recorded by the GSI within the study region (5 km radius of the site)). Rainfall data was obtained from Met Eireann's website for the nearest weather station at Shannon.

TABLE 3.5.1: Annual rainfall in millimetres for Shannon

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	220.7	62.1	102.7	49.6	35.8	105.8	94.4	187.8	86.5	156.6	61.8		1163.8
2007	93.5	71.4	62.9	11.2	66.3	103.6	96.9	100.6	51.6	44.3	52.9	166.3	921.5
Mean*	97.8	71.5	71.4	55.7	59.5	62.8	56.8	82.4	81.6	93.4	94.8	99.0	926.7

*30-year average from year 1960-1990

The actual rainfall falling on an area does not represent the available recharge to the underlying aquifer. A percentage of the rainfall will be taken up by the soil and can discharge·to·the·surface·water·bodies·as·surfacewater·run-off.

The amount of rainfall taken up by the soil is dependant on the evapotranspiration, surface gradients and soil type (i.e. permeability rates). The annual long term average evapotranspiration rate for the area is given as c. 475 mm. Therefore based on the rainfall data and evapotranspiration, it is estimated that 451.7 mm of actual recharge is available to the underlying ground waters. This is known as the effective rainfall.

Surface water run-off is dependent on the gradients on site and the permeability rates of the soil covering. The site is underlain by low permeability glacial t·ills and as such under the GSI guidelines for recharge coefficients only 50-80% of the effective rainfall will reach the underlying aquifers. Taking into account these ratings the recharge available to the underlying aquifers is in the range of 250 mm/yr. The GSI use a conservative value of 200 mm/yr recharge for areas underlain by locally important aquifers. Groundwater flow in the area is assumed to be in a northerly direction towards the River Creegh which is situated c. 300 m north of the facility. This reflects the topographic gradients in the study area.

3.5.3.2 Aquifer Classification

The bedrock is classified by the GSI as a Locally Important Bedrock Aquifer which is generally moderately productive only in local zones (Ll). These aquifers are generally capable of supplying well yields of sufficient volume for domestic needs and small industries, such as that of the facility.

3.3.2.1 Groundwater Usage

There were no wells recorded in the GSI Well database for the area. The study area is not serviced by mains water and it is expected that groundwater is used to supply the nearby residential properties. It is assumed that each residence along the county roadway has individual private wells or avails of the Drumehilly Group Scheme. There are approximately 13 no. houses along the county roadway within 500 m of the site. The facility is serviced by an on site bored well or the Drumehilly Group Water Scheme.

3.3.2.2 Groundwater Vulnerability

The Quaternary sediments within the area are generally moderate in thickness with groundwater vulnerability ranging from High to Extreme. Figure 3.5.1 overleaf illustrates the status of the underlying aquifers). The facility is underlain in sections by concrete which protects the underlying aquifers.

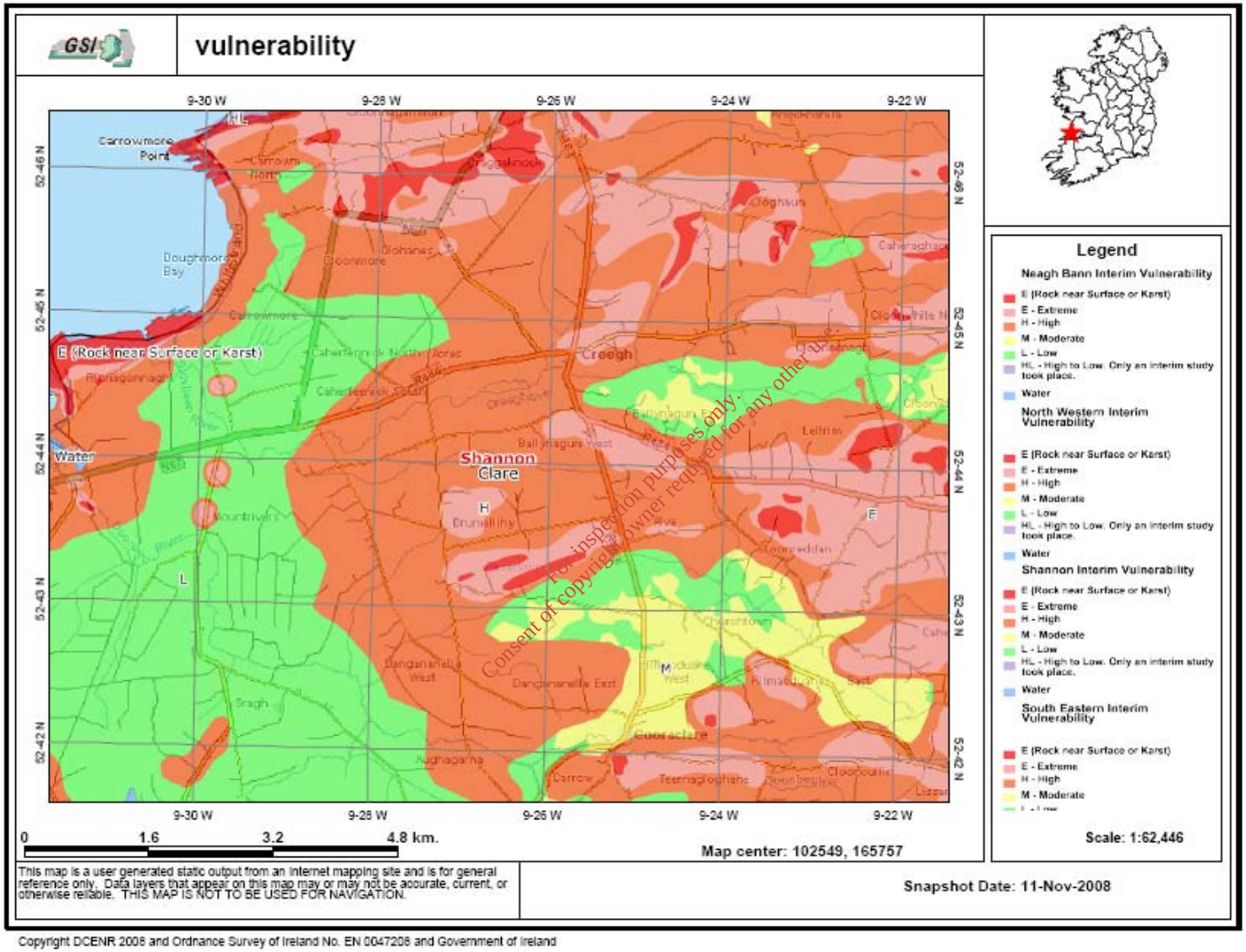

Figure 3.5.1 Groundwater Vulnerability

Combining the groundwater vulnerability rating and the aquifer classification gives a groundwater resource protection zone of Ll/H-E. In the areas of hardstanding these protection zones are given as Ll/L (low vulnerability). The GSI have defined a series of response matrices for certain activities to place controls on the potentially polluting activities thus protecting the underlying groundwaters. Whilst there is no response matrix for waste transfer stations, the siting of a landfill within an Ll/H-E and Ll/L area is considered acceptable subject to certain conditions. Currently the facility operates under a waste permit, and it is proposed to obtain a Waste Licence from the EPA as part of these developments on site. Under the conditions of the Waste Permit operational practices are put in place to ensure there is no risk to the underlying groundwaters.

3.5.3.3 Groundwater Quality

Groundwater quality analysis was carried out by Bord na Mona Environmental Ltd in 2005 and 2008 and a copy of the results is given in Table 3.5.2 below and continued overleaf.

Table 3.5.2: Chemical Analysis of Groundwater				
Parameter	**January 2005**	**April 2005**	**August 2008**	**Drinking Water Standard***
Ammonia mg/l	0.04	-	-	0.23
Chloride mg/l	25	26	36	250
E. Coli no./100ml	<1	-	-	0
Total Coliforms no./100ml	6.3	-	-	0
pH (pH units)	8.3	-	7.4	6.5 – 9.5
Conductivity µS/cm	174	-	710	1500
Total Alkalinity mg/l	-	-	336	-
BOD mg/l	-	-	<2	-
COD mg/l	-	-	21	-
Suspended Solids mg/l	-	-	<5	-
Boron µg/l	-	16	76	1000
Calcium mg/l	-	12	43.5	-
Potassium mg/l	-	0.9	1.4	-
Magnesium mg/l	-	2.3	22.13	-
Sodium mg/l	-	18	49.8	-
Arsenic µg/l	-	<2	<1	10
Aluminium µg/l	-	254	20	-
Berylium µg/l	-	<2	<1	-
Barium µg/l	-	47	150	-
Chromium µg/l	-	<2	<1	50
Cadmium µg/l	-	<2	<0.4	5
Cobalt µg/l	-	<2	<1	-
Copper µg/l	-	<2	2	2000
Iron mg/l	-	<0.1	6	-
Manganese µg/l	-	4	34	-
Silver µg/l	-	<2	<2	-
Nickel µg/l	-	<2	7	20
Lead µg/l	-	<2	<1	10

Table 3.5.2: Chemical Analysis of Groundwater Contd.				
Parameter	**January 2005**	**April 2005**	**August 2008**	**Drinking Water Standard***
Antimony µg/l	-	<2	<1	5
Selenium µg/l	-	<2	<1	10
Tin µg/l	-	<2	<1	-
Zinc µg/l	-	7	<1	-
Mercury µg/l	-	<1	<0.05	-
Fluoride mg/l	-	0.9	<0.10	1.5
Sulphate mg/l	-	22.3	<0.50	-
Nitrate mg/l as N	-	0.69	<0.2	11.3
Nitrite mg/l as N	-	<0.02	<0.02	0.15
Total Nitrogen mg/l	-	-	1.20	-
Orthophosphate mg/l	-	<0.02	0.02	-
DRO µg/l	-	<10	-	-
Mineral Oil µg/l	-	<10	-	-

*Water Standards take from European Communities (Drinking Water) (No.2) Regulations 2007; SI No. 278 of 2007

The groundwater quality beneath the site is generally clean with none of the parameters concentrations analysed lying above the Drinking Water Standard. The potential pollutants (associated with the development) are hydrocarbons, metals, nutrients and bacteria. There were no hydrocarbon compounds detected in the 2005 sampling event. The levels of trace metals (arsenic, cadmium, chromium etc) are low and within the drinking water standards. Similarly nutrient levels (ammonia, nitrate, phosphate) were low in all sampling events. Low levels of total coliforms were detected however there were no levels of faecal coliforms.

The concentration of some of the parameters have shown an increase from the period 2005 to 2008; namely: chloride, conductivity, calcium, magnesium, sodium, potassium, boron, barium, manganese, and nickel. These parameters remain below the drinking water standard and as such the increases are not considered significant, however ongoing groundwater monitoring should be carried out to review any indicators of potential contamination.

Under the Water Framework Directive the groundwater body within the study area has been identified as being "expected to meet good status in 2015". There were no significant risks identified within the area on groundwater quality. Pressures from agricultural and point source discharges are potential risks to all groundwater bodies including the study area in question.

3.5.4 Potential Impacts of Proposed Developments

The facility currently operates as a waste transfer station under a permit with the Local Authority. It is proposed to increase the volumes of waste being accepted and processed at the facility. Currently a lot of the operational areas of the site are hardstanding and it is proposed to increase the area of hardstanding as part of improvements on site. This will increase the protection to the underlying groundwaters.Groundwater abstraction for drinking water purposes and process water for yard cleaning is currently taking place on site and this will continue into the future. Abstraction rates are minimal and of similar volume to that of domestic usage and a small farm. The impact of the abstraction of such low yields is considered minimal.

There is one discharge to groundwaters associated with the development, namely the wastewater treatment plant, this emission to groundwater is referred to as GW1. This system treats domestic wastewater from the residence on site and facility employees. The system consists of a Bord na Mona Environmental Ltd Platnium P12+ Puroflo Bio-Filter Tertiary Polishing System with discharge to ground via a percolation area. The percolation area is situated to the back of the site adjacent to the proposed composting building. A site suitability assessment was carried out as part of the development of the system and permission for the system was granted by the Local Authority. As part of the conditions of the Waste Permit of the facility biannual monitoring of the treat effluent is carried out (pH, COD, BOD, SS). All parameters monitored in February 2008 were within their respective Emission Limit Value (ELV) as set out in the Discharge Licence W.P. 162.

There is the potential for accidental discharges to ground from leachate generated within the waste material as it is accepted and processed at the facility. Surface water run-off from the yard areas are directed through the surface water collection system and discharged off site through a siltation trap and oil interceptor (located to the front of the facility). There are no discharges to ground from surface water run-off.

Due to the movement of vehicles and machinery on site and the storage of hydrocarbons there is a potential for accidental spillages and/or leakages of potentially polluting materials which could have a negative impact on the underlying groundwaters. Mitigation measures and best practises operations, as detailed below, will be carried out on site to ensure there are no negative impacts on the underlying subsurface.

3.5.5 Proposed Mitigation Measures

In order to ensure the proposed developments at the Clean (Irl) Refuse & Recycling Ltd. facility do not have a negative impact on the underlying groundwaters, a series of mitigation measures have been adopted as detailed below.

• All domestic wastewater from the site will continue to be treated from the on-site wastewater treatment plant. On-going monitoring of the treated effluent as part of the conditions of the waste permit (and subsequently the Waste Licence) will ensure the discharges to ground to not have a negative impact on groundwaters.

• All potentially polluting substances (such as hydrocarbons) will be/are stored in properly bunded areas in accordance with best engineering standards and environmental guidelines. There is currently two fuel tanks which are located within the fuel storage shed on the site. Spillage kits will be located though out the facility, particularly in the areas of fuel storage and vehicle maintenance. Any refuelling of equipment/vehicles on site will be/is carried out within designated areas which will be fully contained to prevent the ingress of any spillages to the subsurface. Chemicals (quarantined waste) will be/are stored within designated areas which are fully contained.

• All machinery and plant equipment will be/is regularly serviced and maintained to prevent any incident leakages of potentially polluting hydrocarbons.

• Waste accepted and processed through the facility will be/is carried out within designated areas. Any leachate runoff from the waste in the Biotstabilistaion Plant will be/is directed through the leachate collection system to the underground leachate storage tank on site. The foul waters is temporarily stored within this tank for subsequent collection by a licensed haulier for discharge in the Clare County Council's waste water treatment plant in Lisdoonvarna under agreement with the local authority. There should be no leachate generated from the dry recyclables and wetwaste will be diverted from the main reception hall in the processing buildings to the Biotstabilistation Plant, where a leachate management plan will be in place.

• The majority of the site is covered with hardstanding and hardcore areas and any waste activity is carried out in these areas only. The hardstand cover prevents any accidental ingress of any polluting substances into the underlying groundwaters.

• The facility will operate under the conditions of an EPA Waste Licence. The conditions of the licence will ensure that the underlying groundwaters will be protected.

- It is recommended to carry out routine groundwater quality monitoring at the facility to determine the ongoing quality of the groundwater beneath the site. The schedule of groundwater monitoring should be carried out as detailed in the forthcoming EPA Waste Licence for the facility. The treated effluent from the onsite wastewater treatment plant should be monitored biannually in accordance with the conditions of the Discharge Licence W.P. 162 and subsequent Waste Licence.

3.6 AIR

In order to determine the impact to air of the proposed development at Clean (Irl) Refuse and Recycling Ltd. a baseline air assessment was carried out and potential impacts on this baseline air quality were defined and discussed. Potential pollutants were identified and assessed in order to determine the current baseline air quality in the vicinity of the proposed development. Potential impacts to air quality during the operational phase of the development are discussed below along with mitigation measures to minimize these potential impacts.

3.6.1 OVERVIEW OF POTENTIAL POLLUTANTS

The proposed infrastructure development will include:

- Bio stabilisation tipping and Curing building with installation of in-vessel tunnels
- Biomass Gasification System and associated infrastructure
- Extension to existing processing buildings
- Relocation of glass bunkers
- Provision to End of Life Vehicle unit
- Relocation of existing diesel tank bunded storage area
- Wheelie bin/truck wash service area
- Wheel wash
- Hard standing skip storage area

The facility will continue with the existing waste processes which include, dry recyclable processing, wet waste processing, baling of material , dropdown skip processing, timber shredding processing, construction and demolition waste processing. The additional infrastructure will allow the continuation of the existing processes and also will accommodate bio stabilisation (in-vessel tunnels in an aerated curing system), provision of an End of Life Vehicle unit, Wheelie bin/truck wash wheel wash, biomass recovery (electricity production) and additional Skip storage.

Examination of both the existing and proposed processes indicates that a number of potential pollutants may be produced at significant levels to have an impact on the existing air quality. The identified pollutants include:

- Particulates (Dust Deposition)

- Incomplete combustion products
- Traffic derived pollutants
- Odour
- Bio·aerosols

Each of the identified pollutants will be examined and mitigation measures documented or proposed where appropriate.

Dust Deposition

Particulate matter or dust is an air pollutant consisting of a mixture of solid and liquid particles suspended in the air. Its physical and chemical characteristics are dependent on emissions from various sources, atmospheric chemistry and weather conditions. Particulate matter can be defined as either primary or secondary. Primary particulate matter is that which is emitted directly into the air. Secondary particulate matter is formed in the atmosphere from gaseous precursors (mainly sulphur dioxide, nitrogen oxides, ammonia and non-methane volatile organic compounds).

Particulate matter arises from both man-made and natural sources. Anthropogenic sources of dust include the generation of carbonated matter (e.g. soot and ash) from incomplete combustion processes. The movement of materials, vehicle movement and combustion emissions can result in dust generation. Natural sources of particulate matter include sea-salt and biological particles such as pollen.

Dust emissions can be characterised in accordance to their particle size. Fine particulates, such as carbon particles in wood smoke and diesel engine exhaust, have a diameter range of between 0.1µm and 1.0µm. Coarser particles are those with a diameter range between 2.5µm and 10µm. These include soil dusts, street dust, coal and fly ash, sea salt, pollen and mould spores. Humans can segregate particulates by size on deposition within the respiratory system. Larger particles deposit on the fine hair follicles in the nose and throat and can be removed by several means. Fine particles (particles of 10µm or less) may travel into the lungs and be retained for longer periods of time and can contribute to respiratory and pulmonary disease.

Particulate matter with an aerodynamic diameter less than 1µm can stay airborne in the atmosphere for days or weeks and can be transported uniformly over long distances (up to thousands of kilometres). Larger particles are airborne for minutes or hours depending on their size, wind velocity, topography and other factors. They can be transported

distances less than 10km from their source and are generally deposited in local downwind areas.[34]

Particles that are deposited to ground give rise to problems such as soiling of buildings, coating of vegetation, contamination of soils, water pollution, ecological changes, altered soil and water pH balances. Inhalable and respirable dust impacts on human health and is associated with respiratory disease and impaired pulmonary function.

There are currently no Irish statutory standards or EPA guidelines relating specifically to dust deposition thresholds. Presently the facility operates to a dust deposition limit as set out in its existing waste permit. The total dust (soluble and insoluble) deposition limit value at site boundary is 350mg/m^2/day (where monitoring is conducted over a continuous 28 ± 2 day period).

Incomplete Combustion products

The primary sources of incomplete combustion products at the facility will be traffic derived pollutants and combustion by-products arising from the operation of the proposed Biomass Gasification plant. An existing source of incomplete combustion products is the use of an onsite diesel generator. This is used to power the process machinery within the wet and dry waste buildings. A minor source of these parameters would be the existing wood chip boiler.

Most of the world's vehicles use internal combustion engines, burning petrol or diesel or gas hydrocarbon fuels for their energy supply. If a pure hydrocarbon fuel was burned under ideal conditions, then all of the fuel would be converted into energy, carbon dioxide and water. In practice this perfect reaction does not occur. The presence of nitrogen in the atmosphere and the impure mixture of hydrocarbons that is typical of most fuels result in a number of reaction by products. These by products are nitrogen oxides, carbon monoxide, carbon particles (particulate matter – PM_{10}), sulphur dioxide and a range of volatile organic compounds.

[3] World Health Organisation (1999) Air Quality Guidelines
[4] World Health Organisation (2006): Health Risks of Particulate Matter from Long-Range Transboundary Air Pollution

(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 and to a lesser extent the combustion of diesel fuel.

(2) Oxides of Nitrogen (NO_x)

The term oxides of nitrogen refer 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. Power generation and Road traffic are the principal source of anthropogenic nitrogen oxides in Ireland *('Ireland's Environment- 2008 EPA 2008)*.

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 (BTEX)

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. Catalyst controls and other technologies in gasoline cars have resulted in significant reduction in Volatile Organic Compounds (VOC) in the overall emissions in Ireland since 1998 *('Ireland's Environment- 2008 EPA 2008)*. The predominant VOC's associated with transport related activities were included in the measurement programme carried out in 2005. Comparison is made with the recorded levels then and the most recent EPA data recorded in 2007. Four compounds were chosen as indicators of pollution from these sources; benzene, toluene, ethylbenzene and xylene isomers.

(4) 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 historically 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 Millennium 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.

Odour

Odour is perceived by our brains 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)*).

The production of offensive odours can cause significant problems for receptors close to waste transfer/composting facilities. Composting plants with their biological activity yields numerous odorous compounds and may cause annoyance in the environment. The generation of an odour may not, in itself, be a problem in that in many cases the odour is not released to the environment and also if it is released it may be below acceptable guideline levels.

Bio aerosols

Micro-organisms (or microbes) can be defined as very small organisms which are capable of living on their own. They are found all over the earth in a range of environments which include hot springs, polar ice-caps and the intestines of animals including man. They are fundamentally involved in the recycling of nutrients and are an integral part of the composting process. The microbes are responsible for degrading organic wastes and converting them into compost. During the composting process the activity of these microbes cause the temperature of the composting material to rise well above ambient giving rise to clouds of steam observed when the materials are turned.

When composting materials are moved around during either the shredding, blending or screening processes, microbes (both alive and dead), spores plus various parts of cells that have broken up, are released into the air. Due to the small size of the microbes, they tend to remain airborne for long periods of time forming what is called a 'bio aerosol'.

Bio aerosols are of concern during composting because of the potential negative impact they may have on public or worker health. Airborne micro-organisms are inhaled throughout normal everyday life and rarely cause any ill effects as the body is equipped to cope with the presence of microbes.

Background levels of bacteria and fungi are highly variable and range from 1-1000cfu/m^3 (cfu – colony forming units), although higher values can be commonly encountered in agricultural and forest environments. There is the possibility of a risk to the health of certain receptors depending on individual sensitivities from bio aerosols. This risk may be increased when large concentrations ofhese airborne micro-organisms are generated during activities conducted in composting operations (*Technical Guidance on Composting Operations Environmental Agency October 2001, Draft for external consultation*).

At present there are no guideline or limit values for bio aerosol concentrations in Ireland or Europe.

An EPA funded study was carried out in 2004 by Cré Composting Association of Ireland entitled ‘ Bioaerosols and Composting- A Literature Evaluation’ August 2004, examined the reported impacts of composting on bio-aerosols levels and also on the surrounding environment. The review deals primarily with worker exposure to bio-aerosols and also with outdoor composting processes. The review recommends that a guideline setback distance of 200m to the nearest sensitive receptor is observed. In this case, the distance from the biofilter to the nearest sensitive receptor is 200m. It is important to note that the recommended set back distance was determined with open windrow composting in mind where, turning, shredding and screening would all take place outdoors. This will not be the case at the proposed facility as all of these operations will be contained with the bio stabilisation building.

3.6.2 Baseline Data

The existing facility has operated under a number of Waste permits since 2002. The air monitoring requirements under the existing permit required annual dust deposition measurements to be carried out. There is a significant amount of historical data for this parameter.

During 2005 a sampling programme for a number of ambient air pollutants was carried out at the facility. These parameters included PM_{10} (particulate matter less than 10µm), Benzene, Toluene, Ethylbenzene, Xylene, Nitrogen Dioxide and Sulphur Dioxide. The number of employees and the number of truck movements to and from the site has not significantly altered between 2005 and 2008. The average number of movements at the site presently is 75 per day. Therefore the data collected in 2005 should reflect the impact of existing activity at the facility for these parameters.

Dust Deposition

Four dust deposition surveys were carried by Bord na Móna personnel at Clean (Irl) Refuse and Recycling Ltd. Each survey was conducted in accordance with the requirements of the current Waste Permit. Measurements were made at 5 locations (DM-01-DM-05). The procedure employed for each survey was the Standard Method *VDI 2119 (Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument (Standard Method) German Institute)*. This method was selected as it is the only enforceable one available. Following the requirements of this technique, Bergerhoff gauges were installed away from buildings and other obstructions, 1.5 m above ground level for a period of 28 ± 2 days. When the exposure period was complete, the gauges were capped, removed and analysed in accordance with the specifications of the VDI 2119 method. The sampling locations of each of the gauges are presented in Table 3.6.1 of this report. The results of each of the dust surveys are given in Table 3.6.2. The results are compared with the TA Luft Air Quality Standards Bergerhoff Method, which specifies a total dust (soluble and insoluble) deposition limit of 350mg/m^2/day (where monitoring is conducted over a continuous 28 ± 2 day period). The locations of the Bergerhoff gauges (DM-01-DM-05) are presented in Attachment 2 Drawing No C(IRL)WL-10 Emissions to Air.

TABLE 3.6.1: LOCATION OF DUST MONITORING POSITIONS	
Monitoring Location	***Location***
DM-01	North of site
DM-02	Western boundary of site at offices
DM-03	East boundary of site
DM-04	Western boundary of site opposite processing sheds
DM-05	Southern boundary of site

TABLE 3.6.2: DUST DEPOSITION LEVELS				
	Monitoring Period			
Monitoring Location	**Apr-05**	**Sep-06**	**Oct-07**	**Jun-08**
DM01	76	87	90	157
DM02	153	Note 1	108	95
DM03	18	360	210	191
DM04	118	93	54	62
DM05	182	964 Note 2	180	404
Limit Value	350			

Note 1: The gauge fell during the exposure period.

Note 2. Significant earth moving works took place during this period

The dust results over the four surveys indicate that in general the dust levels at the facility are moderate and do not exceed the stipulated dust deposition limit value. Exceedences of the stipulated limit value have occurred at the AM-05 location at the southern boundary. These elevated levels reflect the earth moving that has occurred at this location at various times during the history of the site. These levels do not reflect the normal production activities within the facility. Apart for the DM-05 location (which is effectively an unstabilsed soil berm) the remaining locations at the boundary exhibit levels that are well below the limit value of 350mg/m^2/day.

A significant portion of the facility has been concrete hard standed over the last number of years. This has reduced the potential for wind blow dust and therefore the potential for high levels of dust deposition. The facility also employs a water bowser to dampen surfaces during periods of dry weather. Existing potential sources of dust deposition at the facility include the movement of vehicles around the site, handling

and movement of C&D waste and the shredding of timber waste at the southern end of the facility.

Incomplete Combustion products

5 locations were chosen for the sampling of SO_2, NO_2 and BTEX during the 2005 ambient air quality survey. A single sampling location was chosen for PM_{10}. The air sampling points are described in Table 3.6.3 below.

TABLE 3.6.3: LOCATION OF MONITORING POSITIONS – 2005 SURVEY

Monitoring Location	***Location***
AM-01	Site entrance (North Boundary)
AM-02	East boundary of site
AM-03	Southern boundary of site
AM-04	Western boundary of site opposite processing sheds
AM-05 (PM-01)	Western Boundary of the site adjacent to offices

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

Baseline 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 poles at locations indicated in Table 3.6.3, in well ventilated areas away from trees and fences and situated approximately 1-2m above ground level. The locations were chosen to reflect baseline 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 28 day monitoring survey period (18th April to 16th of May 2005) 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 a UKAS accredited laboratory for analysis.

The SO_2 and NO_2 tubes were analysed by ion chromatography and the results expressed as $\mu g/m^3$. Results are presented in Table 3.6.4 below:

TABLE 3.6.4: NITROGEN DIOXIDE, SULPHUR DIOXIDE CONCENTRATIONS – 2005 SURVEY		
Monitoring Location	**Nitrogen Dioxide µg/m^3**	**Sulphur Dioxide µg/m^3**
AM-01 Site entrance	1.60	1.09
AM-02 – East Boundary	1.80	3.81
AM-03 Southern Boundary	0.60	1.09
AM-04 Western Boundary – next to processing sheds	1.20	0.36
AM-05 Western Boundary – next to offices	1.20	0.54
Limit Value	40[Note 1]	20[Note 2]

Note 1: Air Quality Standards regulations 2002 (S.I. No. 271 of 2002).Annual Average

Note 2: Air Quality Standards regulations 2002 (S.I. No. 271 of 2002).Annual Average (protection of vegetation)

The results obtained for nitrogen dioxide are low; the highest value obtained being 1.60µg/m^3 recorded at the site entrance (AM-01). This location was only 2 meters from the site entrance and 4 metres from the L6108 roadway. These results are consistent with those expected for a site located in a rural 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 ambient air quality guidelines for Nitrogen Oxides are outlined in S.I. Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002). The Air Quality Standards 2002 transposes the First and Second Daughter Directives relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, benzene and carbon monoxide in ambient air. The older air quality standards regulations (S.I. 244 of 1987) will be fully revoked by these regulations in 2009. These Air Quality Standards Regulations 2002 also transposed part of the Air Framework Directive not covered by the EPA Act 1992 Regulations 1999. 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 relatively low, the highest level obtained was at the eastern boundary AM-03 (3.84 µg/m^3). This location is on the southern boundary half way along the boundary fence. As is the case for Nitrogen Oxides the ambient air quality guidelines for Sulphur Dioxide are outlined in S.I. Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002). These standards

outline an hourly limit value of 350µg/m^3 not to be exceeded 24 times in any calendar year and a daily limit value of 125µg/m^3 not to be exceeded more than three times a calendar year (99 percentile). It also stipulated an annual average of 20µg/m^3 for the protection of vegetation. It is clear that the results obtained are well below these limit values.

The Irish EPA carries out ambient air quality monitoring under the specific requirements of the Air Quality Standards Regulations 2002. These regulations require that the EPA provide the public with information on ambient air quality. This information must be up to date and available on a widespread basis. These regulations are a result of the Air Framework Directive 96/62/EC. This directive requires that member states divide their territory into zones for the assessment and management of air quality. In Irelands case there are four zones ranging from Zone A to Zone D. The extent of monitoring and assessment in each zone is determined by population size and air quality status. The facility location falls within Zone D (the predominantly rural zone). Therefore the average air quality levels recorded by the EPA for this zone can be used for comparison purposes with the levels measured at the facility. Table 3.6.5 below outlines the reported levels for 2007 in Zone D.

TABLE 3.6.5 EPA REPORTED BACKGROUND LEVELS[NOTE 1] OF NO_2 AND SO_2

Location	**Concentration (µg/m^3)**
Nitrogen Dioxide	
Killkitt, Co. Monaghan	2
Glashaboy, Co. Cork	9
Cork Harbour	11
Navan	16
Ferbane	6
Average	**8.8**
Sulphur Dioxide	
Shannon Estuary	3
Cork Harbour	3
Killkitt	2
Navan	4
Ferbane	5
Average	**3.4**

Note 1: Background levels were taken from 'Air Quality in Ireland 2007- key indicators of Ambient Air Quality' EPA

The average EPA levels are higher than those recorded at the facility.

(2) Volatile Organic Compounds (BTEX)

Diffusion tubes were used to determine the baseline 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 five 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 28 day monitoring survey period (18th April to 16th of May 2005), 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 µg/m^3. The results are shown in Table 3.6.6 below:

TABLE 3.6.6: BTEX CONCENTRATIONS – 2005 SURVEY

Location	Benzene µg/m^3	Toluene µg/m^3	Ethyl-Benzene µg/m^3	m/p Xylene µg/m^3	o- Xylene µg/m^3
AM-01	1.78	0.47	0.24	1.04	0.28
AM-02	0.13	0.85	0.19	1.42	0.33
AM-03	0.02	0.34	0.05	0.14	0.09
AM-04	0.21	0.81	0.19	1.09	0.19
AM-05	0.30	1.02	0.71	3.22	0.62
Limit Value	**5**[Note 1]	**400**[Note 2]	**500**[Note 2]	**100**[Note 2]	**100**[Note 2]
EPA[Note3] Zone A Average	2.8	5.1	0.5	1.4	0.4

Note 1:S.I No. 271 of 2002. Air Quality Standards Regulations 2002 – Annual Average

Note 2: Environmental Factors and Health, The Danish Experience" Danish EPA 2001 – Danish C Values

Note 3: EPA monitoring data for sampling period 2007 from the Rathmines monitoring location.

The concentrations obtained for benzene at the five locations are low ranging from 1.78µg/m^3 to 0.02µg/m^3. 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/m^3 over a calendar year. This limit value is adopted into the S.I No. 271 of 2002. Air Quality Standards Regulations 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/m^3 for toluene, 500µg/m^3 for ethylbenzene and 100µg/m^3 for xylenes. The results obtained from the monitoring survey are significantly below these values.

Comparison of the recorded levels in 2005 with the EPA reported levels for Zone A in 2007 indicate that the levels at the facility are significantly lower that those recorded at the Rathmines location and reflect the rural setting of the Waste Transfer station.

(3) $\underline{PM_{10}}$

The monitoring programme was 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. The monitor was located at PM-01.The results of the monitoring programme are highlighted in Table 3.6.7 below and over leaf in Fig 3.6.1

TABLE 3.6.7 PM-10 CONCENTRATIONS AT PM-01 FROM THE 20/07/05 to 02/08/05	
Sampling Date	**PM_{10} Concentration (µg/m^3)** **Daily Average**
20/07/2005	16.2
21/07/2005	5.8
22/07/2005	8.7
23/07/2005	8.3
24/07/2005	20.4
25/07/2005	15.8
26/07/2005	<5.0 Note 2
27/07/2005	36.6
28/07/2005	19.5
29/07/2005	14.6
30/07/2005	5.4
31/07/2005	9.6
01/08/2005	17.9
02/08/2005	<5.0 Note 2
Limit Note 1	***50***

Note 1: Air Quality Standards Regulations 2002 S.I 271 of 2002 (Daily average)
Note 2: Less than the limit of detection

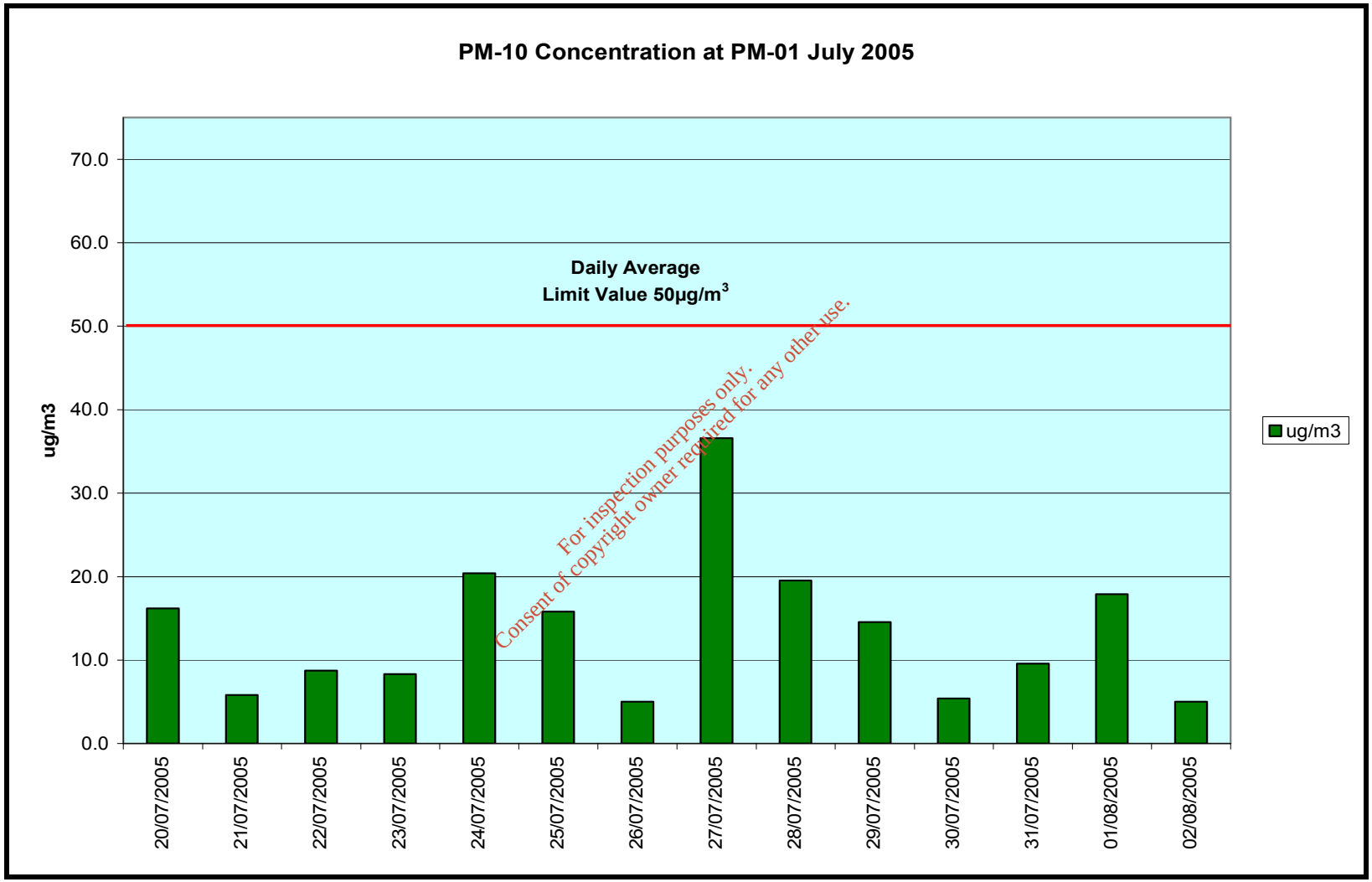

Fig 3.6.1 Baseline PM-10 Levels at Custom Compost

TABLE 3.6.8 EPA (ZONE D) REPORTED LEVELS		
Location	**Daily Average**	**Daily Maximum**
Carnsore Point	27	85
Kilkitt	10	74
Castlebar	14	87
Drogheda	18	82
`Cork Harbour	17	49
Navan	23	48
Ferbane	21	64
Average levels for Zone D	**18.6**	**69.9**

Note 1: Baseline levels were taken from 'Air Quality in Ireland 2007- key indicators of Ambient Air Quality' EPA

As part of the requirements of S.I. No. 271 of 2002 – Air Quality Standards Regulations 2002, the EPA are also required to carry out PM_{10} monitoring in Zones A – D throughout the country. Table 3.6.8 outlines the recorded average and maximum levels in Zone D during 2007. The baseline levels recorded as part of the air quality assessment for the development are similar or lower in magnitude to those levels recorded by the EPA.

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. The proposed site is rural in nature surrounded by unimproved and improved grasslands. During a number of site visits and under a variety of meteorological conditions no significant odour was subjectively discerned at or around the site boundary.

As part of the potential odour impact of the facility, it is possible that levels of hydrogen sulphide, amines and mercaptans may arise from the operation of the proposed composting facility and associated bio filters. The existing facility has received no odour complaints since it began processing waste. Therefore, the levels of Hydrogen Sulphide, amines and mercaptans would be considered to be background and reflect the rural nature of the surrounding area. As there is no significant source of the above parameters in the surrounding area it was deemed appropriate to exclude their measurement from the scope of the baseline work.

Bio aerosols

Presently, the facility screens out an organic rich fraction from mixed commercial and residential waste. This material is exported to an external composting facility for biological treatment. A total of 1550kg per year of this material is handled at the facility. It is not expected that these fines would generate significant amounts of bio-aerosols at the boundary due to the limited volume kept at the site at any one time. No baseline monitoring of this parameter was undertaken. It would be expected that baseline levels of this parameter in the vicinity of the facility would range from 1-1000cfu/m^3 as referred previously.

3.6.3 ENVIRONMENTAL IMPACTS

If uncontrolled, construction and operation of the proposed development can give rise to air emissions.

3.6.3.1 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. These activities would give rise to Dust deposition and emission of traffic pollutants from the incomplete combustion of fuels.

Dust Deposition

Dust is likely to be generated via topsoil removal, extension of the existing hard standing area, excavation of foundations, construction of new buildings and infrastructure, installation of site infrastructure, and movement of construction traffic.

The impact of fugitive dust generated from these operations will, to a certain extent, depend on wind direction, wind speed and rainfall. Shannon Airport Meteorological station is the closest Met Eireann synoptic station to the site, located approximately 35km east of the proposed site. The prevailing wind direction is predominately from the western sectors. The 30-year Met Eireann average climate data for Shannon indicates that the average annual (mean monthly) wind speed is 5.2m/s. The total annual rainfall rate at Shannon Meteorological Station is 926.8mm. It can be reasonably expected that both the average wind speed and annual rainfall would be similar or higher at the location of the proposed facility due to its more exposed location nearing the Atlantic coast. Climatic conditions are therefore favourable for the majority of the year to reduce any residual potential for the build up of significant levels of pollutants.

During the construction phase, 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 and the use of generators at the site during the construction phase of the development will generate exhaust fumes and subsequently contribute to potential emissions of SO_2, NO_x, CO, particulate matter and VOC's including BTEX. While 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) should minimise the generation of any unnecessary air emissions.

3.6.3.2 Operational Phase

The principal sources of air emissions from the operational phase of the proposed development include:

- Traffic movements in and out of the facility
- Operation of the C&D waste processing line
- Operation of the timber shredder
- The composting process
- Windblown Dust from on site activities
- Operation of the Diesel Generator
- Operation of Biomass Gasification plant.

These activities have the potential to generate significant levels of dust, incomplete combustion products, odour and bio aerosols.

Dust Deposition

Dust deposition will principally arise from the movement of site vehicles within the facility, shredding of timber and handling of the woodchip, processing of C&D waste, tipping of feedstock for the composting process, screening of final compost product and loading of compost product. The proposed development has a number of provisions which will limit the potential impact of these activities.

- All vehicle movements will take place on hard standed concrete surfaces only
- A water bowser will continue to be employed to dampen the hard standing area during dry periods.

- The existing timber shredding process and C&D processing will be moved indoors into a new custom made building
- All feed stock and compost handling operations including screening will be carried out within custom made fully enclosed composting buildings. The air from these buildings will be extracted and passed through a wet scrubber and biofilter system which will significant reduce any particulate in the air.
- Lorries/trucks will be properly enclosed or covered during transportation of friable materials such as wood chip, feedstock for the composting process and mature compost to prevent the escape of materials along public highways.

In complete combustion products

The principle source of these pollutants will be the additional traffic movements that will arise as part of the proposed development and the combustion by-product emissions from the operation of the proposed biomass gasification plant.

Traffic related Pollutants

The operation of the development will result in an increase in traffic as detailed in Section 3.10 of this EIS. 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 3.6.9 overleaf.

Average traffic flows associated with the proposed development, as reported in Section 3.10 of this EIS, were used to predict ground level concentrations of particulate matter, CO, NO_2, total hydrocarbons and PM_{10} at the worst case location of the dwelling house located at the junction of the L6108 local access road to the facility and the R483 regional road.. The junction chosen is considered to be the area where the most significant effects of increased traffic flow are likely to be experienced, once the development is fully operational. Assessments of predicted traffic related pollutants were carried out under a worst case traffic speed traffic speed of 15kph (for both routes) and reference dates 2010 and 2025 under both no development and development conditions. The Annual Average Daily Traffic (AADT) figures are not available for these routes. Therefore a worst case AADT was derived based on peak traffic counts carried out in the am and pm. Growth factors were applied to the determined AADT values for both roads. These were derived from NRA guidance documents. Reference was made to the following guidelines when carrying out this assessment

- *Guidelines for the treatment of Air Quality during the planning and construction of National Road \schemes – NRA*
- *National Roads Authority Future Traffic Forecasts 2002-2040 August 2003*

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 (2007). The adjusted figures for 2010/2025 (no development) and 2012/2025 (with development) are presented in Table 3.6.9, please note that these include background concentrations. The results 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
- S I No. 271 of 2002 Annual Limit value for CO of 10mg/m^3

TABLE 3.6.9 PREDICTIVE MODELLING OF TRAFFIC DERIVED POLLUTANTS AT DWELLING LOCATED AT JUNCTION OF L6108 AND R483

Scenario	CO Annual Mean (mg/m3)		Benzene Annual Mean (ug/m3)		NO_2 Annual Mean (ug/m3)		PM_{10} Annual Mean (ug/m^3)	
	Annual Average	Increase /Decrease %	Annual Average	Increase /Decrease %	Annual Average	Increase /Decrease %	Annual Average	Increase /Decrease %
2008 Existing	0.57	N/A	0.55	N/A	4.48	N/A	14.60	N/A
2010 Do Nothing	0.55	-3.56	0.54	-3.07	4.36	-2.63	14.41	-1.32
2010 Proposed development	0.55	-3.44	0.54	-3.05	4.63	+3.57	14.48	-0.81
2010 Do Nothing	0.56	-2.23	0.54	-1.86	4.07	-9.14	14.25	-2.37
2010 Proposed development	0.56	-2.12	0.54	-1.85	4.22	-5.78	14.28	-2.17
Standard	10 Note 4		5 *Note 1*		40 *Note 2*		40 *note 3*	

Note 1 S I No. 271 of 2002 Annual Limit value for Benzene of 5ug/m^3

Note 2 S I No. 271 of 2002 Annual Limit value for NO_2 of 40ug/m^3

Note 3 S I No. 271 of 2002 Annual Limit value for PM_{10} of 40ug/m^3

Note 4 S I No 271 of 2002 Annual Limit value for CO of 10mg/m^3

Table 3.6.9 indicates that predicted levels of PM_{10}, benzene, NO_2 and CO at the dwelling house (the chosen sensitive receptor) are, at present well below the limit values. Examination of the predicted levels for 2010 with development, indicate a minor increase in NO_2 levels, but this is still not significant in comparison to the limit value. No increase is predicted for the other examined parameters. There is no significant increase predicted for 2025. Overall, there is little impact predicted at the sensitive receptor for these parameters.

Biomass Gasification Plant

It is proposed as part of the development to include a Biomass Gasification Plant within the facility boundary. At present the facility already operates a wood chip boiler which is supplied by the timber shredding process that takes place at the facility. This wood chip boiler generates a maximum of 26kW and supplies heated water to the on site showers and heating requirements for the site offices. The biomass unit will supply power to the composting process at the facility and potentially export energy when in full use. The composting process

requires a significant amount of energy for the operation of the air blowers which maintain the aerobic conditions within the enclosed concrete bunkers. The unit will be supplied by feed stock from the facility which will include wood chip, paper and cardboard. The proposed energy output of the unit will be 500kw to 1MW. The unit will be located in the south eastern corner of the facility. The unit will operate for a maximum of 7,700 hours per year.

The gasification unit will use a biomass fuel such as wood chip, paper or cardboard. Operation of the unit may have the potential to result in incomplete combustion products being emitted into the surrounding atmosphere. These products will arise from the operation of the gas engine which combusts the gas produced by the gasification unit. Typical incomplete combustion products emitted from these types of boilers would include Nitrogen Dioxide, Carbon Monoxide, and Non Methane Hydrocarbons (NMHC). It is proposed that the emissions from the gas engines are ducted into a 13m high stack. The location and physical characteristics of the emission stack and the maintenance of the gas engines will be carried out in such a manner as to ensure any potential emissions from the stack will not result in any exceedence of appropriate air quality standards or result in a significant impact on the ambient air quality of the surrounding environment.

Existing Diesel Generator

The existing generator operates a maximum of 44 hours per week. The generator capacity is 500Kw with a 500KVA rating. Diesel is supplied to the unit from the existing on site bunded diesel tank. This generator will become a back up system to the proposed Biomass Gasification plant. Therefore, this system will not significant contribute to the overall emissions from the site once the proposed development has been completed.

Odour

Based on the proposed development description, the main proposed activity that has the potential to generate significant odours is the operation of the bio stabilisation the facility. Odours may arise from the handling and tipping of feed stock, blending and shredding of feed stock, storage of feed stock, the composting process itself, movement of compost from the indoor tunnels to the curing area, the curing compost itself and screening of the mature compost.

Of these, the most significant sources are the processes involving the feedstock and the main composting process itself. Once the compost has matured for 10 to 14 days within the fully enclosed concrete tunnels, then the odour potential of the compost is significantly reduced. Nevertheless all of the processes mentioned above will be carried out within an enclosed building. Air from both the, tipping area, fully enclosed tunnels and curing areas will be

collected and ducted through a wet scrubber followed by a biofilter. This will remove between 95-99% of the odour generated during the process. As part of the management of the biostabilisation process an odour management plant has been complied. The management plan (Attachment 9. Bio stabilisation Plant Odour Management Plan CIR20-131) outlines a number of operational conditions that will be enforced to minimise the production of odour. These conditions·include:

- Rejection of overly odorous feed stock loads
- Maintenance of the appropriate Carbon/Nitrogen ratio of feedstock blends to prevent ammonia formation
- Strict maintenance of aerobic conditions at all times within the compost mass
- Adherence to a closed door policy to prevent the escape of any fugitive emission from the process buildings
- Maintain the negative pressure conditions within the reception (tipping) and curing areas to prevent escape of odours to the environment
- Collect any leachate produced and re-use in blending of new batches of compost
- Maintain a clean site and prevent and occurrence of standing water

Bio-aerosols

The impact of the handling and production of compost is a microbiological one. This would occur during the process when the compost particles are emitted into the air during blending, turning and screening.

The potential impact on humans is low from mature compost when adequate temperatures, moisture levels and exposure times were maintained during the composting process. The heat generated during the composting process destroys a significant number of pathogens present in the raw material and also turns the compost into an unsuitable substrate for some pathogens due to the loss of moisture, reduction of nutrients and the presence of other competing micro- organisms.

A number of different types of pathogens may develop during the composting process. These include the fungus *Aspergillus Fumigatus.* This particular pathogen may be responsible for allergies, asthma and respiratory infections. Risks not only arise from living organisms but also from spore and endotoxins of bacterial origin.

All of the aspects of the composting process that may produce bio-aerosols such as raw material handling, tipping, the composting process itself, compost turning, compost movement to the curing bunkers, turning of maturing composting and screening are all carried out within the dedicated composting building. The air from these buildings is captured and treated to reduce odours. This treatment process will also significantly reduce any bio-aerosols produced. Any bio-aerosols produced will have to pass through the wet scrubber followed by the biofilter. The high moisture levels in both of these units will significantly reduce the levels of this parameter reaching the ambient air environment.

Based on the proposed air capture and treatment, it is contended that the bio-aerosol emission from the composting process will not significantly increase the background bio-aerosol levels at the boundary.

3.6.4 Mitigation Measures

3.6.4.1 Construction phase

Dust Deposition

Dust minimisation measures will be implemented during the construction phase of the project in order to reduce the potential for the migration of dust from the site and from the construction traffic using public roads. This will involve the following good site practices:

- The use of site speed limits to prevent the unnecessary generation of fugitive dust emissions
- Lorries/trucks will be properly enclosed or covered during transportation of friable construction materials to prevent the escape of materials along public highways.
- The use of the water bowser on the internal roads and surfaces during periods of dry weather.
- Stabilisation of the berm on the southern and northern boundaries as soon as construction is completed in that area.

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.

3.6.4.2 Operation Phase of the Proposed Development (Expansion of Existing Waste Transfer Station))

Dust Deposition

As part of the operation phase the following practices will continue to be incorporated to ensure dust generation is kept to a minimum:

- The internal haul roads will be kept damp during periods of dry weather.
- Installation of a Wheel wash to prevent material coming on site and being taken off site
- All loaders and haul trucks will be kept clean.
- Maintenance of internal site roads in a clean condition
- A <15 kmph speed limit will be enforced to minimise the generation of airborne dust
- The screening berms at the southern end of the site will be vegetated in order to reduce dust generation and migration and existing berms will be maintained and vegetation replaced where required.
- The TA Luft and Draft EPA guideline of 350 mg/m^2/day over a 30 day period (Bergerhoff method) at the site boundary will be used as a limit value (TA Luft 1986, EPA, November 2006).
- Strict adherence to operational procedures and the effective implementation of best practices by the developer will ensure that dust levels are kept to a minimum.

Incomplete combustion products

Traffic Pollutants

The predicted benzene, CO, PM_{10} and NO_2 concentrations for the development will have little effect on the nearest sensitive receptors. The following measures will aid in reducing emissions at source:

- Regular maintenance of vehicles
- The idling and revving of engines will be limited.

Biomass Gasification Plant

The operation of this plant will be in line with BAT requirements. The plant itself will be a new previously unused piece of equipment that will operate to the highest technical specifications. The raw material feed stock for the operation of this unit will only consist of wood chip, paper and cardboard and will therefore not come in under the requirements of the Waste Incineration Directive. As the plant will be new, it will comply with the BAT emission requirements for this type of gasification process. Therefore, the potential impact of this unit will be minimal.

It is proposed that following commissioning that emission testing be carried to determine the emission levels from the operation of the unit under a typical feed stock mix. It is a positive environmental impact that products from the facility are used to generate energy that is inputted into the composting process. This will reduce the environmental impact of the proposed composting process, result in a significant reduction in the use of fossil fuels, reduce the number of deliveries of diesel fuel to the site and hence the possible carbon foot print of the facility.

Odour

The primary sources of potential odour emissions will the operation of the composting facility. Both the composting process and handling of feedstock have the potential to produce significant amounts of odour. The type of composting process proposed is ideally suited to minimise the creation of odorous substances. It is proposed that all activities take place within a sealed building which will prevent the uncontrolled

emission of odour from the process. All feedstock materials will be received within an enclosed tipping area. Once blended, the feedstock material will be loaded into fully enclosed concrete tunnels and composting will take place over a period of 10 to 14 days. Following this period the material is then removed into another fully enclosed building for curing over a period of 6 to 8 weeks. All process and building air will be captured and treated to eliminate any odours from the activity. Attachment 9 outlines the proposed process and proposed odour removal infrastructure and stipulates a 95-99% odour removal efficiency.

A number of mitigation measures are proposed to ensure that the production of odour at the facility is minimised. These include the following:

- Highly odorous waste would not be accepted at the facility
- Putrecisble wastes will be mixed and placed in the bunkers within 24 hours
- A cleaning programme will be derived to ensure that no build up of material occurs in the feedstock bunkers, tipping floor and mixing building
- Strict adherence to the stipulated mixing ratios should be adhered to, to prevent blends containing high levels of nitrogen, moisture or a lack of porosity.
- Maintenance of aerobic conditions at all stages of the process to minimise the formation of malodours
- All activities that have a high potential for odour generation such as feedstock blending, tunnel loading/unloading, composting, curing, turning of curing piles and screening will be carried out within the proposed building or enclosed composting system to ensure capture and treatment of any odours produced.

Adhering to the above recommendations and operating the composting facility in accordance with the process description will ensure that the levels of odour produced from the process will be minimised and that the resulting odours will be adequate treated to ensure that no significant impact will occur at the nearest sensitive receptor.

Bio-aerosols

The specific operations of the composting process that have the potential to produce significant levels of Bio-aerosols have been identified. As all of these operations will be contained within the composting building, the potential for impact on the surrounding

environment will be significantly reduced. Further reduction of the potential impact of this parameter on the surrounding environment will be made when the air within the building is captured and passed through a wet scrubber and finally a biofilter before it is emitted to ambient air. A study carried out in 1999 compared an enclosed composting plant with biofilters with a partly open plant. This study demonstrated that the operation of the enclosed plant resulted in down wind (50m) bio -aerosols concentrations that were only 5% of the recorded downwind bio -aerosols concentrations from the partly open plant. *(Schilling B, Heller D, Graulich Y, Gottlich E. Determining the emission of microorganisms from biofilters and emission concentrations at the site of composting areas. Schriftenr Ver Wasser Boden Lufthyg. 1999, 104:685-70)*

Full enclosure of the composting process will ensure that the emission of bio-aerosols to the surrounding environment will be minimised and that the levels of this parameter will not have a significant impact on the surrounding environment.

3.7 NOISE AND VIBRATION

3.7.1 INTRODUCTION

A survey of baseline noise levels at the site of the waste transfer station of Clean (Irl) Refuse & Recycling Ltd. has been conducted during 2007 and 2008 by Bord na Móna Technical Services, to determine current noise levels at the site perimeters and at noise sensitive locations situated close to the facility. The facility currently operates from 7.30a.m. to approximately 7.30p.m. Monday to Friday and 7.30 a.m. to 1p.m. on Saturday, depending on business demand. It is proposed to introduce new operational hours as follows:

Proposed hours of operation:

7a.m. to 10p.m. Monday to Friday
7a.m. to 2p.m. Saturday

Proposed hours of waste acceptance/handling:

8a.m. to 8p.m. Monday to Friday
8a.m. to 1p.m. Saturday

Proposed hours of any construction and development works at the facility and timeframes:

9a.m. to 6p.m. Monday to Friday
9a.m. to 1p.m. Saturday

On three occasions, day-time and night-time acoustic assessments were conducted (9th October 2007, 6th March 2008 and 13th November 2008) at six strategic locations (N1-N6) to assess any potential impacts from activities from the site. The facility has been monitoring noise biannually under the existing Waste Permit 002/07/WPT/CL (granted on the 25th June 2007) in accordance with Condition 5.9 and Annex 2 (b). The Waste Permit states that:

> *'Activities on site shall not give rise to noise levels off-site, at noise sensitive locations, which exceed the following sound pressure limits daytime 55dB(A) and night-time 45dB(A)'.*

The noise sampling locations are given in Table 3.7.1 and shown in the existing monitoring locations Drawing C(IRL)WL-06 Drawing in Attachment 3.

3.7.2 BASELINE NOISE AND VIBRATION ASSESSMENT

Noise Assessment:

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

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 Integrated Pollution Control Licensing Guidance Note for Noise in Relation to Scheduled Activities.* Daytime noise is defined as 0800 hrs to 2200 hrs and Night-time noise relates to 2200 hrs to 0800 hours.

Tonal and Impulsive Characteristics

For the purpose of this assessment, tonal noise is characterised in accordance with ISO 1996-2, which indicates that a noise source being tonal at a particular frequency is either clearly audible or exceeds the level of the adjacent bands by 5dB or more.

An impulsive noise is of short duration (typically less than one second), it is brief and abrupt, its startling effect causes greater annoyance than would be expected from a simple measurement of sound pressure level. For example an instantaneous bang/thud that may be associated with pile driving, hammering etc. At present current guidance (Environmental Protection Agency) recommends that *audible* impulsive noise at sensitive locations at night should be avoided, irrespective of the noise level.

Monitoring Locations

Table 3.7.1 overleaf presents the geographical description of the site boundaries and the nearest noise sensitive locations selected to determine the current site specific noise environment.

TABLE 3.7.1 : LOCATION OF NOISE MONITORING MEASUREMENTS			
Reference No. C(IRL)WL-06	**National Grid Reference**	**Location Type**	**Geographical location**
N1	166135E, 102775N	External	Clean (Irl) Car park at North of Facility
N2	166068E, 102748N	Boundary	South East Corner of Facility
N3	1658773E, 102679N	Boundary	South West Corner of Facility
N4	165867E, 102785N	Boundary	West of Facility Adjacent to Office Building
N5	166096E, 102696N	External	Noise Sensitive Location Occupied Dwelling West of Facility *Gated Entrance*
N6	166078E, 102665N	External	Noise Sensitive Location Occupied Dwelling West of Facility *Corner of House*

Monitoring Equipment

The following equipment was employed during the acoustic assessments, showing the most current calibration status:

Bruel & Kjaer Real-Time Noise Analyzer Type 2260 Observer with Sound Analysis Software BZ 7210:
Model No: 2260
Serial No: 2418359
Date of Calibration: 19 Feb 2008, next calibration due 19 Feb 2010
Certificate of Calibration Number: 19593

Bruel & Kjaer Real-Time Sound Level Calibrator
Model No. :4231
Calibrator Serial Number: 2415925
Date of Calibration: 14 Feb 2008, next calibration due 14 Feb 2009
Certificate of Calibration Number: 16902

Microphone Type: B&K 4189
Tripod

The current annual Certificate of Calibration is available for the noise meter from Bord na Móna Environmental Ltd., Technical Services upon request.

On Site Calibration

The instrument was calibrated immediately before and after the measurement periods with no drift in calibration level noted.

Site Information

All measurements during the three noise monitoring events were taken at 1.5 m height above local ground level and 1-2 m away from reflective surfaces. Daytime noise measurements were sampled for 30 minutes and Night-time noise measurements was sampled for a period of 15 minutes.

Noise Survey 9th & 10th October 2007

The weather on the days of the Noise Survey 9th & 10th October 2007 met the requirements for good monitoring conditions with the wind speed on both days less than 7m/s. The weather conditions on the afternoon of 9th October were very mild and dry, only a gentle breeze was observed (3.7m/s[5]). Night-time monitoring was conducted between the hour of 7a.m.-8a.m. on the 10th Oct, and the weather conditions were dry with visible morning dew across the landscape. A light breeze prevailed (2.7m/s[6]).

Noise Survey 6th and 7th March 2008 (subsequently 28th May 2008)

The Noise Survey 6th and 7th March 2008 included both daytime and night-time noise monitoring. It was necessary to conduct daytime monitoring over two separate monitoring dates (6th March 2008 and 28th May 2008) as weather conditions on the 6th March 2008 became increasingly windy and was impacting on the noise survey. It should be noted that Clare Co. Co. road works were taking place on the 6th March 2008. These operations included tarring of the road and compaction with a roller. All night-time noise monitoring was conducted between 7 a.m. and 8 a.m. on the 6th March 2008. The weather conditions on the days of the Noise Survey were as follows:

[5] Met Éireann Wind Data Shannon Airport 09/10/2007
[6] Met Éireann Wind Data Shannon Airport 10/10/2007

6th March 2008 night-time noise**:** Breezy, with gusts and occasional light shower. The three night-time locations N-6, N-5, N-2 were completed during the hour of 7a.m. to 8a.m. The wind speed was less than 7m/s.

6th March 2008 daytime noise: Very breezy, with frequent gusts and occasional light showers. It was possible to complete N-1 and N-3 however following these locations the wind speed increased to greater than 7m/s and the monitoring of further locations was discontinued. The weather conditions did not improve to resume the noise survey.

The Met Éireann Climate Data for Shannon airport on the 6th March 2008 was recorded at 7.7m/sec which concurs with the strong winds experienced in the latter part of the day. However, a wind vane used at the site in Cree showed the wind to be 6.1m/s at it's strongest when the survey was discontinued.

28th May 2008 day time noise: For those locations (N-2, N-4 & N-6) where it was not possible to conduct day time noise monitoring on the 6th March, the site was re-visited on 28th May 2008. The weather conditions on this day were dry and mild and the wind speed as recorded by Met Éireann Climate Data for Shannon airport was 2.16m/s.

Noise Survey 13th and 14th November 2008

The weather on the days of the Noise Survey 13th & 14th November 2008 met the requirements for good monitoring conditions, with the wind speed on both days less than 7m/s. A gentle breeze (4.6m/s) from a westerly direction was experienced on the afternoon of 13th with an average temperature of 11.4°C and calm periods through out the noise measurements with no rainfall recorded. Night-time monitoring was conducted between the hour of 7a.m.-8a.m. on the 14th November, and the weather conditions were dry and calm with a temperature of 11.4°C with westerly wind direction speeds of 3.2m/s at times.

Measurement Parameters

At each of the monitoring locations the following data parameters was 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.

L_{Max} Values

The maximum RMS, A-Weighted sound pressure level occurring within a specified time 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.

RESULTS OF THE BASELINE NOISE SURVEY:

Tables 3.7.2 to 3.7.8 below presents the results of the noise surveys undertaken across the monitoring locations as shown in Drawing C(IRL)WL-06 in Attachment 3.

TABLE 3.7.2: DAY TIME NOISE MEASUREMENT RESULTS
Noise Survey 9th & 10th Oct 2007

Location No.	Measurement Period (min.)	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N1	30	15:30	48.5	49.8	36.6	78.4
N2	30	17.13	43.4	46.2	35.6	68.8
N3	30	08.03	39.7	42.2	34.2	61.6
N4	30	18.34	59.6	49.4	34.8	96.3
N5 (NSL)	30	19.12	41.6	44.2	34.4	59.2

TABLE 3.7.3: NIGHT TIME NOISE MEASUREMENT RESULTS
Noise Survey 9th & 10th Oct 2007

Location No.	Measurement Period (Min.)	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N1	15	06.59	51.4	49	32.8	71
N3	15	07.45	40.1	42.0	33.6	68.1
N5(NSL)	15	07.16	54	50.4	38	82.4

TABLE 3.7.4: DAY TIME NOISE MEASUREMENT RESULTS
Noise Survey 06th & 07th March 2008, 28th May 2008

Location No.	Period (min.)	Date	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N1	30	6th March 08	08.27	52.6	53.2	45.8	84.3
N2	30	28th May 08	11.20	56.2	58.8	46.4	70.7
N3	30	6th March 08	09.50	52.9	51.8	40.4	88.8
N4	30	28th May 08	10.33	50.4	52.0	32.0	74.6
N6 NSL)	30	28th May 08	09.52	48.9	49.2	43.2	74.6

TABLE 3.7.5: NIGHT TIME NOISE MEASUREMENT RESULTS
Noise Survey 06th & 07th March 2008, 28th May 2008

Location No.	Period (Min.)	Date	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N6	15	6th March 08	06.59	45.4	45.8	40.2	66.4
N5*	15	6th March 08	07.16	51.3	49.9	41.6	76.8
N2	15	6th March 08	07.45	56.7	58.8	41.2	91.4

TABLE .3.7.7: DAY TIME NOISE MEASUREMENT RESULTS
Noise Survey 13th & 14th November 2008

Location No.	Measurement Period (min.)	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N1	30	16.24	48.5	51.0	39.1	76.3
N2	30	15.13	44.3	46.3	35.7	63.8
N3	30	14.39	42.7	45.1	32.8	66.4
N4	30	14.03	58.1	59.4	52.9	84.3
N6 (NSL)	30	15.48	50.6	52.9	46.9	68.3

TABLE 3.7.8: NIGHT TIME NOISE MEASUREMENT RESULTS
Noise Survey 13th & 14th November 2008

Location No.	Measurement Period (Min.)	Sampling Time	Leq dB(A)	L_{10} dB(A)	L_{90} dB(A)	LMax dB(A)
N1	15	07.00	46.7	49.7	37.9	69.6
N3	15	07.36	43.0	46.1	37.4	63.0
N6(NSL)	15	07.17	43.5	46.2	37.1	64.4

A graphical summary is provided for each noise monitoring location during daytime and night-time events over the three surveys in Figures 3.7.1 and 3.7.2 overleaf.

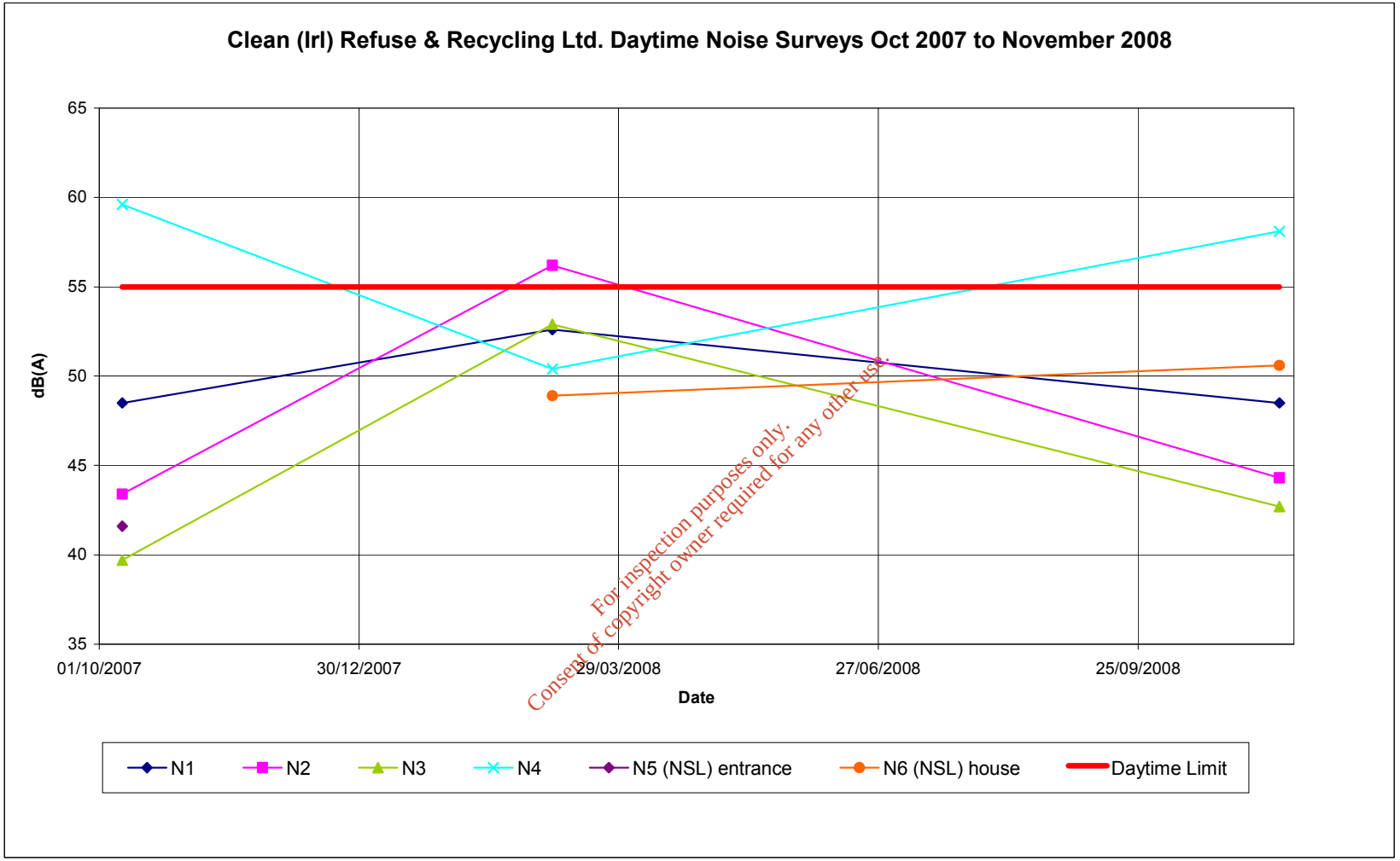

Figure 3.7.1 Daytime Noise at Noise Locations N1 to N6

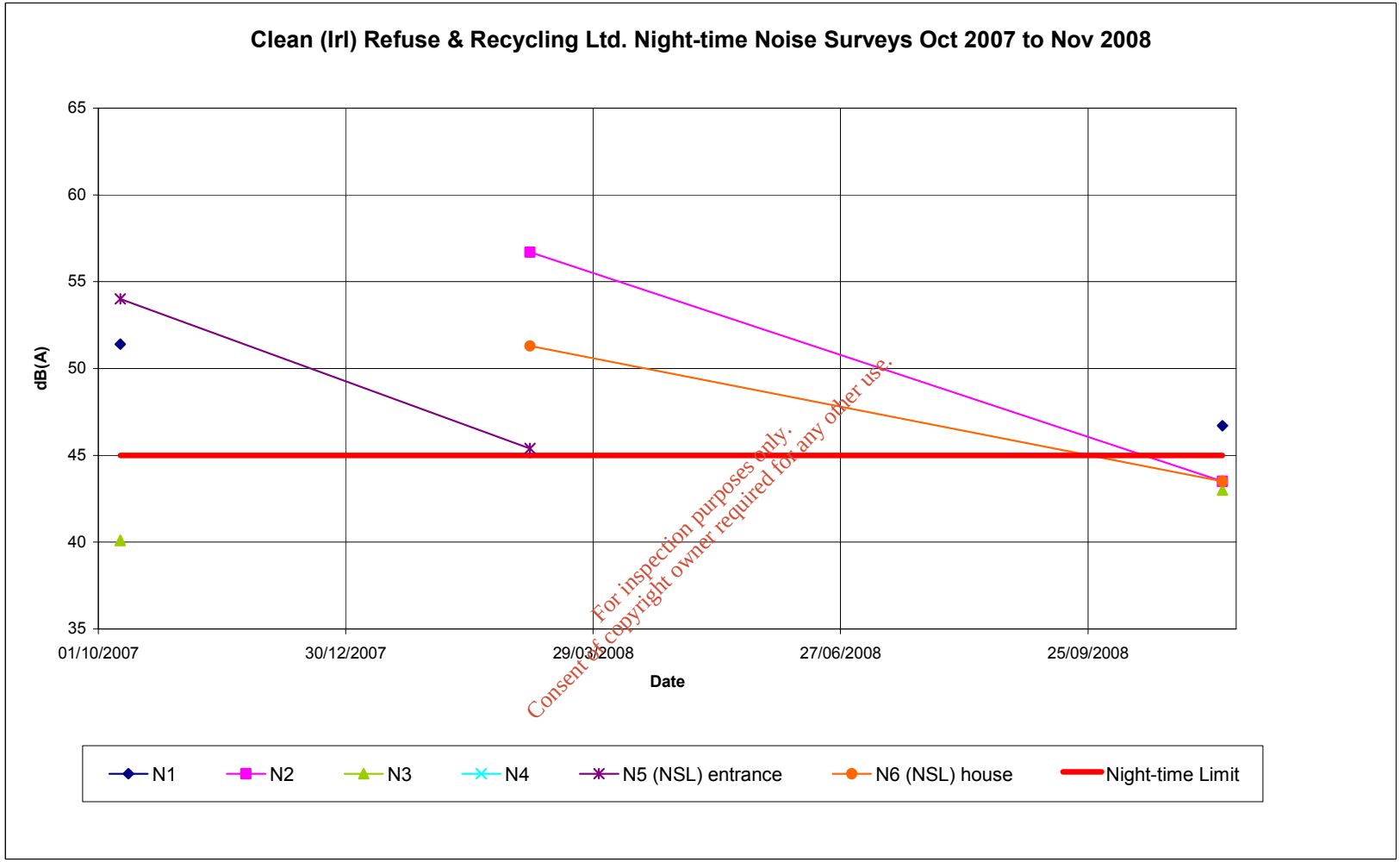

Figure 3.7.1 Daytime Noise at Noise Locations N1 to N6

Noise emissions from both the facility and extraneous sources have been included in this survey. The site at Cree is located in a very rural area, with little surrounding development. The land character is generally flat and the traffic volume on the road is generally low, most of which can be attributed to Clean (Irl) Refuse & Recycling Ltd. employee vehicles and waste collection trucks arriving and departing during normal operating hours.

The permit requires assessment of four Boundary Locations N1-N4 and this assessment has been met by the Noise Surveys. The locations chosen were the North, South East, South West, and West of the site to provide a representative indication of noise emissions coming from the site (Appendix 1 outlines the noise locations on site). A fifth location, which was external to the facility boundary, was previously identified as the noise sensitive location N-5 which was located at the gated entrance. However, the actual NSL dwelling is set back approximately 50 feet and a new location N-6 was monitored for noise emissions during the survey to investigate if there is any disturbance or nuisance caused at a location where there is human occupation. The NSL is located c.55m from the most western boundary to the corner of the house. From the centre of the processing buildings the NSL is located at a distance of c.125m from the centre of processing activities.

Considering that there have been three different noise monitoring events for the accumulation of data for this baseline survey, the survey carried out on 6th March 2008 (and subsequently on 28th May 2008) will be discussed in detail, as this survey identified areas of potential impact on noise sensitive receptors as most significant. This survey was also carried out on a working day where the Construction and Demolition Waste trommel was running at the facility. It can be seen from Figure 3.7.1 and Figure 3.7.2 for daytime and night-time noise that mitigation measure that have been put in place since the reporting of results in June 2008 and have been effective. The following provides a detailed interpretation of normal operation at the Clean (Irl) Refuse & Recycling facility Ltd. for the noise survey conducted in the first quarter of 2008.

Location N-1 (Day)Clean (Irl) Car Park (north)

This location was situated in the gravel car park (a private car park for Clean (Irl) employees only) which lies directly in front of the north facing main entrance of the facility. The car park has a hedgerow of approximately 3 feet high as the perimeter and is not sheltered by any trees or boundary walls. The front of the facility is gated with metal gates and there are no hedging or trees that would buffer any noise emissions from the site.

The weather conditions on the day was very breezy on 6th March, with the wind becoming stronger towards the end of the 30 minute monitoring period. The Leq dB(A) recorded during this monitoring period was 52.6 dB(A) which is an acceptable level of noise. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 53.2 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 45.8 dB(A). The Lmax dB(A) was 84.3 dB(A) and this can be attributed to the sound of a car doors banging in the car park during the monitoring period.

Dominant noises from within the facility included the ballistic separator and rolling fraction from within the processing sheds. Within the site yard, the tipping action of skips created noise, although this was intermittent and occurred only twice in the period. The movement of heavy plant at the front of the yard, banging of truck doors and voices were also evident.

External noises that were not created by activities at the site included several cars and vans that passed by the car park on the public road. Birdsong was heard throughout the monitoring period.

Location N-2 (Day) <u>South East Facility Boundary</u>

The location was situated at the south (rear) of the site on the east side. Large deposited earthen berms of soil across the back of the site have a buffering effect on noise created by operations at the site on the surrounding area.

The Leq dB(A) during this monitoring period was 56.2 dB(A) which outside the required 55 dB(A) as stipulated in the waste permit. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 58.8 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 46.4 dB(A). The Lmax dB(A) was 70.7 dB(A).

The C&D trommel was in full operation for the 30 minute noise monitoring period. The operation of the trommel involves:

1) Plant manoeuvring between the C&D waste storage area to transfer the C&D waste onto the conveyor belt using arm/claw action,
2) Conveyor belt feeding C&D waste into an enclosed cylindrical rotating compartment,
3) Separation of fines from a height to a fines storage area underneath the trommel and
4) C&D picking line to manually remove metals and non-hazardous contamination which are segregated to respective holding areas.

The difference between L_{10} dB(A) and the L_{90} dB(A) was 12.4 dB(A) which implies that there was an increase in noise against the background noise. However, for the most part of the time the L_{90} dB(A) was 46.4 dB(A) the activities did not give high enough noise emissions over 55 dB(A) to warrant the noise as a nuisance or disturbance.

Other noise emissions recorded from within the site during the survey included forklift movement, a water bowser and skip truck unloading skips at the rear of the site. The weather conditions on the day of 28th May 2008 were fine with a light breeze. The dominant noise was the sound of the trommel rotating with the C&D waste. Noises external to the site consisted mainly of birdsong.

Location N-3 (Day)South West Facility Boundary

The location was situated at the south (rear) of the site on the west side. There are even larger mounds (deposited, not natural formations) of soil across the back of the site on the south west of the facility than that of the south east side, which buffers noise created by operations on the site to the local area. The surrounding non-marsh land is mainly utilized for cattle grazing. The location was taken as close to the boundary as possible.

The Leq dB(A) during this monitoring period was 52.9 dB(A) which is an acceptable level of noise. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 51.8 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% was 40.4 dB(A) The Lmax dB(A) was 88.8 dB(A). It should be noted that the survey at this location on 06th March 2008 experienced very windy conditions; however the wind speed was not strong enough to cease monitoring.

In general this was a very quiet location, mainly due to the buffering effect of the soil banks. The wood chipper, JCB and trommel were not operational during this time. There was little vehicular movement apart from skip truck movement at the rear of the site and a forklift moving in the wheelie bin area in the southern section

of the site. External noises only included birdsong and the sound of the wind in the surrounding area.

Location N-4 (Day)West Boundary Adjacent to Office Building

The employee building lies on the west side of the site. The distance from the west face of the building to the boundary fence is approximately 2 meters. All access to the building is from the east face into main yard. The noise survey was conducted on 06th May however, the survey was corrupted by dogs constantly jumping and yelping at the fence which was directly beside the noise meter tripod through out the entire monitoring period and this was not representative of noise emissions from site activities. The survey at this location was repeated on 28th May when the weather conditions were more favourable and the survey was not impacted to such a degree.

The Leq dB(A) during this monitoring period was 50.4 dB(A) which is an acceptable level of noise at a NSL. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 52.0 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 32.0 dB(A). The Lmax dB(A) was 74.6 dB(A).

Voices could be heard from within the building. Activities external to the employee building comprised of truck movement past the northwest corner of the waste processing sheds. The ballistic separator did not appear to be running during the monitoring period. Several clangs on metals, vehicle doors banging, and vehicular reversing beeping sounds were observed. The dominant noises observed at this location were the passing of a forklift around the northwest side of the processing sheds. External noise included cars passing on the local road and birdsong.

Location N-6 (Day) Sensitive Receptor- Corner of Dwelling

This location was set up west at the corner of the occupied dwelling located approximately 50ft west of the facility north-western boundary. Levels above 55 dB(A) at the sensitive receptor would indicate if activities at the site generate noise emissions that could cause nuisance or disturbance.

The Leq dB(A) during this monitoring period was 48.9 dB(A) which is an acceptable level of noise at a NSL. The L_{10} dB(A) which is the level of sound

pressure for 10% of the time was 49.2 dB(A), and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 43.2 dB(A). The Lmax dB(A) was 74.6 dB(A).

Normal activities were underway at the Clean Ireland Refuse & Recycling Ltd. facility on the 28th May when weather conditions were mild with a light breeze. From within the site the ballistic separator, clangs on metal and skip tipping action could be heard in the distance. The dominant noise from the facility was the ballistic separator, however the dominant noise at this location was vehicles passing on the adjacent local road to the dwelling. Extraneous noise included birdsong and crows overhead.

Night-time Noise

Location N-2 (Night) South East Facility Boundary

The Leq dB(A) during this monitoring period was 56.7(A) which exceeds the limit set out in the waste permit of 45 dB(A) for an NSL. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 58.8 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 41.2 dB(A). The Lmax dB(A) was 91.4 dB(A).

This location was actually very quiet with respect to activities on the site. The weather had become very windy and almost definitely caused an increase in noise in the ambient environment. Light rain was experienced towards the latter of the 15 minute monitoring period. There were no activities recorded during this period from the surrounding site that would have given rise to the elevated noise level reading for this location. The dominant noise during this period was short intermittent bangs. Birdsong was evident throughout the period.

The L_{90} dB(A) is generally low at 41.2 dB(A) and well below the limit for NSL at 45 dB(A) for 90% of the time of the monitoring period.

Location N-5 (Night) Sensory Receptor- Dwelling Gated Entrance

This location was situated external to the facility boundary at the gated entrance to the NSL dwelling. It is approximately 50ft closer to the facility activities than NSL N-6. It should be noted that the wind picked moderately during this period.

The Leq dB(A) during this monitoring period was 51.3 dB(A) which exceeds the acceptable level of 45 dB(A) as stipulated in the Waste Permit. The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 49.9 dB(A) and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 41.6 dB(A). The Lmax dB(A) was 76.8 dB(A).
The sound of the rolling fraction was observed and a skip truck passed on the western side of the yard to the rear of the facility. Beeping sounds were observed on three occasions and varied in duration from 10-16 seconds.

Most of noise observed was associated with vehicular movement external to the facility, with employees arriving for work to the car park or passing on the local road in a western direction past the monitoring location. On one occasion the occupier of the NSL drove directly past the noise meter tripod.

The dominant sound during this period was the beeping in conjunction with external traffic with in close proximity of N-5. The L_{90} dB(A) is generally low at 41.6 dB(A) and well below the limit for NSL at 45 dB(A) for 90% of the time of the monitoring period.

Location N-6 (Night) **Sensory Receptor- Corner of Dwelling**

The Leq dB(A) during this monitoring period was 45.4 dB(A) which is marginally outside the limit of 45 dB(A). The L_{10} dB(A) which is the level of sound pressure for 10% of the time was 45.8 dB(A), and the L_{90} dB(A) which is the level of sound pressure for 90% of the time was 40.2 dB(A). The Lmax dB(A) was 66.4 dB(A).

Prior to 7a.m. there was no activity on the site. It was observed that waste processing equipment was started up during this 15 minute period and the rolling fraction was operating. However, the door was closed on the west facing section of the processing sheds. Noise was created from cars arriving to the employee car park, and cars and a waste truck travelling west on the local road adjacent to the dwelling. The dominant noise during this period was an idling truck at the front of the facility and the rolling fraction from the processing sheds. The L_{90} dB(A) is generally low at 40.2 dB(A) and well below the limit for NSL at 45 dB(A). External noise included birdsong.

Tonal Assessment

A tonal noise is an impulsive noise is one of short duration (typically less than one second). Data was downloaded from the noise meter and assessed for tonal noises. A noise source being tonal at a particular frequency is either clearly audible or exceeds the level of the adjacent bands by 5dB or more. This tonal assessment indicates that none of the site noises measured during this assessment had a tonal element that could cause disturbance and nuisance to sensory receptors.

Vibration Sources

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

3.7.3 Environmental Impacts

As the development constitutes a continuation of the existing waste transfer activities and the creation of new infrastructure, there will be noise generation associated both with the operational and construction phases for the expansion of the facility. The noise detected during this noise survey is representative of the existing and ongoing noise environment at the site.

The nearest noise sensitive location is located (NSL6) is located c.55m from the most western boundary to the corner of the private dwelling. From the centre of the processing buildings, the NSL is located at a distance of c.125m from the centre of processing activities.

Operational Phase

Noise generated on site will be associated with the equipment and plant to carry out the activities. A full listing of existing equipment is also included in Attachment 5 'Lists'. A breakdown of the principal equipment/activity that may potentially create a nuisance is given in table 3.7.9 overleaf.

Table 3.7.9 Noise Generation in relation to Activity	
Activity	**Associated Potential Noise Generation**
(i) Dry recyclable processing:	(i) Ballistic Separator
(ii) Wet waste processing:	(ii) Tipping of Waste
(iii) Baling of material:	(iii) Baler
(iv) Dropdown skip processing:	(iv) Skip contact with surface
(v) Timber shredding:	(v) Timber shredder
(vi) C&D Waste:	(vi) Trommel
(vii) Biostabilisation Plant:	(vii) Shredders, front end loaders
(viii) End of Life Vehicle unit:	(viii) HGV delivery, Baling of scrap metal
(ix) Wheelie bin/truck wash:	(ix) Insignificant
(x) Wheel wash:	(x) Insignificant
(xi) Biomass recovery plant:	(xi) Engine
(xii) Skip storage area:	(xii) Transfer of skips
(xiii) General waste handling:	(xiii) Forklifts, plant, waste vehicles
(xiv) Employees:	(xiv) Private vehicles

The main noise sources at the facility include operation of the aforementioned equipment. The item of plant that was primarily identified during as a source of noise during the noise survey was the ballistic separator during night-time noise monitoring before 8.am. Vehicles movements into and out of the facility along the local road are also be a source of noise however, vehicles movements are staggered throughout the day serving to minimise the impact on the nearest sensitive receptors.

As there is a significant amount of development proposed for the site, Table 3.7.10 outlines the construction works which may give rise to noise emissions associated with the proposed upgrade. Construction works will take place over approximately fivephases, as the site will continue to be operational through out thus limiting the amount of construction that may take place at one given time. All construction works will be carefully planned and staggered over time to avoid generating excessive construction noise that may cause a nuisance to noise sensitive receptors.

Table 3.7.10 Noise Generation in relation to Activity	
Activity	**Potential Noise Impact**
(i) Stripping of field and overlaying with hardcore	(i) Minimal Digger noise and hardcore delivery and compaction
(ii) Construction of earthen berms skip storage area	(ii) Minimal Digger noise
(iii) Hardstanding Phase 1 of skip storage area	(iii) Concrete delivery truck
(iv) Construction of extensions to processing buildings	(iv) Crane, HGVs, assembly
(v) Construction of glass bunkers	(v) Small structure assembly
(vi) End of Life Vehicle Unit	(vi) Concrete trucks, materials delivery
(vii) Installation of wheel/truck/bin wash and leachate holding tank	(vii) HGV delivery of leachate tank,
(viii) Excavation to accommodate installation of underground leachate holding tanks	(viii) Diggers, possible rockbreaker
(ix) Construction of Biostabilisation Plant and Biofilter	(ix) Concrete trucks, materials delivery (HGV)
(x) Construction of Biomass Recovery Plant	(x) Concrete trucks, materials and equipment delivery (HGV)
(xi) Hardstanding Phase 2 of skip storage area	(xi) Concrete trucks
(xii) Ongoing hardstanding of the hardcore areas	(xii) Concrete trucks

3.7.4 MITIGATION MEASURES

Noise levels detected during these noise surveys were within the EPA guideline limits for the majority of the time, with the exception of N4 and N2. N2 is generally not impacted by noise emanating from the site and on this occasion the monitoring was impacted by weather conditions. N4 which is adjacent to the employee services area is a hive of activity and the closet boundary to processing activities and the road within the site. As the proposed development constitutes an existing development, it is not anticipated that noise levels will increase particularly with the introduction of the Bio stabilisation Plant.. However, 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 including excessive revving of engines
- 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 vibration
- Cladding of trommel if required
- Movement of plant from C&D waste storage area and feeding into conveyor belt will be enclosed
- Timber shredding process including timber shredder will be fully enclosed
- All processing building are equipped with roller doors and will remain closed as much as practicable
- Skip drop down will be indoors, reducing noise
- Presence of Bio stabilisation Plant act as buffer for noise at south-end of the site
- Maintenance and creation of landscaped earthen berms
- Alter existing operational hours from 7.30a.m. to 8.00 a.m.
- Construction works carried out over 5 phases and all construction works will be carefully planned and staggered over time. Construction will take place during normal working hours and normal construction noise management practice will be put in place
- Traffic and deliveries (construction) will be intermittent and staggered
- The Engine associated with the Biomass Recovery Plant will be have noise·reducers·in·line·with·best·available·technology·

- Utilise the historical data available for the site to identify potential areas of noise generation (No noise complaints record since operation in 1984)

- Bio stabilisation Plant operation:

    - All processing equipment, including shredders, mixers, front-end loaders and screens will be operated within enclosed buildings during defined working hours each day, thus reducing any noise from these sources.

    - All rolling stock, including front-end loaders, tractors and roll-off lorries and transfer vehicles operating outdoors are equipped with properly functioning mufflers to suppress noise. These will be replaced when needed to control noise from the operation of this equipment.

    - All other equipment on site, including the mixer, screen, conveyor belts and blowers for the tunnels and aerated static pile curing system are equipped with quiet electric motors.

    - All electrical blowers for the tunnels and aerated static pile systems will be housed in the tipping building or curing building to further reduce noise from this source.

    - Noise from the bio-stabilisation site should not exceed noise levels of any other farm related or existing commercial activity currently taking place on the site or nearby farm. Also, all equipment, except for the blowers, will only be operated during normal business hours.

- Ongoing monitoring of noise emission from the site under the waste licence application. Drawing C(IRL)WL-25 shows propose noise monitoring locations in Attachment 3.

3.8 TRAFFIC

The Traffic Impact Assessment was carried out to examine the potential impacts on the existing road networks of the traffic generated as a result of the proposed upgrade at Clean (Ireland) Refuse & Recycling Ltd.

OVERVIEW OF ROAD NETWORK AND TRAFFIC VOLUMES

3.8.1 Existing Road Network – Baseline Survey

The proposed development is located in the town land of Ballinagun West, Cree, Co Clare. The location of the site and adjacent road networks are shown in Figure 3.8.1 overleaf and is also included as map C(IRL)WL-17 in Attachment 2. General access to the site can be achieved *via* two possible country roadways. Clean (Ireland) Refuse & Recycling Ltd. employee vehicles can access the main site and employee car park from a westerly or easterly direction. From the Kilrush to Quilty road, the R483, the site is accessed *via* the L-6108, approximately 800m west of this junction on approach to Cree village. The site can alternatively be accessed through the site entrance from west of the facility using either the local road that connects with Doonbeg to the north; or the local roads that connect with Cooraclare to the south. Waste vehicles may access Clean (Ireland) Refuse and Recycling from an easterly direction only, using the R483 Kilrush to Quilty regional road and the L-6108.

Existing access into the site is through a gated entrance at the north of the site *via* the weighbridge only. The location of the main entrance to the facility will not be altered under the proposed upgrade of the facility. It is envisaged that the proposed skip storage area at the north of the site will be accessed though the existing car park. The design of the existing site access ensures that vehicles entering the site do not impede the traffic flow on the public road.

Within the vicinity of the development, the R483 is a single two-lane carriageway road having the approximate width of 7m, with good quality road alignment, surfacing and structure. The local access road, the L-6108, is approximately 4m wide, with wider areas (7-8m wide) in seven locations along this 850m stretch of road due to a road upgrade ofthe existing road by Clean (Irl) Refuse & Recycling Ltd under an agreement with the Roads Section of Clare Co.Co. The current sight lines from the L-6108 onto the R483 are greater than 300m to the north and 200m to the south to facilitate safe access and egress from the local road onto the regional road.

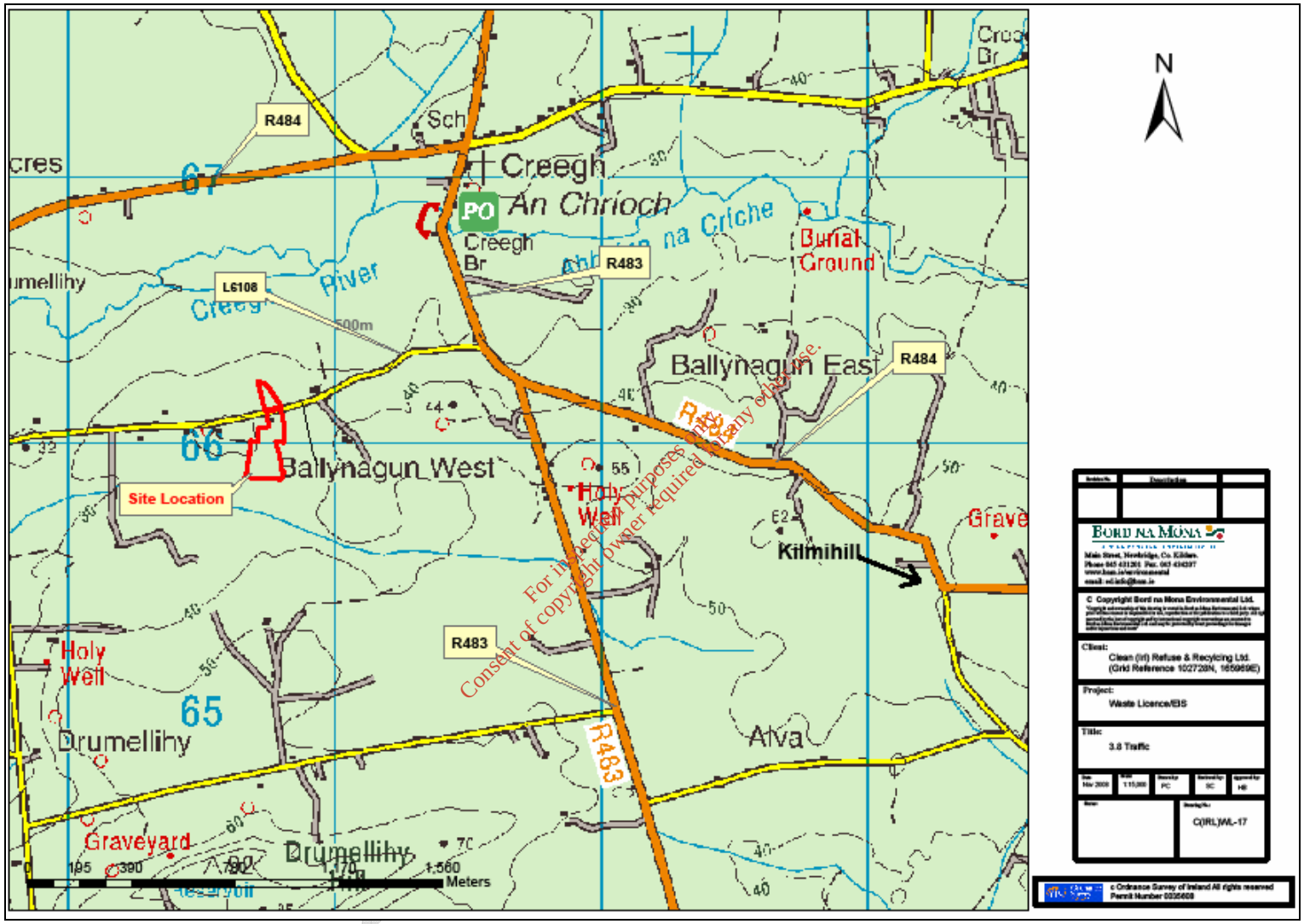

Figure 3.8.1 Site location and local road network (NTS)

3.8.2 Traffic Volumes

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 on (1) the junction between the L-6108 and the R483 road and (2) on the junction between the R483 and the R484 road on the 6th and 11th of November 2008. This latter junction is known as the Kilmihil junction. Figure 3.8.2 overleaf shows the directional flow of traffic at both junctions surveys and is also included as map C(IRL)WL-18 in Attachment 2.

Methodology

Traffic counts were carried out on Thursday the 6th November 2008 from 5:00pm to 7:00pm and on Tuesday the 11th November 2008 from 8:00am to 10:00am. These periods present peak traffic periods in the area for a typical weekday. The count was carried out on the junction (as shown in Plate 3.8.1) between the L-6108 and the R483 roads (Clean (Irl) Refuse & Recycling Ltd. junction) and on the junction between the R483 and the R484 roads (Kilmihill junction) (as shown in Plate 3.8.2)

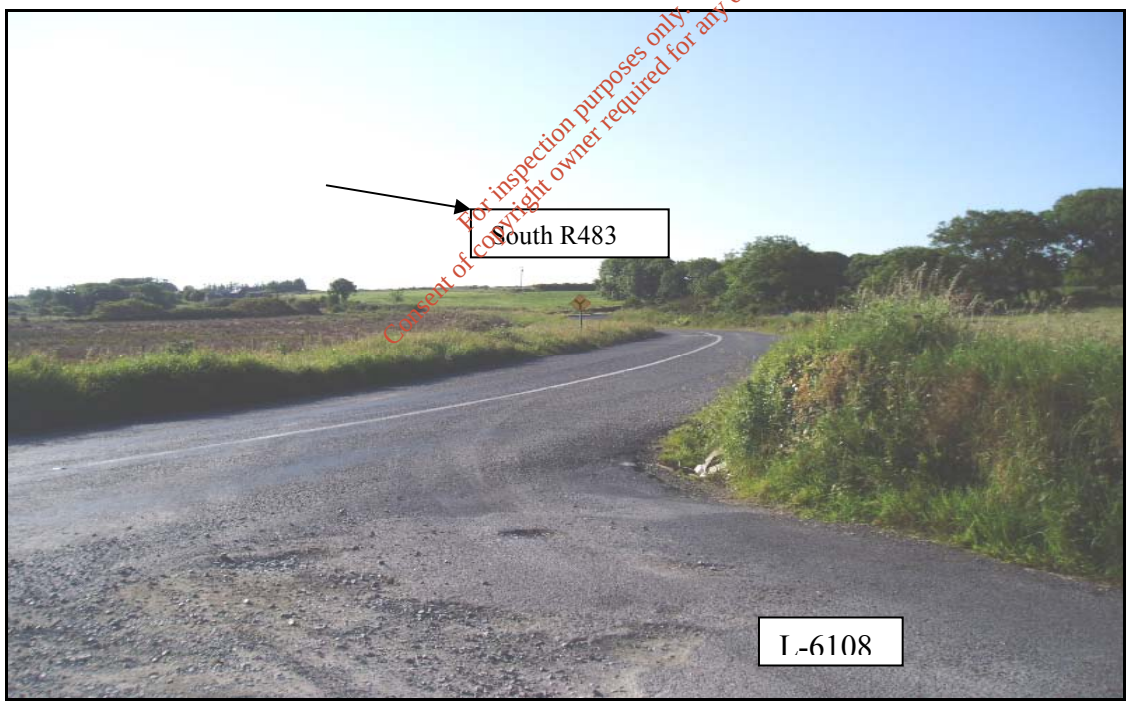

Plate 3.8.1 L-6108 junctions with R484

Plate 3.8.2 R483/R484 Kilmihill Junction

The count was undertaken as follows:

Clean (Irl) R & R Ltd. Junction	Kilmihill Junction
1. R483 travelling north to south 2. R483 travelling south to north 3. Exiting the L-6108 travelling north along R483 4. Exiting the L-6108 travelling south along R483 5. Exiting the R483 (north) turning right onto L-6108 6. Exiting the R483 (south) turning left onto L-6108	1. R483 travelling south to north 2. R483 travelling north to south 3. Exiting the R184 travelling south along R483 4. Exiting the R184 travelling north along R483 5. Exiting the R483 (south) turning right onto R484 6. Exiting the R483 (north) turning left onto R484

A detailed breakdown of the traffic survey conducted at both junctions is presented in Tables 3.8.1 to 3.8.4. In order to fully access road carrying capacity, the traffic count is converted to Passenger Car Units, PCUs. One Heavy Commercial Vehicle (HCV), which is comprised of articulated and rigid trucks, buses, tractors and vehicles pulling trailers, is equal to 2.5 PCUs.

[National Roads Authority 2008: N22 Tralee Bypass/Tralee to Bealagrellagh traffic modelling report]

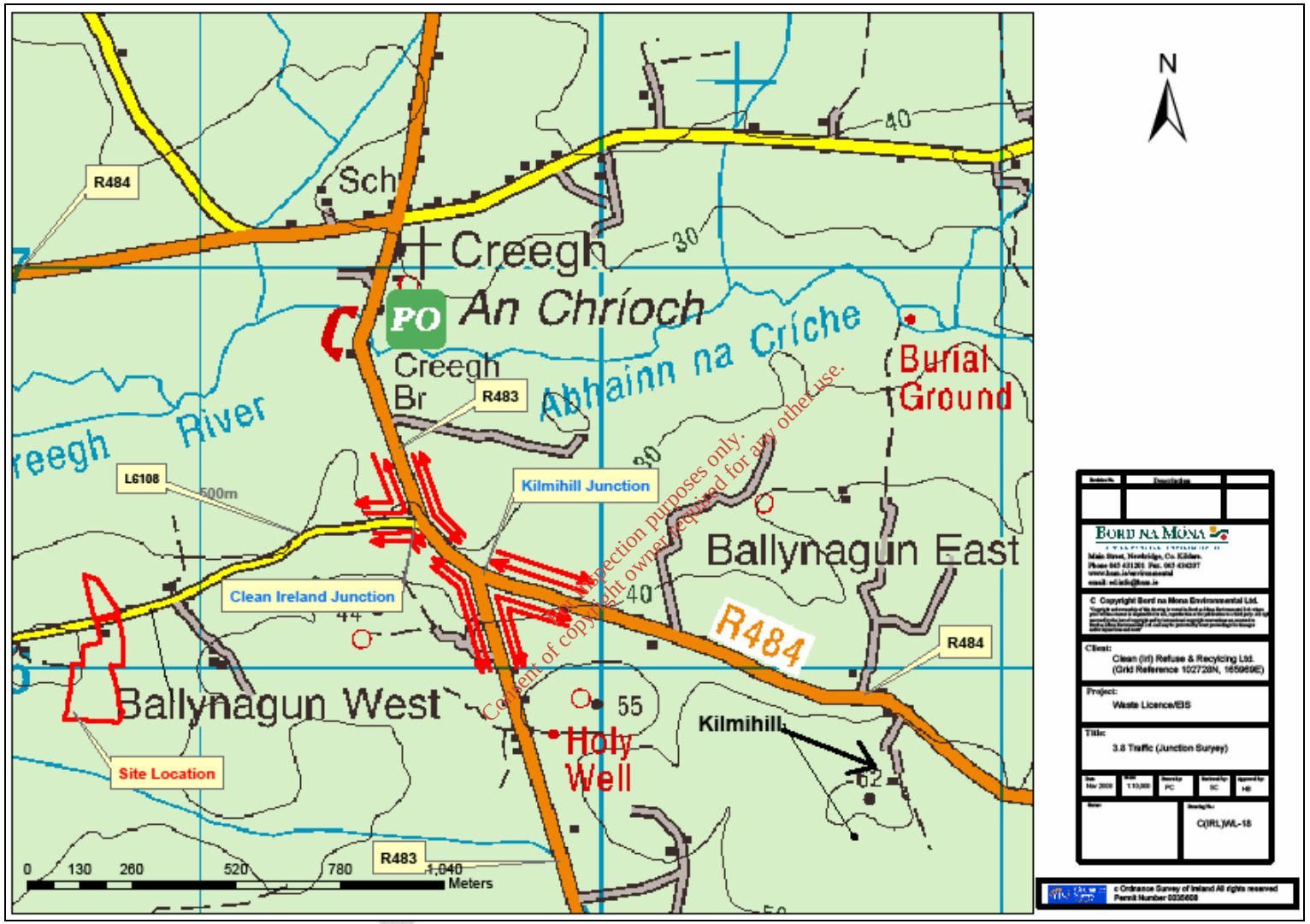

Figure 3.8.2 Junction Survey (NTS)

Table 3.8.1 Clean (Irl) Refuse & Recycling Ltd. Junction 11th November 2008							
Time of Count		8:00a.m.-10:00a.m.		**Location of Count**		L-6108 and R483 Junction	
		HCV					
Direction [1]	**Car**	**Truck**	**Bus**	**Tractor**	**Total Vehicles/hr**	**Total PCU/hr**	**%HCV**
1	188	5	1	2	98	104	4.1
2	109	7	1	0	59	65	6.8
3	10	1	0	0	6	6	9.1
4	6	3	0	0	5	7	33.3
5	11	0	0	0	6	6	0
6	9	0	0	0	5	5	0

Table 3.8.2 Clean (Irl) Refuse & Recycling Ltd. Junction 6th November 2008							
Time of Count		5:00p.m.-7:00p.m.		**Location of Count**		L-6108 and R483 Junction	
		HCV					
**Direction [1]] **	**Car**	**Truck**	**Bus**	**Tractor**	**Total Vehicles/hr**	**Total PCU/hr**	**%HCV**
1	147	1	0	0	74	75	0.68
2	213	7	0	1	111	117	3.6
3	9	1	0	0	5	6	10
4	27	1	0	0	14	15	3.6
5	6	0	0	0	3	3	0
6	11	2	0	0	7	8	15.4

Note [1] Denotes

1. R483 travelling north to south
2. R483 travelling south to north
3. Exiting the L-6108 travelling north along R483
4. Exiting the L-6108 travelling south along R483
5. Exiting the R483 (north) turning right onto L-6108
6. Exiting the R483 (south) turning left onto L-6108

Table 3.8.3 Kilmihill Junction							
Time of Count		8:00a.m.-10:00a.m.		**Location of Count**		R483 and R484 Junction	
		HCV					
Direction [1]	**Car**	**Truck**	**Bus**	**Tractor**	**Total Vehicles/hr**	**Total PCU/hr**	**%HCV**
1	60	5	1	0	33	38	9.1
2	126	3	1	1	66	69	3.8
3	3	0	0	0	2	2	0
4	60	2	0	0	31	33	3.2
5	8	0	0	0	4	4	0
6	65	4	0	1	35	39	7.1

Table 3.8.4 Kilmihill Junction							
Time of Count		5:00p.m.-7:00p.m.		**Location of Count**		R483 and R484 Junction	
		HCV					
Direction [1]	**Car**	**Truck**	**Bus**	**Tractor**	**Total Vehicles/hr**	**Total PCU/hr**	**%HCV**
1	150	4	0	1	78	81	3.2
2	102	1	0	0	52	52	0.97
3	4	0	0	1	3	3	20
4	81	7	0	0	44	49	8.0
5	8	0	0	0	4	4	0
6	66	3	0	0	35	37	4.3

3.8.3 Evaluating Traffic Movements

Clean (Irl) Refuse & Recycling Ltd. Junction

Traffic movements along L-6108

The results of the morning survey show that the total number of vehicular movements observed entering or exiting the L-6108 was 40 from the R483. This value equates to 46 PCU movements. During the morning period, the total number of vehicles entering the L-6108 was 20 cars. The total number of vehicles exiting the L-6108 that morning was 16 cars and 4 trucks. The results of the evening survey show that the total number of vehicular movements on the L-6108 was 57, which equates to 63 PCU movements. In the evening, 36 cars and 2 trucks exited the L-6108 and 17 cars and 2 trucks entered the L-6108. Since all trucks entering and exiting the Clean (Irl) Refuse & Recycling Ltd. facility must pass the Clean (Irl) Refuse & Recycling Ltd. junction, it can be assumed that the trucks counted on the L-6108 will include all trucks entering and exiting the facility. Based on the results of this survey, the peak hour ratio was 0.70, which classifies this road as a rural inter-town route. The direction of predominant traffic flow has also been determined from the survey. 55% of cars that entered the L-6108 during the morning period came from R483 (north). In the evening, 65% of cars entered the L-6108 *via* the R483 (south). No trucks entered the L-6108 in the morning. Two trucks entered the L-6108 in the evening, having travelled from the R484 (south). 63% of the cars that exit the L-6108 during the morning survey took the R483 (north) route. In the evening, 75% of cars turned onto the R483 (south). In the morning, 75% of trucks leaving the L-6108 took the R483 (south). There was an even number of trucks exiting the L-6108 travelling R483 north and south in the evening.

A separate survey carried out in April 2008 found that there were 135 HCV movements entering and exiting the Clean (Ireland) Refuse & Recycling Ltd. facility per week. This figure can be considered an upper limit value as the data was recorded during Clean Ireland's recycling week, and so extra movements from Clean Ireland's recycling trucks and transport company trucks would have elevated the result.

Traffic movements along R483

During the morning survey, there were 313 vehicular movements or 337 PCUs in both directions though the junction. This count is made up of 196 vehicular movements (or

208 PCUs) heading southbound and 117 vehicular movements (or 129 PCUs) heading northbound. During the evening survey, there were 368 vehicular movements or 371 PCUs in both directions though the junction. This count consisted of 148 vehicular movements (or 150 PCUs) heading southbound and 220 vehicular movements (or 231 PCUs) heading northbound. A modification of the peak hour ratio value was determined from these figures to be 0.85. This figure suggests that the R483 can be classified as a commuter route.

Kilmihill Junction

Traffic movements along R483

During the morning survey, there were 197 vehicular movements (or 214 PCUs) in both directions passing the junction. This count can be broken down into 131 vehicles (or 139 PCUs) travelling southbound and 66 vehicles (or 75 PCUs) travelling northbound. In the evening period, there were 258 vehicular movements (or 270 PCUs) in both directions passing through the junction. This can be broken down into 103 vehicular movements (or 105 PCUs) travelling southbound and 155 vehicular movements (or 165 PCUs) travelling northbound. A modification of the peak hour ratio value was determined from these figures to be 0.76. Traffic volumes decrease on the R483 from the Clean (Irl) Refuse & Recycling Ltd. junction to the Kilmihill junction as traffic is diverted to the R484 route. The R484 and the R483 both intersect the N68. The R483 intersects the N68 at Kilrush. The R484-N68 junction is located approximately 1.8km northeast of Kilrush and 22km west of Ennis.

Traffic movements along R484

During the morning survey, there were 143 vehicular movements (or 154 PCUs) entering and exiting the R484. These movements are comprised of 77 vehicular movements (or 83 PCUs) entering the R484 from the R483 and 66 vehicular movements (or 71 PCUs) exiting the R484 onto the R483. During the evening survey, there were 170 vehicular movements (or 198 PCUs) both entering and exiting the R484. These can be broken down into 77 vehicular movements (or 82 PCUs) entering the R484 from the R483 and 93 vehicular movements (or 105 PCUs) exiting the R484 onto the R483. A modification of the peak hour ratio value was determined from these figures to be 0.85, which classifies this route as a commuter route.

AADT Figure

The annual average daily traffic (AADT) value for the R483 has been estimated from expansion factors that have been calculated using the NRAs traffic counter data for the Ennistymon N67-8 route. The N67-8 is situated c.4km from the R483 road segment at Clean (Irl) Refuse & Recycling Ltd. junction. In addition, the N67-8 has similar dynamics to the R483, which allows the expansion factor obtained from one route to be used to estimate the ADDT figure for the other route. The expansion factor is obtained by dividing the AADT value for N67-8 for 2006 with the sum of the traffic volumes taken from the 6th November 2006 between 5:00pm to 7:00pm and from the 11th November 2006 between 8:00pm and 10:00pm. The value of the expansion factor becomes 4.7. It should be noted that 2006 data was used as more recent traffic count data for the N67-8 could not be obtained for the periods in question.

Taking the total traffic volume on the R483 at the Clean (Irl) Refuse & Recycling Ltd. junction for both the morning and afternoon traffic survey as 739, the AADT figure can be estimated from the expansion factor as 3473.

The AADT values calculated in this report are compared to AADT values obtained for traffic surveys carried out in 2001 and 2005. The data is summarised in Table 3.8.5 below.

Table 3.8.5 ADDT Values

Traffic Survey Year	Responsible	AADT
2001	NRA/Clare County Council	1,381-1,831 (1606)
2005	Bord na Mona	1,889-4,755 (3,323)
2008 (This survey)	Bord na Mona	3473

Based on the figures above, the growth rate between 2005 and 2008 for the R483 is 4.5%. This AADT is in line with the increase in traffic predicted by the NRA in their National Roads Needs Study which predicted an annual increase in traffic of 4% per annum from 2000-2005.

The results of the survey are shown on Tables 3.8.1 to 3.8.4.

3.8.4 Future Road Network – Environmental Impacts

Construction Phase

The site development works and construction sequence for the proposed development will, in general, comprise the following main steps. In turn such phases will generate construction traffic on a temporary basis:

- Stripping of field and overlaying with hardcore
- Construction of earthen berms skip storage area
- Hardstanding Phase 1 of skip storage area
- Construction of extensions to processing buildings
- Construction of glass bunkers and End of Life Vehicle Unit
- Installation of wheel/truck/bin wash and leachate holding tank
- Excavation to accommodate installation of underground leachate holding tanks
- Construction of Biostabilisation Plant and Biofilter
- Construction of Biomass Recovery Plant
- Hardstanding Phase 2 of skip storage area
- Ongoing hardstanding of the hardcore areas

Time of Year, Duration & Phasing of Operations

The development of the site will take place during the five years following granting planning permission.. A planning application to the local authority will be made subsequent of the completion of the EIS and submission of a Waste Licence Application. It is envisaged that, due to the different aspects of the development, construction will take place at the site during approximately five phases. The time of year that the construction phases will be carried out has not been decided however, all efforts will be made not to create a significant increase in traffic movements on the local road networks and avoid disturbance for local residents. Hours of work for all parts of the construction phase of the development will conform to the Health and Safety at Work Regulations. The haul routes of the construction materials will be defined by Clean (Irl) Refuse & Recycling Ltd. in agreement with the sub-contractors or suppliers.

Construction Techniques, Access and Traffic

The construction techniques will directly correlate with the type of traffic that will be required to complete the upgrade of the site. Several different types of construction vehicles will have to be brought on site. Processing Buildings to be constructed will be prefabricated in sections and will arrive by HGV (HGC) to site where they are assembled insitu using a crane which will also have to transported to the site. All floors within the buildings will be hardstanded over existing hardcore with concrete and designed such that gradients will direct the flow of any water into the leachate management system, hence quantities of concrete will have to be transported to the site. Other vehicles will include diggers and loaders as it will be necessary to cut back into the earthen berm at the south end of the site to make available area for the building of the Biostabilistation Plant. Several concrete loads will be required to lay down concrete to ensure the entire site is hardstanding for the protection of sensitive receptors. In general this traffic can be summarised as the following:

- HGV for transport of prefabricated frames
- Cranes and hoists
- Concrete trucks
- HGV or lorry for transport of tanks
- HGV for transport of Biostabilisation (invessel)

The Clean (Ireland) Refuse & Recycling Ltd. site can be accessed via two possible roadways as detailed above. However it is likely that the construction traffic will come from the contractors or builder providers in the east and will access the site either via the Kilrush to Cree Road R483 (on the L-6108), or from Ennis on the N68 via the Kilmihill Road (R484).

Any soil, hardcore or bedrock that will be excavated during the construction will be moved to other areas of the site perimeter to create berms for noise and visual impact mitigation measures. The number of workers and the number of HGV's accessing the site will vary throughout the construction period. It is anticipated that no more than 5 contractors will be present on site during the construction phase of the development.

Traffic levels associated with the proposed infrastructure upgrade will result in a significant but temporary impact to traffic in the locality. It is proposed that the delivery of structural and building materials will result in a potential increase of vehicular movements to the facility *via* the R484 and the L-6108 roadways. HGV's will arrive solely and infrequently during the 5 year period and as the facility will continue operating the extent to which construction will take place will be limited.

Operational Phase

Traffic Generation

The current number of Clean (Irl) Refuse & Recycling Ltd household customers is approximately 18,000. This customer base is spread across several counties as outlined in Chapter 3.1 Human Beings. Serviced areas include Co. Clare, C. Kerry, Co. Limerick, Co. Offaly and Limerick City. With the proposed development of the site the company aims to increase the customer base (household) to a number of 30,000. The existing collection routes will continue to be used, and extra routes may be added to the collection schedule depending on the need for the bin collection service in the area. Figure 3.8.3 overleaf shows the haul routes for the existing areas for which Clean (Irl) Refuse & Recycling Ltd. waste collection trucks. This map is also attached as C(IRL)WL-13 in Attachment 2. Figure 3.8.3 shows the cumulative routes i.e. all the typical routes taken over any given week. Figures 3.1.2 to 3.1.7 in Chapter 3.1 Human Beings show the haul routes on particular days of the week (Monday to Saturday) which illustrates that the traffic impact on the areas from the waste collection service is spread over 5.5 days.

The development of the site will result in a significant increase of tonnages processed at the facility from 21,000 tonnes to 64,600 tonnes per annum. This in turn will result in an increase in traffic movements generated by site activities. The volume of proposed waste types is summarised in the pie chart in figure 3.8.4 below. Also overleaf is Table 3.8.6 which shows a break down of the traffic movements that will be generated with the proposed expansion of the site. A comparison is also drawn with the existing movements to illustrate the projected increase in traffic movements associated with the facility.

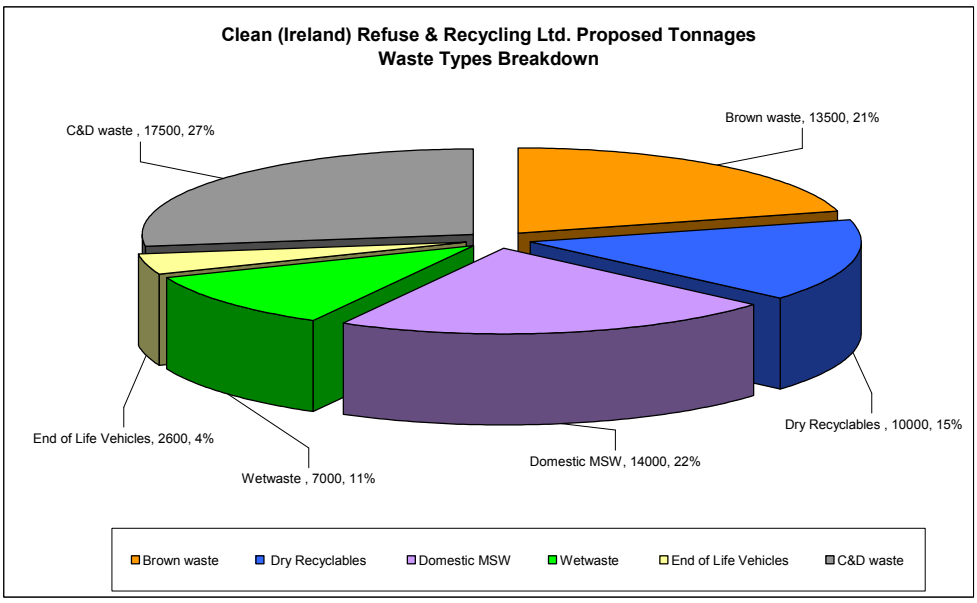

Figure 3.8.4 Proposed Tonnages

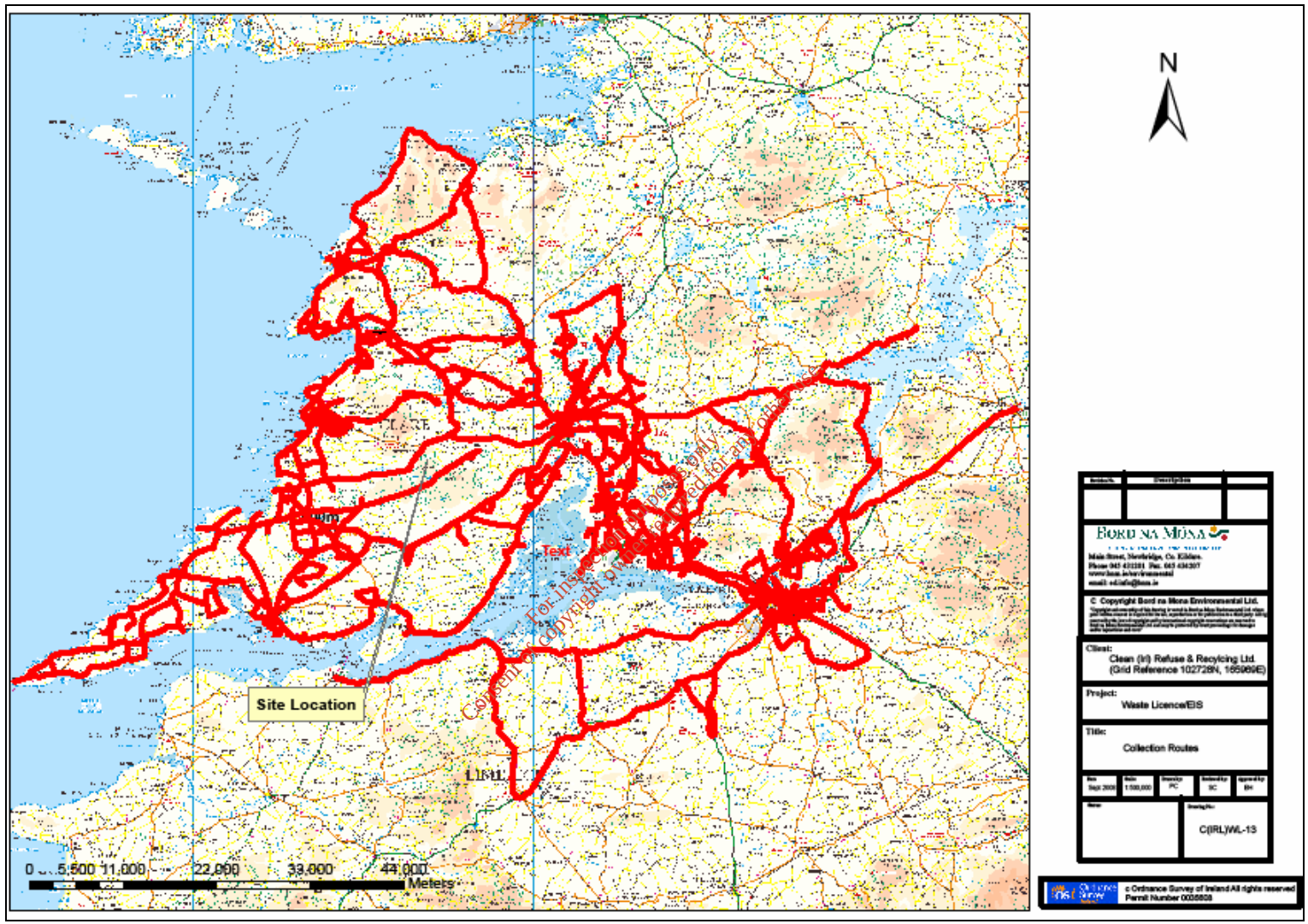

Figure 3.8.3 Collection Routes (NTS)

Table 3.8.6 Clean (Irl) Refuse & Recycling Ltd Traffic Generation (Operational Phase)

		Existing				Proposed					
Waste Type	**Tonnes per load**	**Tonnes per annum (2007 figures)**	**Loads per annum**	**Traffic movements per annum**	**Traffic movements per week**	**Tonnes per annum**	**Loads per annum**	**Traffic movements per annum**	**% increase in traffic movements per annum**	**Traffic movements per week**	**Traffic movements per day**
End of Life Vehicles	4	0	0	0	0	2600	650	1300	100	25	5
C&D	20	5195	260	520	10	17500	875	1750	337	34	6
Brown Bin Waste	14	0	0	0	0	13500	964	1929	100	38	7
Municipal solid waste	14	0	0	0	0	14000	1000	2000	100	39	7
Wetwaste	14	9309	665	1330	26	7000	500	1000	-25	20	4
Dry Recyclables	6	6864	1144	2288	45	10000	1667	3333	46	65	12
TOTAL		21368	2069	***4137***	81	64600	5656	***11312***		222	40

Skip Truck Activities

In accordance with market demand, Clean (Irl) Refuse & Recycling Ltd. proposes to increase their acceptance of construction and demolition waste to 17,500 tonnes per annum, which equates to 875 skips per annum (based on 20 tonne trucks). At present, the facility accepts 260 skips of C&D waste per annum. This proposal thus represents an increase of over 300% on the C&D waste accepted by the facility since 2007. To meet this demand, there may potentially be 1230 more skip truck movements into and out of Clean (Irl) Refuse & Recycling Ltd. The routes that these skip trucks will take is as yet unconfirmed. However, it is proposed that all skip trucks within a 5 km radius travelling from north or from south of the facility will use the N67 and the R483 roadways to enter the site. Skip trucks travelling from east of the facility will use the N68 and R483 roadways to access the site.

Brown Bin Waste Collection

It is proposed to centralise the brown bin waste collection process at Clean (Irl) Refuse & Recycling Ltd. by putting into place, on a permanent basis, one central 14 tonne waste collection truck to be located at a depot alternative to the Clean (Irl) Refuse & Recycling Ltd. facility at Cree. This 14 tonne truck will be gradually filled using dropdowns from one specialised enclosed 2 tonne brown bin waste truck, which, when not on collection routes, will reside at this alternative location. The 2 tonne truck will collect brown bin waste on existing routes and deposit each 2 tonne load into the 14 tonne truck. The 14 tonne truck will travel from this depot to the site in Cree most likely using the N68 and the R483 on a daily basis, Monday to Saturday, every second week in line with the brown bin collection schedule. This equates to approximately 306 vehicular movements resulting from the 14 tonne truck along the R483 per annum. The use of this centrally locate 14 tonne truck will immediately reduce the impact from the introduction of this activity which is associated with an increase of 13,500 tonnes per annum.

End of Life Vehicles

It is proposed that four to five cars will be transported simultaneously to the end of life vehicle unit using a HGV. The cars will be dissembled and compacted in the unit and then removed off site in consignments of 30 cars (24 tonnes). The route(s) to be used by the HGV is unknown at this time, as the broker most likely may be overseas and the HGV will be transporting the baled scrap to the appropriate port. The calculations in Table 3.8.6 account for one traffic movement leaving the site for collection of 4 cars by a HGV, however this is the worst case scenario and it is feasible that the HGV will only deliver to the site.

Municipal Solid Waste

It is proposed to collect 14,000 tonnes equating to 1000 loads of municipal solid waste annually from established haul routes, which equates to 2000 waste collection vehicular movements into and out of the site. 14 tonne trucks will be used to transport the municipal solid waste to the site Monday to Saturday, 51 weeks a year. It has not been defined as yet the source of the MSW, however existing haul routes will be included for the general collection areas.

Wetwaste

It is proposed to reduce the quantity of wetwaste collected from customers by 25% to 7,000 tonnes per annum in line with government policy to divert waste from landfill. With the introduction of the brown bin waste collection service, organic waste which currently is included in the wetwaste bin composition will now be segregated at source and therefore the volumes of wetwaste will be reduced. At present, there are 1330 traffic movements into and out of the site resulting from wetwaste collections. The reduction will decrease traffic movements to 1000.

Dry Recyclables

It is proposed to increase dry recyclables collection by 46% to 10,000 tonnes per annum. At present, there are 2,288 traffic movements into and out of the site per annum. The existing collection routes may be expanded depending on the client base. Should the ceiling in the increase in tonnages for dry recyclables be met, this will result in 3,333 traffic movements per annum.

Employees

Clean (Irl) Refuse & Recycling Ltd. employ 30 people directly at the site in Cree, resulting in between 50 to 60 daily staff car movements. The headcount is expected to increase by 2 permanent operators when the Biostabilisation Plant is established, which will potentially increase in 2 cars or 4 traffic movements more per day.

3.8.5 Mitigation Measure

To minimise traffic disruption, waste trucks will not pass through Kilmihill outside peak hours (i.e. 7am-9am and 4pm to 6 pm.).

National roads will be used as traffic routes as alternatives to local roads.

Brown bin waste collection will be centralised at an alternative depot to reduce the number·of·traffic·movements·to·the·site·in·Cree.

Skip storage from the south end of the site will cross the roadway to the north to the skip storage area approximately 20 times per week, with minimum disruption to the road.

Sight lines have already been established in line with Roads section of Clare Co.Co.

Construction traffic will be infrequent over a long duration of time.

Existing lay-bys on the L-6108 will continue to serve the public vehicles.

3.9 CLIMATIC FACTORS

3.9.1 Introduction

This section examines the impact of the proposed development on the local and global climate.

3.9.2 Study and Assessment Methodology

Characterisation of the climatic conditions prevailing in the vicinity of the proposed site was performed utilising historical meteorological data compiled by the meteorological service, Met Éireann. Throughout Ireland exists weather station monitoring locations including both climatological and synoptic stations. Synoptic stations record meteorological elements on an hourly basis, such as air and soil temperatures, rainfall, wind, pressure, weather, cloud, visibility, humidity and sunshine. Climatological stations record less meteorological elements, also on a daily basis, such as rainfall, maximum and minimum temperatures.

There is no site specific climatic information available for the project site at Cree, Co. Clare. Located northeast of the Clean (Irl) Refuse & Recycling Ltd. facility is the closest weather station to the site in Co. Clare, Kilmaley climatological station. This station however, does not record wind speed or direction (?) and is also located more inland than the project site. Wind speed and direction is an important element of the climatic assessment considering site operations associated with a waste transfer station e.g. dust generation, odours, and noise. Therefore the closest synoptic station is Shannon synoptic station located east of the Cree site (c.37km). Data for this station has been used as it is more likely to represent climate conditions at the Cree site due to its proximity to the coast.

Meteorological conditions recorded at Shannon are available for the long-term period from 1961 to 1990, this includes temperature, relative humidity, sunshine, rainfall and wind conditions. At the time of writing, more recent long-term results were not available in collated format from the Meteorological Service. All relevant historical data is presented in summary format in Tables 3.9.1 to 3.9.4 in the following sections.

3.9.3 Existing Environment

3.9.3.1 Local Environment

(i) Wind

Monthly mean wind speeds recorded at Shannon during the period 1961 to 1990 are presented in Table 3.9.1, while the percentage frequency of wind speeds occurring during the directions for Shannon for the period August 2007 to August 2008, as illustrated in the Shannon Windrose (figure 3.9.1), shows a higher percentage of winds in the area are experienced in the range 230° to 260° from north, i.e. ranging from southwest to west. Gentle to Moderate breezes (3.4m/s to 7.9 m/s) dominate in the area (78.3% of the year 2007/2008), which can be expected considering the proximity to the coast and land period 1978 to 2008 is presented in Table 3.9.2. The percentage of occurrence of wind character is outlined in figure 3.9.1.

The strongest winds for the Cree site (greater than 10knots / 5.15m/s) occur during the period from October to March (excluding November), with the average monthly wind speeds during this period ranging from 5.15 m/s to 5.72 m/s (10.0 to 11.1 knots). Lowest wind conditions (<4.6m/s or 8.9 knots) experienced at the site for approximately 21.2% of the year, predominately during the summer months, with the average monthly wind speeds during the June to August period ranging from 4.4 m/s to 4.6 m/s (8.6 to 8.9 knots). In general, the site always experiences some degree of wind from the Atlantic Ocean from a south westerly direction due to its proximity of less than c.5km from the west coast of Ireland.

Table 3.9.1: Mean Monthly Wind Speeds (knots) at the Shannon Synoptic Station 1961 – 1990

	J	F	M	A	M	J	J	A	S	O	N	D	Ann
Shannon	10.9	11.1	11.0	9.5	9.5	8.9	8.7	8.6	9.6	10.0	9.6	10.5	**9.8**

Table 3.9.2: Percentage Frequency of Wind Speeds at Shannon 1978 – 2008

Wind Speed (knots)	Wind Speed (m/s)	Beaufort Scale Descriptive Term	Total Percentage Frequency – All months 1978 to 2008
<1	0 – 0.2	Calm	0.8
1 – 3	0.3 – 1.8	Light air	12.3
4 – 6	1.8 – 3.3	Light breeze	21.2
7 – 10	3.4 – 5.4	Gentle breeze	30.5
11 - 16	5.5 – 7.9	Moderate breeze	25.6
17 – 21	8.0 – 10.7	Fresh breeze	7
22 – 27	10.8 – 13.8	Strong breeze	2.2
28 – 33	13.9 – 17.1	Near gale	0.4
34 - 40	17.2 – 20.7	Gale	0.1
41 - 47	20.8 – 24.4	Strong gale	-*
48 - 55	24.5 – 28.4	Storm	-*

** percentage frequency is between zero and 0.05*

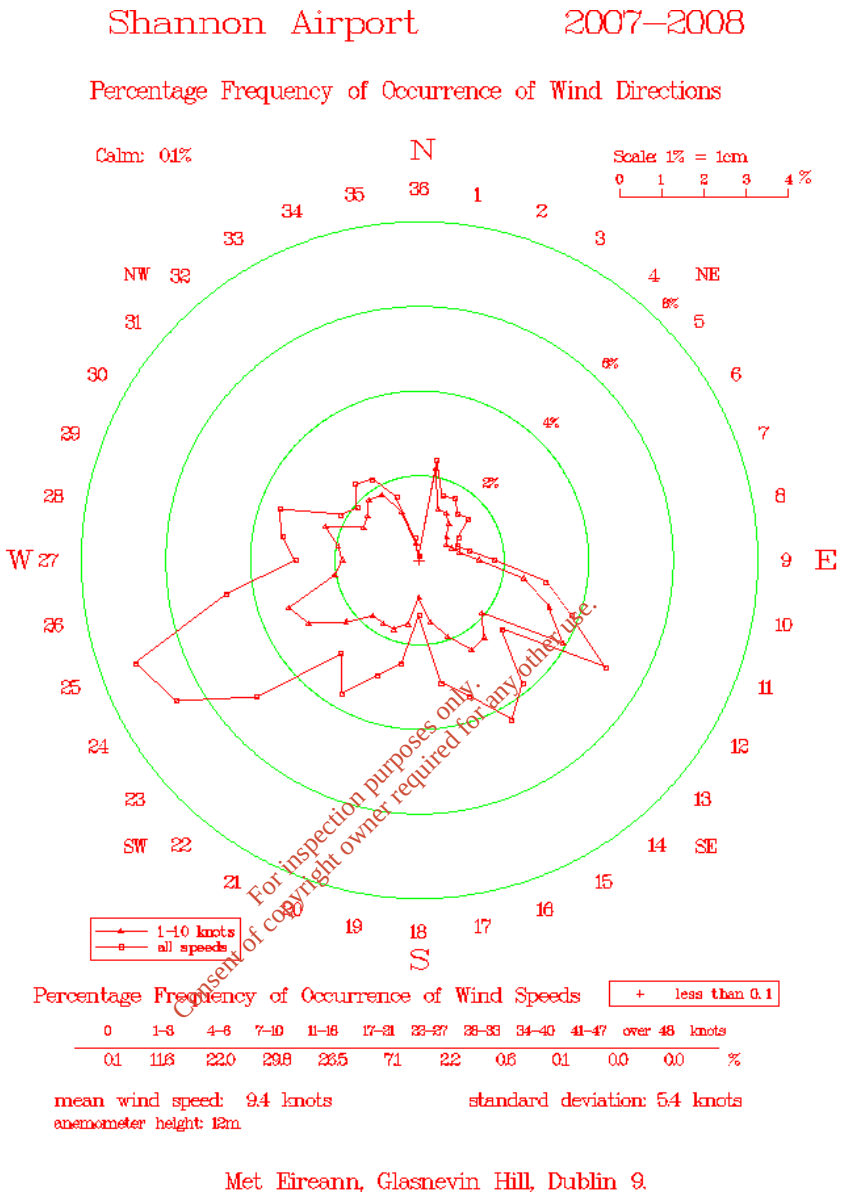

Figure 3.9.1 Wind Rose For Shannon 2007 -2008

(ii) Precipitation

Average monthly and annual rates of precipitation over the period of 1961 - 1990 for Shannon are presented in Table 3.9.3. The results indicate that the annual average rate of precipitation in this area is 926.8 mm. Long term monthly mean precipitation rates range from 55.5 mm to 99.6 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 thunder showers, which may be localised in rainfall intensity.

Table 3.9.3: Precipitation Rates at Shannon Synoptic Station (mm)

1961 – 1990

	J	F	M	A	M	J	J	A	S	O	N	D	Ann
Mean Monthly Total	97.2	72.1	71.8	55.5	60.1	62.4	57.1	82.3	81.8	92.4	94.7	99.6	**926.8**
Daily Max	29.0	33.5	28.5	29.6	27.0	29.7	29.7	42.5	35.9	35.5	33.0	33.0	**50.4**

(iii) Air Temperature

The pattern of long-term daily temperatures at Shannon 1961-1990 is shown in Table 3.9.4. Air temperature ranges from a mean monthly temperature of 5.4°C in January to 15.7°C in July. The average annual temperature (29 year average) is approximately 10.1°C. The highest mean daily maximum temperature of 19.4°C occurs during the month of July.

Table 3.9.4: Air Temperature at Shannon Synoptic Station

1961 – 1990

°C	J	F	M	A	M	J	J	A	S	O	N	D	Ann
Mean	5.4	5.6	7.0	8.8	11.3	14.0	15.7	15.5	13.6	11.1	7.5	6.3	**10.1**
Mean Daily Max	8.2	8.5	10.5	12.7	15.3	17.9	19.4	19.2	17.2	14.2	10.4	8.9	**13.5**

3.9.3.2 Global Climate Conditions

(i) Climate Change

Climate change is a global environmental problem[7] and while natural variation in climate and global temperatures occurs, it is thought that the increased production and accumulation of anthropogenic greenhouse gases (those that absorb and reradiate portions of the infrared radiation from the earth) is producing an increase in global temperature, which is expected to affect the overall climatic conditions on the planet. Increased Irish temperatures of between 1.5°C to 2.5°C and a marked reduction in rainfall by 25-40% by the middle of this century have been suggested likely outcomes of global warming[8].Temperature change in turn is expected to affect sea level, precipitation levels, frequencies of droughts and flooding, agriculture, forests,

[7] Department of the Environment, Heritage and Local Government, National Climate Change Strategy 2007

[8] Department of the Environment, Hertiage and Local Government, National Climate Change Strategy 2007 Ref 2003 report on Climate Change: Scenarios and Impact for Ireland

bio-diversity and socio-economic sectors, soil-moisture and sea-level. However, the severity of these impacts is extremely uncertain.

The greenhouse gases of concern are Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFC's), Perfluorocarbons (PFC's) and Sulphur Hexafluoride (SF_6)[9]. On a global level, CO_2 is responsible for more than half the climate change. More than 80% of the increased CO_2 content of the atmosphere arises from the use of fossil fuelsand about 20% from the destruction of rain forests. In Ireland, the main greenhouse gas is CO_2 mainly arising from the burning of fossil fuel in transport, heating and electricity generation[5].

Irish emissions of CH_4 and N_2O from the agricultural sector were 28% of all greenhouse gas emissions in 2005[10], the highest of all sectors. With regard to CH_4, in 1990 84.1% of all CH_4 emissions were derived from the agricultural sector, mainly due to enteric fermentation in ruminant animals, with 13.9% from landfill gas and the remaining 2% from energy-related emissions. Emissions of CH_4 from the transport sector are forecast to have the largest increase (by 180%) by 2010 [11].

The 1992 UN Conference on Environment and Development in Rio de Janeiro – adopted the Framework Convention on Climate Change (UNFCCC). All 15 member States have ratified the Convention. The objective is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate. The Kyoto Protocol, signed in 1997, agreed legally binding targets to reduce global emissions of six greenhouse gases by 5.2% in the period from 1990 to 2012. The EU adopted the most ambitious reduction target of 8%, on the basis that individual Member States would be differentiated to reflect differing economic and other circumstances. A "burden sharing" agreement has been reached on the distribution of this overall target. Under this arrangement, Ireland has agreed a national target to limit the increase in its greenhouse gases emissions to 13% above 1990 levels in the period 2008-2012. Without this action, a net annual increase in emissions of 37.3% is projected. Therefore, reductions of 13.1 million tones (Mt) CO_2 equivalent will be required to meet the 13% target. Programmes including Emissions Trading (as developed under European Directive 2003/87/EC) and the use of cleaner production aim to sustain ably reduce emissions of greenhouse gasses.

(ii) Acidification

Acidic deposition is the combined total of wet and dry deposition, with wet deposition being commonly referred to as acid rain. It is predominantly caused by atmospheric pollutants arising from combustion sources, such as sulphur dioxide (SO_2) and nitrogen oxides (NOx), that are

[9] Environmental Protection Agency (2004) Ireland's Environment
[10] Department of the Environment, Heritage and Local Government (October 2007) National Climate Change Strategy, Chapter 7
[11] Department of the Environment and Local Government (October 2000) National Climate Change Strategy,

converted into acid substances in the atmosphere. The resulting 'acid rain' and dry deposition of acid acidifies soil and water courses and can lead to habitat damage. The issue is a cross-border issue, with the most sensitive ecosystems in Europe located in central Europe[12]. In recent years, international agreements have sought to reduce emissions of those gases contributing to acidic deposition. More specifically, the agreements and legislation which affect the transport sector are the pending Council Directive 1999/30/EC (relating to the limit

values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air), a proposal for a Directive on National Emission Ceilings for certain atmospheric pollutants, S.I. No. 407 of 1999 Air Pollution Act, 1987 (Environmental Specifications for Petrol and Diesel Fuels) Regulations, 1999 and the various protocols to the UNECE Convention on Long Range Transboundary Air Pollution (CLRTAP).

Under Protocols to the CLTRAP, NOx and SO_2 emissions are to be controlled at specified levels. In order to comply with these levels, the proposed National Emission Ceilings Directive is the culmination of the EU's strategies on the control of acidification. This Directive sets emission ceiling limits for SO_2, NOx, VOC and ammonia to be achieved by 2010. The limits set for Ireland for SO_2 and NOx are 28 and 59 kilotonnes respectively. This is the first Directive to set limits on the total emissions of pollutants in each country.

(iii) Ozone Depletion

Depletion of the stratospheric Ozone layer has been taking place in certain parts of the globe over the past twenty years due to the build up of Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Carbon Tetrachloride, Methyl Chloroform etc. These decreases in Ozone levels are caused by the photochemical reactions of Ozone with the above species released to atmosphere from industrial and domestic sources. The effect is to increase the amount of ultra-violet (UV) radiation reaching the earth's surface, resulting in damage to human health and having an adverse impact on the terrestrial and marine ecosystems. European Regulation 2037/2000 on Substances that Deplete the Ozone layer requires phasing-out or banning ozone-depleting substances and requires proper disposal of existing ozone-depleting substances. It is in line with the Montreal Protocol on Substances that Deplete the Ozone Layer and goes beyond some of the international requirements.

[12] European Environment Agency (2003) Europe's Environment – The Third Assessment

3.9.4 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, will result in the release of greenhouse gases to the atmosphere.

The main sources of air emissions from operations at the existing and proposed development that may have the potential to contribute directly to atmospheric concentrations of the aforementioned pollutants of climatic concern (primarily CO_2, NOx and SO_2) include vehicular/traffic and heating systems emissions on-site.

3.9.5 Mitigation Measures

Existing energy efficient heating has been achieved with the installation of a wood chip. This clean technology provides hot water for space heating and employee services (washing facilities) which indirectly reduces the impact on the atmosphere from the site.

3.9.6 Residual Impact

The existing and proposed development is not expected to result in significant impacts on the local or global climate.

3.10 LANDSCAPE & VISUAL IMPACTS

3.10.1 INTRODUCTION

This section examines the impact on the landscape of the existing and the proposed buildings including the infrastructure associated with operations at the Clean (Ireland) Refuse & Recycling Ltd. waste transfer station located at Cree, Co. Clare. It outlines the existing character of the site and surrounding area, the impact of the proposed development on the character of the landscape and mitigation measures to minimise the visual impact of the proposed development.

The site for the proposed development is located on a c3.0ha site in a rural area in the townland of Ballinagun West, approximately 1.4km southwest of Cree, Co. Clare. The site was visited on the 17th October 2008 in sunny and bright conditions where the visibility was generally good.

3.10.2 ASSESSMENT METHODOLOGY

The assessment of the potential impact on the landscape is based on the guidelines set out in the "Guidelines for Information to be Contained in Environmental Impact Statements" published by the Environmental Protection Agency (EPA), March 2002. It also considers the Landscape Character Areas and ERM report as set out in the Clare County Development Plan 2005-2011.

EXISTING LANDSCAPE

The Existing Landscape is described using the following terminology:

(i) Context

Areas from which the existing site can be seen were noted. Particular attention was paid to views from the road, residences along the road, designated tourism routes and view points, amenities, monuments and archaeological sites.

(ii) Character

The site is assessed and described as it is perceived both from within the site and from outside the site in the wider landscape. The intensity and character of the landscape are also described.

(iii) Significance

This addresses the significance of the existing landscape and examines the level of intrusion on designated views, designated landscape and designated landscape amenity areas.

(iv) Sensitivity

This section addresses the changes that would alter the character of the environment. Any change in the area has a corresponding impact on the character of that particular area. However, the extent of impact depends on cultural associations, uniqueness and degree of change in the landscape and the nature of the surrounding land-uses.

POTENTIAL IMPACTS

Visual impact may occur by means of intrusion and/or obstruction. The following terminology has been used in the assessment and is defined as follows:

- Visual Intrusion – This occurs where a proposed development impinges on an existing view without obscuring the view.
- Visual Obstruction – This is an impact on a view which also involves obscuring the existing view.

The Visual Impact may be described as:

- Imperceptible – An impact capable of measurement but without noticeable consequences; or
- Low (Slight) – An impact which causes change in the character of the environment which are not significant or profound; or
- Moderate (Significant) – an impact which by its magnitude, duration or intensity alters important aspects of the environment; or
- High (Profound) – An impact which obliterates all previous characteristics.

The nature of the impact may be described as:

- Neutral – Represents a change which does not affect the quality of the environment; or
- Positive – Represents a change which improves the quality of the environment; or
- Negative – Represents a change which reduces the quality of the existing environment.

The duration of the impact may be described as :

- Temporary Impact – Impact lasting for one year or less; or
- Short term Impact – Impact lasting for one year to seven years; or
- Medium term Impact – Impact lasting from seven years to twenty years; or
- Long term Impact – Impact lasting for twenty years to fifty years; or
- Permanent Impact – Impact lasting for over fifty years.

3.10.3 SITE DESCRIPTION/LANDSCAPE CHARACTER

Landscape Context

The site for the proposed development is located in the Townland of Ballinagun West, approximately 1.4km southwest of Cree, Co. Clare. The entrance to the facility is located on the secondary road (L-6108) c.0.8m west off the Kilrush to Quilty road R483. The closest services and non-resident buildings are located c.1.4km away in the small village of Cree, with a distance of c.5km to the closest beach on the west coast of Clare. There are no landscape sensitive areas, designated routes, designated views or areas protected for nature in the immediate vicinity of the site. The recreational areas in the vicinity of the site are mainly beaches and small coastal villages, with White Strand beach being the closest recreational area at approximately 5km from the site in Cree. The closest town with legally defined boundaries is Ennis located c. 38km from the site in Cree. The site is situated in a rural setting in west Clare where the immediate surrounding landscape is dominated by flat green fields intermingling with gently rolling hills.

Landscape Character

Site Description

The proposed site is an irregular shape and occupies a total area of c. 3.0ha. The site footprint narrows at the northern end (See Site layout Plan Drawing C(IRL)WL-02 in Attachment 3) and is split into two sections by the road L-6108. The site lies on a slight ridge splitting the site, where the gradient gently falls to the north however, this is not visually obvious. The site is currently a mixture of hardstanding and hardcore at various areas across the operational sections of the site. The site boundary is a combination of earth banks, hedgerows, railway sleepers, landscaping (Alder and Scarlet Willow), and railing/wall with security gates. Gradients do not vary greatly across the site (37m to 33m O.D.). A ridge at an elevation of c.35m runs across the central part of the site from east to west. The north of the site falls off from this ridge at c.35m to c.33m OD at the entrance to the facility to the boundary at the proposed skip storage area. The southern part of site at the rear of the processing buildings rises on the west and south to 37m O.D. and gently falls to the south east area. Due to this topography, surface water run off from the site is split into two drainage systems, namely the north drain and south drain.

Landscape

County Clare possesses a high diversity of landscapes, reflecting a wide range of landscape forms and elements that have been influenced by various human activities over time. Lough Derg provides a natural boundary to the east and is fed by numerous rivers and streams, many of which weave their way through the extensive drumlin belt in the

eastern part of the county. Other watercourses include Graney, which rises from Lough Graney, nestled within the uplands of the Sliabh Aughties.

Considerable contrasts emerge between the east and west of the county, with extensive limestone area composed of lower limestone pavements, pastures and loughs fringing the distinctive Burren uplands. The Fergus River, which rises above the Corrofin, is a keylandscape influence in the central part of the county, flowing through the county town of Ennis and feeding into the extensive Fergus estuary with its numerous islands and historical settlements. The Shannon estuary and its widening into the Atlantic has a profound influence along the south of the county, creating inlets and smaller estuaries. The Atlantic influence is seen along the extensive coastline, particularly in the rocky and dramatic coast on the north of loop head and indeed further along the coast in features such as coastal stacks and islands. The human impacts are evidenced along the Atlantic, with the high number of defensive promontory forts that provide distinctive punctuations along the coastal landscape.

The landscape character of this part of County Clare is rural in nature with agriculture remaining the main activity within the county. The key characteristics of the general surrounding landscape, as defined under Kilmihill Farmlands Landscape Character Area (LCA 19) by ERM on behalf of the Heritage Council (2004), includes undulating to rolling hills of a medium-high elevation with some drumlin-type landforms present, but not dominating the landscape. Confer plantations are a principal landscape feature common to the area and a plantation was identified in the vicinity (<2km south) of the facility which is most likely to be planted with Sitka Spruce and Larches common to plantations in Ireland. The area around Cree and across to Kilmihill consists of complex moorland and farmland with occasional flatter areas within these hills existing, such as the Cree River Valley. Hedgerows enclose fields generally in the lower and more settled areas, with post and wire fencing commonly enclosing boundaries. Plate 3.10.1 overleaf shows the site location from a north view 1.5km amongst the rural setting,

Topographically, the land at the site and in the surrounding environs is generally flat with occasional rolling hills in the distance. The surrounding land is a mixture of one-off housing and fields, with hedgerow, post and link fencing or low-rise stone walls defining land and property boundaries.

Plate 3.10.1 Landscape character

Settlement is very dispersed however, there are a number of residential properties (22) located within the immediate vicinity of the site either along the roadway (L-6108) and on laneways off this secondary road as discussed in Chapter 3.1 Human Beings. While land use is dominated by well drained pastures on higher land, many of the fields surrounding the facility are characteristically unimproved, poor and wet agricultural fields which are not appropriate for cattle grazing and are colonised by Rushes, Grasses and Yorkshire Fog.

Site Visibility

The waste transfer station site is located along the axis of the hill which runs in a west to east direction. The highest point of the site is the apex of the existing waste processing building. Visibility of the existing site is limited due to natural cover and intervening drumlins. The site is effectively surrounded by network of single vehicle roads that service the low density housing and farmyards in the area. The most significant potential impact arises from road users of the local road network. A potential impact also exists for the houses located in the vicinity of the site.

Site Views

An assessment of the views of the several locations V03-V22 (refer to Figure 3.10.1) was carried out. The viewpoints were located on the surrounding local and secondary roadways within a 2km radius. Figure 3.10.1 is also included in Attachment 2 as C(IRL)WL-22 for reference.

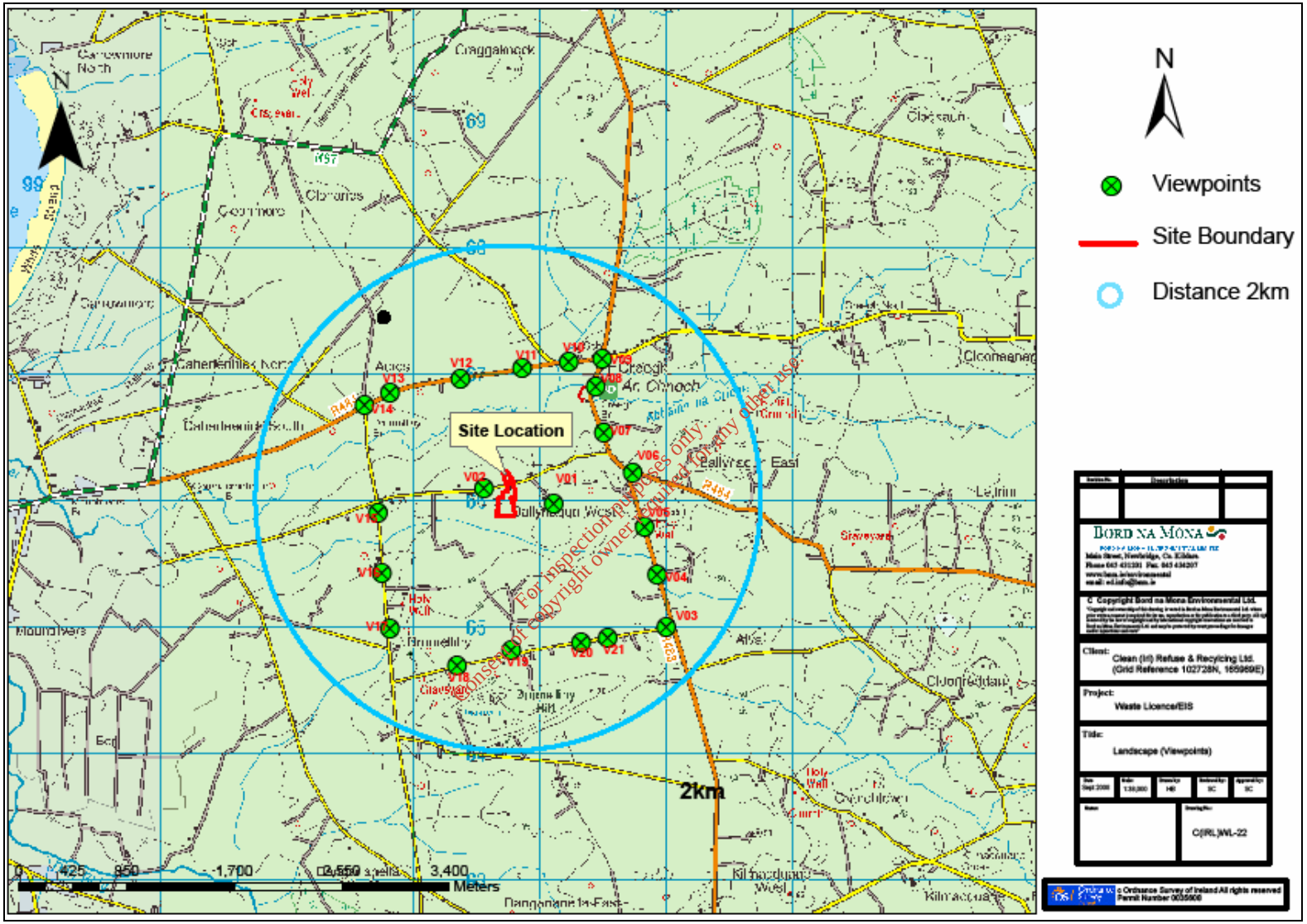

Figure 3.10.1 Viewpoints V01-V21 Clean (Irl) Refuse & Recycling Ltd. (NTS)

Significance

The operation of the existing waste transfer station has significantly altered the landscape from its previous use (pre 1984 agricultural usage). The proposed development requires an increase in the dimensions and scope of existing buildings. The new buildings to be constructed are to be build adjacent to the existing waste handing facility and as such represent an extension of the existing building complex rather than the construction of a new stand alone structure. It is not proposed to increase the height of the existing waste processing buildings; however the proposed Biostabilisation Plant will have an apex 1.2m higher than the existing apex of the waste processing buildings (9m). The stack associated with the Biomass Recovery Plant will be 13m from the ground. The sizing of the diameter of the stack has not been decided on at this stage and this may affect the significance of the visual impact of the stack. The existing views are outlined in the following pages. Although, the existing structures strongly influence the immediate area around the site, views towards the site from residential dwellings and roads around the site vary as local topography and vegetation often obscure clear views of the site.

SENSITIVITY

The proposed development involves the extension of the existing waste transfer station and ancillary works. The potentially significant visual impact arises from the proposed extension to the existing waste processing buildings and the construction of the Biostabilisation Plant and Biomass Recovery Plant. To a lesser extent, the construction of the End-of-Life Vehicle workshop at the west of the site and the erection of glass bunkers (relocated from existing location at the south of the site) in the skip storage area may also create a visual impact. The style of structure would be considered to be in line with existing structures on the site, mainly concrete walls from the base 2-3m high continued with green cladding to roof height. In the context of the local landscape, the site structures would be comparable to shed structures for agricultural use.

Landscape Designations

The Clare County Development Plan 2005-2011 and Landscape Character Assessment of Co. Clare March 2004 set out various sensitive areas in terms of landscape. The development will not affect any major ridgelines, river valleys and is not within or adjacent to any sensitive land uses (e.g. fen, peat bogs, protected nature areas, marsh, coastlines etc.).

Archaeological Designations

Section 3.11 of this EIS, Cultural Heritage, indicates that there are a no archaeological sites adjacent to or within the area of the development. The nearest recorded monument (in excess of 100m of the proposed site) (RMPCL047-050) is located west of the

proposed site in the townland of Ballinagun West. The monument consists of a substantial earthen enclosure which is situated immediately south of the existing public roadway.

Nature Designations

The site is not within, or adjacent to, any protected areas for nature or otherwise designated areas. The pNHA White Strand Carrowmore Marsh lies c.3km west of the proposed site and is the closest habitat with a proposed designation, while the Carrowmore Dunes (SAC 002550) west of the pNHA White Strand Carrowmore Marsh is the closet designated site to the facility.

3.10.4 Visual Assessment

The proposed site will have a long term impact as it is intended that the facility will operate for a further twenty to fifty years. The expansion of the site is considered to be a visual intrusion rather than an obstruction, as the proposed development will be an addition to the existing intrusion on the landscape thereby, impinging on the existing view without obscuring it. Viewing the facility from the R484 (north) the development will not significantly cause a change in the character of the environment, thus resulting in a low visual impact due to the screening presence of the existing structures at the north of the facility.

Development at the south of the site may give rise to a moderate visual impact to surrounding dwellings on the east and west taking into account that the highest apex will rise 1.2metres above the existing apex (9metres) of the waste processing buildings, and also the stack height will rise a further 2.8metres above the highest apex of the Biostabilisation Plant.

Initially, the nature of the impact may be considered to be negative as the development represents a change which reduces the quality of the exiting environment. However, with the implementation of mitigation measures the impact should be neutral where the development represents a change but does not affect the quality of the environment. The following outlines the proposed development which is likely to create a visual impact on the landscape character of the surrounding area:

Construction Phase/Site Development:

- Biostabilisation Plant
- Extension to existing waste processing buildings
- Relocation of glass bunkers
- Provision to End of Life Vehicle unit
- Relocation of existing diesel tank bunded storage area

- Wheelie bin/truck wash service area
- Biomass Recovery Plant including stack

Impacts on landscape will commence at an early stage with the following construction stages:

- Stripping of field and overlaying with hardcore
- Construction of earthen berms at skip storage area
- Construction of extensions to processing buildings
- Construction of glass bunkers at skip storage area
- Construction of End of Life Vehicle Unit
- Installation of wheel/truck/bin wash and leachate holding tank
- Construction of Biostabilisation Plant and Biofilter
- Construction of Biomass Recovery Plant

Operational Phase:
Existing screening of the site consists of the following:

The existing north (front) of the facility is bounded by metal gates with a half concrete/half metal fence on either site. The administrative offices, which has recently received planning permission (P08/P46 17th July 2008) for Material Change of Use (from dwelling to administrative offices) currently is a low rise building with an entrance and driveway. Under the planning conditions this access will be closed off to correspond to the existing security fencing.

The western boundary consists of 7ft high wire mesh fence from the road at the north of the facility to opposite the most north-westerly corner of the processing building. A 9ft high boundary earthen bank continues along the east of the site.

The southern boundary is in the form of earthen berms, which is landscaped with Common Alder and Scarlet Willow; post and wire fencing sets the boundary with adjoining lands.

The eastern boundary is a combination of post and wire fencing with natural hedgerows at the southern end. Adjacent to the processing buildings the boundary is earthen berms landscaped with trees with a support wall comprising of railway sleepers.

During the normal operation, waste activities that are currently conducted indoors include:

- Dry recyclable processing

- Wet waste processing
- Baling of material

Activities that are not carried out indoors include:

- Dropdown skip processing
- Timber shredding processing (timber shredder)
- Construction and Demolition waste processing (trammel)

Views:

A significant land feature which mitigates the presence of site buildings against the backdrop is the drumlin to the south of the facility as shown in Plate 3.1.2 overfleaf. The main view of the site will be from the L-6108 local road on approach from the east and west as shown on Plates 3.10.3 and 3.10.4 on the following pages, where the visual impact will be most noted. For the visual assessment it was not ?possible to conduct an assessment with a 360º view from the surrounding local roads to the subject site (see Plates 3.10.4 to 3.10.22 showing viewpoints V03 to V21). From several views it was observed that the views of the facility form the viewpoints was obscured by local topography.

Plate 3.10. View from north (magnified) showing drumlin to the south of the facility

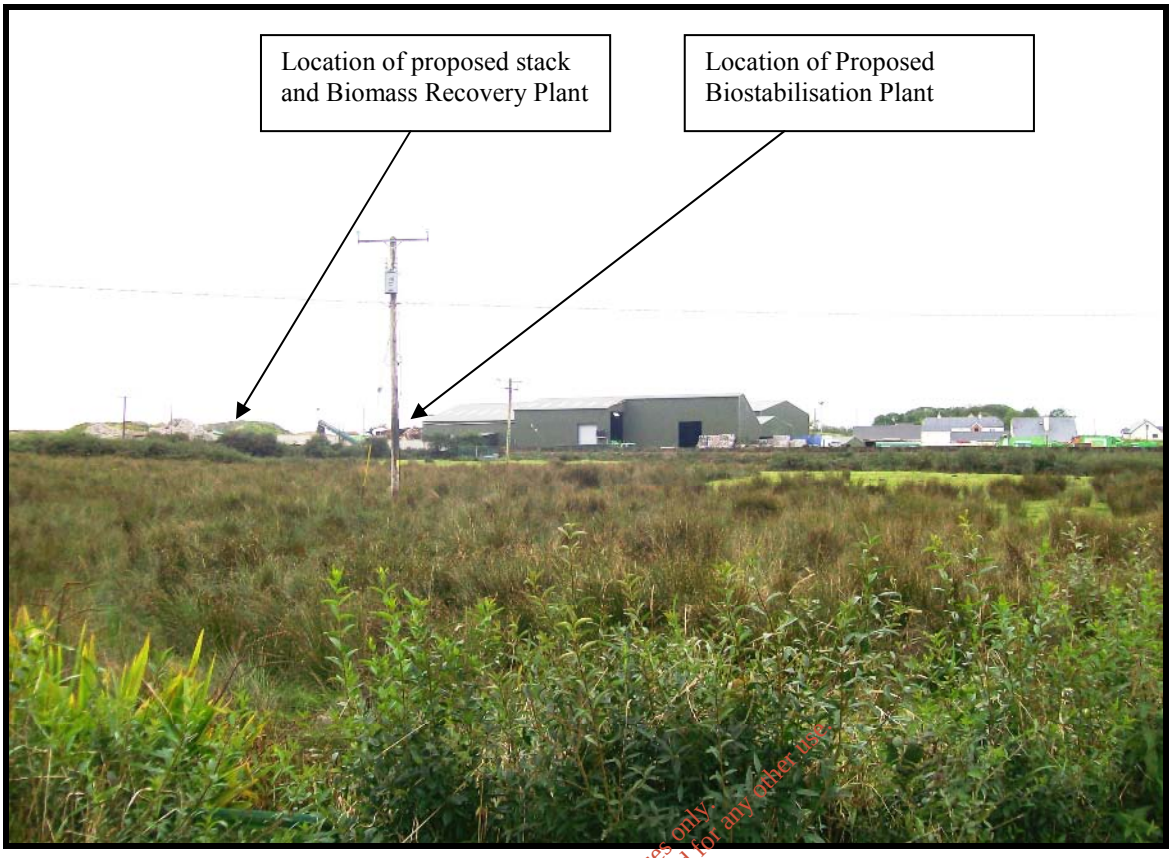

Plate 3.10.3 Viewpoint V01 looking west to facility from dwellings on private lane to the east.

Plate 3.10.4 Viewpoint V02 looking east to facility from dwelling of closet proximity to site.

The proposed site is not visible on approach from the south of the R483 to the Clean (Irl) Refuse & Recycling Junction as shown in Plates 3.10.5 to 3.10.6.

Plate 3.10.5 Viewpoint V03 looking northwest to facility from junction with R483 (approach from south).

Plate 3.10.6 Viewpoint V04 looking northwest to facility from R483 (approach north).

The facility becomes visible in the distance, Plate 3.10.7 below, at V05 on the R483 approach from the south. The visibility is limited due to natural tree lines, hedgerows and vegetation.

Plate 3.10.7 Viewpoint V05 looking northwest to facility from R483 (approach north).

Plate 3.10.8 Viewpoint V06 approach to Cree junction –facility to west and not visible

The view of the facility from the R483 travelling south is obstructed by natural vegetation and private dwellings in the vicinity of the site.

Plate 3.10.9 Viewpoint V07 looking southwest from R483 (approach south).

Plate 3.10.10 Viewpoint V08 looking southwest from R483 (approach south) at Creegh Bridge.

Plate 3.10.11 Viewpoint V09 looking southwest from Cree village

The facility is most visible along the Doonbeg road R484 as shown in the following Plates 3.10.12 to 3.10.15; the facility is set back c.1.5km from the Doonbeg road.

Plate 3.10.12 Viewpoint V10 looking southwest from R484 (approach from east).

Plate 3.10.13 Viewpoint V11 looking southwest from R484 (approach from east).

Plate 3.10.14 Viewpoint V12 looking southeast from R484 (approach from east).

Plate 3.10.15 Viewpoint V13 looking southeast from R484 (approach from east).

The facility is no longer in view at V14 at the junction of the R484 and local road. Local topography and natural hedgerows obstructed the view of the facility for the duration of this section of road to the location of viewpoint V15.

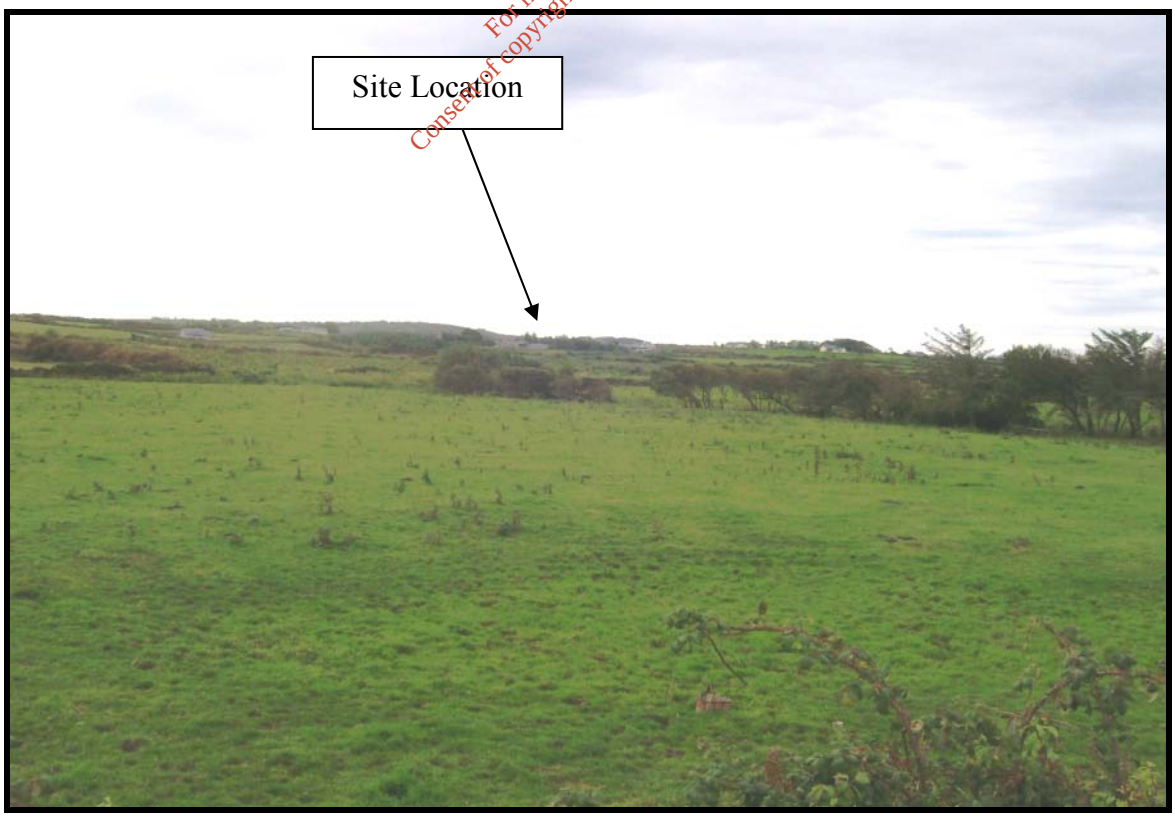

Plate 3.10.16 Viewpoint V14 looking southeast from R484 (approach from north).

The view of the facility is limited from the section of road where viewpoints V15-V17, Plates 3.10.17 to 3.10.19 were photographed.

Plate 3.10.17 Viewpoint V15 looking east from local road (approach from north).

Plate 3.10.18 Viewpoint V16 looking northeast from local road (approach from north).

Plate 3.10.19 Viewpoint V17 looking northeast from local road (approach from north).

The topography of the land rises on the local road to the south of the site; however the facility is not in view from this location at V18 and V19, Plates 3.10.20 and 3.10.21.

Plate 3.10.20 Viewpoint V18 looking northeast from local road (approach from west).

Plate 3.10.21 Viewpoint V19 looking north from local road (approach from west).

The facility comes into view at V21 and V22, Plate 3.10.22 and 3.10.23; however tree lines and natural vegetation limit the view of the waste processing buildings.

Plate 3.10.22 Viewpoint V20 looking northwest from local road (approach from east).

Plate 3.10.22 Viewpoint V21 looking northwest from local road (approach from east).

3.10.5 MITIGATION MEASURES

The development will give rise to visual intrusion for the private dwellings on the L-6108 local road, however it is contended that visibility is limited due to natural cover and intermingling drumlins and the visual impact will be minimised through the appropriate mitigation measures follows;

- Existing berms will be maintained
- Landscaping at the east and south perimeter will be maintained
- Earthen berms will be constructed on west and north boundary of the skip storage area
- Existing hedgerows along the west site boundary will be retained
- Buildings will be constructed to be uniform with existing buildings and will reflect typical agricultural structures in the area
- The stack will be painted to blend in with the proposed structures, and where the height of the stack rises above the highest apex of the proposed buildings, the colour of the stack will be such that it will correspond with the natural skyline
- Southern boundary will be fully stabilised and planted following construction works

3.11 CULTURAL HERITAGE

3.11.1 BASELINE CULTURAL HERITAGE ASSESSMENT

An archaeological assessment of the Clean (Irl) Refuse & Recycling Ltd. site and its environs was undertaken by archaeologist Annette Quinn of Tobar Archaeological Services at the request of Bord na Mona Technical Services in May 2005, in conjunction with a planning application relating to buildings at the site. A copy of Tobar Archaeological Services report is included in Attachment 10.

The cultural heritage assessment, carried out by Tobar Archaeological Services, as part of this EIS, was undertaken to examine Archaeological, Architectural and Historical assets of the area. This includes all humanly created features on the landscape, including portable artifacts, which might reflect the prehistoric, historic, architectural, engineering and/or social history of the area.

This study involved documentary research, and on-site field inspection of the area. As part of a documentary search, the following sources were examined from which a list of sites and areas of archaeological potential was compiled where found:

- A primary cartographic source and base-line data for the assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Clare. All known recorded archaeological monuments are indicated on 6 inch Ordnance Survey (OS) maps and are listed in this record.
- The 1st edition OS maps for the area were also consulted.
- A number of local journals such as The Other Clare were consulted as part of the desk-based research.

Figure 3.10/1 Cultural Heritage Sites Surrounding the Development Site is shown overleaf.

The nearest recorded monument (in excess of 100m of the proposed site) (RMPCL047-050) is located west of the proposed site in the townland of Ballinagun West. The monument consists of a substantial earthen enclosure which is situated immediately south of the existing public roadway.

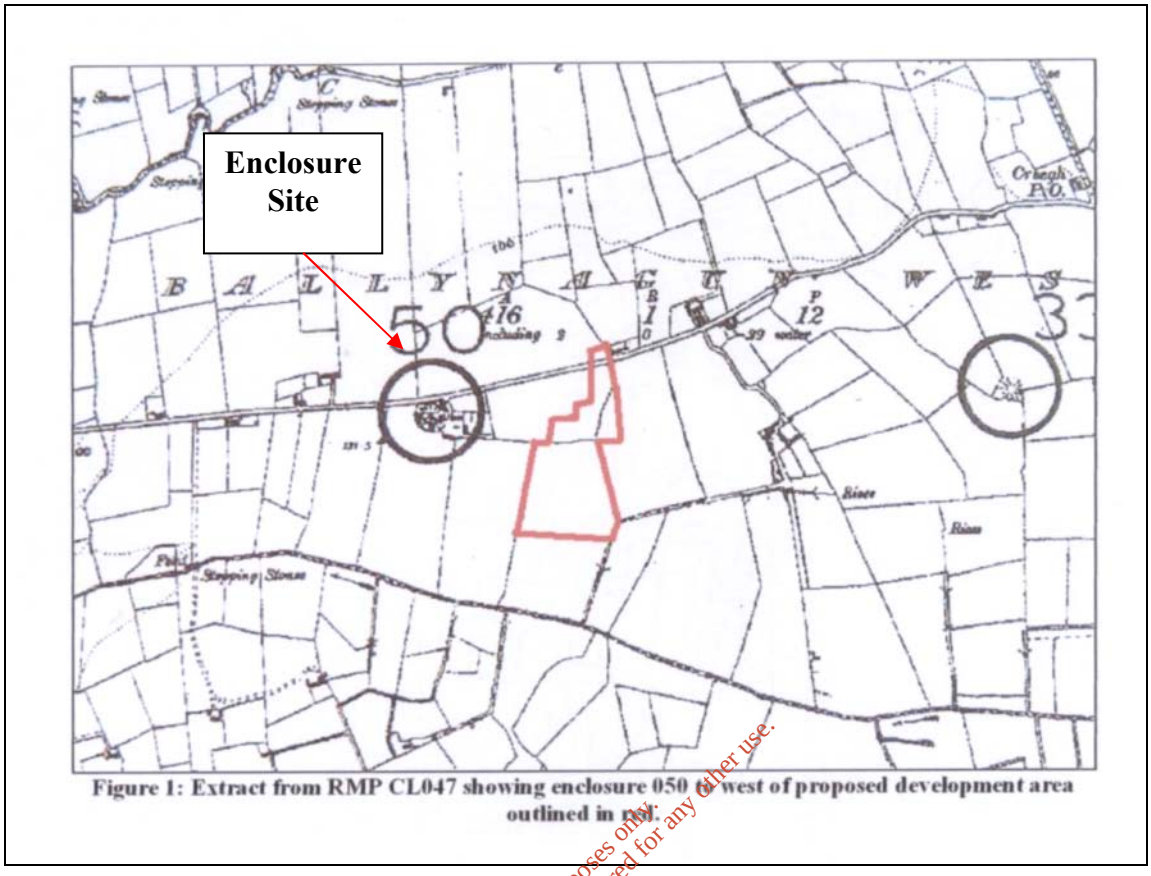

Figure 1: Extract from RMP CL047 showing enclosure 050 to west of proposed development area outlined in red.

Figure 3.10.1: Cultural Heritage Sites Surrounding the Development Site (NTS)

Neither the walkover survey nor the paper survey of the proposed extraction area indicated the presence of any previously unrecorded archaeological sites.

Creegh Bridge (RPA 198) is listed as a protected bridge under the CDP 2005-2011 and is described as a three arched road bridge (c.1820) over a river. There are no other listed architectural features in the vicinity of the Clean (Irl) Refuse & Recycling site.

3.11.2 ENVIRONMENTAL IMPACTS

By their very nature, developments of this kind are likely to have an impact on their environs. Topsoil stripping, ground reductions 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.

3.11.3 MITIGATION MEASURES

There are no known archaeological features located within, or adjacent to the area of the development. The only known feature is recorded in the RMP as (RMP CL047-050) Enclosure Site, which is located to the west of the site. No other features were discovered as a result of this survey.

There will be no visual impact on the surrounding archaeological landscape.

It is recommended that no further archaeological input is required for this development.

3.12 MATERIAL ASSETS

3.12.1.1 INTRODUCTION

Material assets can be defined as resources that are valued and are intrinsic to specific places. This section looks at the effect of the development on the worth of material assets and r resources of the locality under the following headings;

- Adjoining Property;
- Amenity areas and open spaces;
- Services i.e. water, electricity, gas, roads etc; and
- Architectural, archaeological and geological heritage.

The positive effects of the development (i.e. the provision of sustainable employment and supply of aggregate) must be considered in conjunction with the detrimental effects, if any, on the environs.

3.12.2 ADJOINING PROPERTY

New developments can have an adverse effect on adjoining existing development through factors such as building density, standard of buildings, overall design of the site, overlooking, overshadowing, lighting, creation of traffic, severance of access and nuisance such as noise and dust. On the positive side, development can bring growth and stability to an area, depending on the type of development proposed, and can even increase property values in the locality. Noise, vibration, air, traffic and landscape and visual impacts have been addressed in the relevant preceding sections of the EIS.

This development, which will facilitate the continuation of existing waste transfer activities and the introduction of new waste processes at the location within the townland of Ballingun West, Cree, Co. Clare, is considered to be suitable for the following reasons:

- The development is in character with the activities currently carried out at the facility, i.e. waste transfer activities have been taking place since 1984 and has gradually expanded to meet market and legislative requirements

- It is considered that in view of there being an existing customer base, which has been developed by Clean (Irl) Refuse & Recycling Ltd. in accordance with the current site location, that there is a sustainable, viable and reachable market for the waste recovery activities at this location

- Recognising the negative environmental impacts associated with landfilling biodegradable waste materials, the European Union passed the EU Landfill Directive (1993/31/EC) which requires member states to reduce the amount of biodegradable materials to be landfilled over time. This legislation has been transposed into Irish law and requires the country to reduce the landfilling of biodegradable materials from 1995 levels by 25% by 2010, 50% by 2013, and 65% by 2016. At present, Ireland will struggle to meet its target for 2010.

- The EU Waste Framework Directive (2006/12/EC) establishes a hierarchy for managing waste materials identifying the most preferable options down to the least favoured options. Because the majority of biodegradable materials are currently landfilled in Ireland, any effort to collect them separately for recycling and composting complies with this legislative requirement. The proposed facility will process up to 15,000 tonnes of biodegradable material diverting it from the lowest category in the hierarchy of waste management, landfill disposal, and placing it into a higher priority waste management option, namely recycling.

- The development does not require any modifications to the existing telecommunications or electricity supplies to the area.

- It is anticipated that the normal daily water requirement for the site will be consistent with that currently required for wheelie bin and truck washing. Leachate generated within the Biostabilisation plant from washing of floors can be recycled to conserve water. This water will be sourced from either the onsite bored well or the Dromehilly Group Water Scheme as discussed Section 3.5 Hydrogeology.

- Access to the site is off the R483 road via the country road (L-6108). It has been shown in the traffic assessment conducted that the proposed development will not have a direct adverse impact on the local road network as traffic will be staggered throughout the day and mitigation measures such as the central brown waste truck located at a deport will reduce the volume of traffic in relation to the increase in tonnes for the site.

- The existing berms and landscaping along the boundary of the site will be retained to help screen the activity thereby reducing visual and noise impacts. In addition to this, screening berms/embankments will be constructed along the boundary of the proposed northern section of the site to further reduce the potential impacts of the development (refer to Section 3.10: Landscape). These will be planted to improve the visual appearance of the development.

- The agricultural significance of the land is not regarded as important to the area (refer to Section 3.3: Soil & Geology/Soil Description) and thus the change in land usage is not considered a significant impact.

- It is unlikely that the development will not cause a permanent decrease in adjoining property values as the site is already in existence. In addition, the developer's policy of good planning and careful site screening will mitigate any diminution of material assets.

3.12.3 AMENITY AREAS AND OPEN SPACES

The proposed development site and the immediate surroundings are not designated as a proposed Natural Heritage Area or a candidate Special Area of Conservation (pSAC), nor is it designated under any of the other nature conservation or landscape designations currently used in Ireland. The pNHA White Strand Carrowmore Marsh lies c.3km west of the proposed site and is the closest habitat with a proposed designation, while Carrowmore Dunes (SAC 002550) is the closet designated site to the facility.

The site is not crossed by any public rights of ways, nor will its operation interfere with any such ways. There are no scenic routes identified by the Clare Count Development Plan 2005-2011 within the immediate vicinity of the site. It is considered that site activities will not affect this designated area.

3.12.4 SERVICES

These include those effects which arise as a result of services required by a development such as telecommunications, gas, water, electrical supply, sewage disposal, solid waste disposal and the local road network.

- **Road Network**
  Clean (Irl) Refuse & Recycling Ltd. has previously widened the road and introduced lay-bys to reduce impact on traffic on the local road. It is shown in the traffic assessment conducted that the development will not have a significant adverse impact on the local road network. See section 3.8

- **Water Usage**
  Water for domestic purposes will continue to be supplied from either the onsite bored well or the Dromehilly Group Water Scheme. Rain harvesting is practiced for domestic sewage also. Operational water use is low for washing of truck and wheelie bins. The wheel wash will be used as efficiently as possible to reduce water consumption at the facility.

- **Electricity Supply**
  As the development is an existing facility, there will be no requirement for additional or increased electricity supply. Alternatively the facility proposes to generate its own

electricity from a biomass recovery unit. There will be no change to the existing ancillary works as part of this development as an ESB substation has been introduced to the site.

- **Telecommunications**
  The existing telecommunications network will be sufficient to meet the needs of the development.

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

3.12.5 ARCHITECTURAL, ARCHAEOLOGICAL AND CULTURAL HERITAGE

There were no architectural sites identified on the site. In addition, reference to the record of protected structures of Co. Clare (as published in the County Development Plan 2005) indicates the absence of protected architectural sites within the townland of Ballingun West. The geological heritage is not considered significant on the proposed development site, (See section 3.3).

The archaeological heritage of the area was assessed as part of the Cultural Heritage Assessment (see section 3.11). No surface features of an archaeological nature were noted during the archaeological field surveys of the site, and the assessment also did not indicate any recorded monuments within the site. The nearest recorded monument (in excess of 100m of the proposed site) (RMPCL047-050) is located west of the proposed site in the townland of Ballinagun West. The monument consists of a substantial earthen enclosure which is situated immediately south of the existing public roadway. It was concluded that it is unlikely that ground disturbance associated with the proposed development will have any archaeological impact.

3.12.6 PREDICTED IMPACTS

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

3.12.7 MITIGATION MEASURES

As no significant impacts are anticipated, no specific mitigation measures are anticipated. Mitigation measures for aspects of the development such as landscape, traffic, noise, vibration, air, hydrology, soils and geology are described in the preceding sections.

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

Table 3.13.1 highlights the impacts and effects on interactions between these media and identifies the sections of the EIS where the interactions are addressed.

3.13.1 WATER: HUMAN BEINGS/FLORA & FAUNA

There are no surface water courses in the immediate vicinity of the development however, two outfalls from the facility indirectly discharge to surface waters via surface field ditch drains and therefore there is potential risk to surface waters from the site if controls are not put in place. Water use for waste processing at the facility is considered to be low, with existing water harvesting and conservation practices in place. Storm water run off is treated via an interceptor before entering drainage ditches. Contamination of groundwater beneath the site would restrict any future use of the underlying strata for water supplies and would also have the *potential* to impact on the water quality on the local waterways. Mitigation measures to ameliorate these potential impacts are proposed in section 3.4: Hydrology and section 3.5: Hydrogeology.

3.13.2 HUMAN BEINGS: AIR/TRAFFIC/LANDSCAPE

Dust emissions, bioaerosols and noise emissions from the proposed development site have the *potential* to impact on human beings in the vicinity of the site. Dust emissions have the potential to create a nuisance which may be associated with the development. mitigation measures to prevent the aforementioned impacts are given in section 3.6: Air, which will abate any potential nuisance.

The development constitutes a continuation of the existing facility, where dust deposition is employed for dampening down in order to mitigate against dust problems. The introduction of a state of the art biofilter will further reduce potential impact from emissions. This practice will continue in accordance with development.

There two main direct emissions to air for the proposed upgrade of the facility namely, the biofilter and the Biomass Recovery Plant. There will be an increase in the volume of traffic generated by the facility however, mitigation measures will be put in place as outlined in Chapter 3.8 Traffic of the EIS. Haul routes will remain consistent with those currently in use.

The visual impact of the development on the site has the potential to affect human beings, particularly residents on the local road the L6180, however the proposed elevations of the new buildings are not greater than the existing apex of the existing processing buildings. Mitigation proposals are outlined in section 3.10: Landscape. It is considered that restoration of the site will ameliorate this and any future impacts.

3.13.3 FLORA & FAUNA: SOIL & GEOLOGY/AIR

Minor impacts will be encountered by the flora and fauna due to the loss of current habitat type within the proposed excavation areas. This habitat however, is not considered ecologically significant (refer to section 3.2: Flora & Fauna). In addition, screening embankments developed on the site will enhance the flora and faunal biodiversity of the area by creating a new niche to the area.

The migration of dust emissions can have negative impacts on vegetation surrounding the site, however this impact is localised and the vegetation impacted on, is again of low ecological value. Mitigation measures proposed for the amelioration of this impact are outlined in section 3.6: Air.

While negative impacts have been identified they are mainly minor in so far as this facility is already in existence at the location since 1984, and there will not be a significant increase of emissions from the existing baseline to environmental media such as surface water, groundwater and air resulting from the development of the site. As the existing site has been under the remit of Waste Permits and a water discharge licence, the site has been monitoring its environmental outputs for sometime and implementing continuous improvement projects for the protection of the environment. The development of the site will result in considerable improvements for surface water drainage, leachate management, fuel storage and general environmental management of the site. The development will give rise to visual impact at the southern end of the site, however these buildings are designed such that they will blend into existing site structures. In general, the expansion of the site is considered to be significant in terms of development and tonnages however, the impact on sensitive receptors is low once mitigation measures have been implemented by Clean (Irl) Refuse & Recycling Ltd.

TABLE 3.13.1: SUMMARY OF THE ENVIRONMENTAL IMPACTS OF A PROPOSED DEVELOPMENT.

	Human Beings	Flora	Fauna	Soil & Geology	Water	Air	Climate	The Landscape	Material Assets	Cultural Heritage	Traffic
Human Beings		none	none	none	**3.1, 3.4, 3.5**	**3.6**	none	none	**3.12**	none	3.1 & 3.8
Flora	none		none	**3.2**	**3.4 & 3.5**	**3.6 & 3.2**	none	none	none	none	none
Fauna	none	none		**3.2**	**3.2**	none	none	none	none	none	none
Soil & Geology	none	**3.2**	**3.2**		none	none	none	none	none	none	none
Water	**3.1, 3.4, & 3.5**	**3.2 & 3.4**	**3.2 & 3.4**	none		none	none	none	**3.4 & 3.5**	none	none
Air	**3.1 & 3.6**	**3.2**	none	none	none		none	none	none	none	3.6 & 3.8
Climate	**3.1 & 3.9**	none	none	none	none	**3.6 & 3.9**		none	none	none	3.9
Landscape	**3.1 & 3.10**	none	none	none	none	none	none		**3.10**	none	None
Material Assets	**3.12**	none	none	none	**3.4, 3.5 & 3.12**	none	**3.12**	**3.10**		none	3.12
Cultural Heritage	none	none	none	none	none	none	none	none	none		None
Traffic	**3.1& 3.8**	none	none	none	none	3.6	none	none	**3.10**	none	

Note: This Table identifies the Section of the EIS where impacts or effects on interactions between environmental media are discussed. Any interactions which will not be impacted upon or affected by the facility are not described in the EIS.