SECTION 3

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3. THE EXISTING ENVIRONMENT, EMISSIONS, MITIGATION MEASURES & LIKELY SIGNIFICANT IMPACTS

Note: Figures referred to are contained in EIS Volume II, Appendices. Drawings referred to are contained in EIS Volume III, Drawings.

This section of the EIS is broken into ten different subsections as follows:

- Air
- Climate
- Cultural Heritage
- Ecology
- Human Beings
- Traffic
- Soils, Geology, & Groundwater
- Landscape
- Noise
- Surface Water
- Material Assets
- Interrelationships

Each of these subsections are further sub divided into the following subsections:

- **Existing Environment** – In this report the author has interpreted the term 'Existing Environment' to refer to the environment as it pertains to a particular parameter (e.g. dust, odour etc.)
- **Potential Emissions** – In this report the author has interpreted the term 'Potential Emissions' as being those emissions, which have historically been associated with similar type operations at other geographic locations.
- **Description of Likely Impacts** – In this report the author has interpreted the term 'Likely Impacts' as those impacts likely to take place in the event that the necessary containment and preventative measures are not incorporated in the development design.
- **Mitigation Measures** – In this report the author has interpreted the term 'Mitigation Measures' as measures to be incorporated in the design and construction of the proposed development so as to prevent or minimise its impact on the natural environment.
- **Likely Significant Impacts** – In this report the author has interpreted the term 'Significant Impacts' to mean those impacts of significance likely to occur in the event that the design of the proposed development is implemented in its entirety including all containment measures.

3.1 Air

The site of the proposed development is located immediately east of the N81, approximately 2.5 km south west of Donard and 5km north of Baltinglass in County Wicklow. The site is an existing sand and gravel pit situated on the western side of the Carrigower River valley.

The area surrounding the site is predominantly agricultural in nature, with a small number of scattered residences, farms and businesses, which are described in Section 3.5 – Human Beings.

3.1.1 Dust

3.1.1.1 Existing Environment

To determine the air quality on the site at present, a baseline survey of dust deposition rates at selected locations around the site was undertaken. Potential sources of dust in the locality at present include roadside dust, farming activities, re-suspension of soil from fields by the wind and sand from quarry site itself.

The dust monitoring took place between 9 December 2003 and 6 January 2004 (28 days) at five locations along the site boundary. Dust monitoring was carried out in accordance with the German Standard *"VDI 2119 (Measurement of Dustfall, Determination of Dustfall using Bergerhoff Instrument – German Institute)".*

The dust monitoring locations are depicted on Figure 3.1.1. A summary of the results from the dust survey is depicted in Table 3.1.1. The laboratory report on dust is included in Appendix 5.

Table 3.1.1: Baseline Dust Deposition Rates, Whitestown Lower, Co. Wicklow (December 2003/January 2004)

Monitoring Point	Location	Dust Deposition Rate ($mg/m^2/day$)
D1	Southern site boundary	27.7
D2	Eastern site boundary	33.3
D3	North eastern site boundary	22.2
D4	North western site boundary	11.1
D5	At site entrance (western boundary)	16.6

Dust deposition rates across the site ranged from 11.1 $mg/m^2/day$ to 33.3 $mg/m^2/day$.

The results of the dust deposition survey suggest that the existing environment displays low dust deposition rates for a rural agricultural environment; it is understood ranges from 0–60 mg/m^2/day, with values of up to 80–120 mg/m^2/day in urban locations. These levels are low, considering the site is an open sand and gravel pit. It is noted however, that during the dust survey, no extraction activities were being carried out. Coupled with this, the survey was undertaken during winter months.

It is understood that an emission limit value, normally specified by the EPA for waste management facilities, is typically 350 mg/m^2/day.

The spatial pattern of dust deposition may be influenced by local wind direction and strength. The prevailing wind direction is from the southwest, which would tend to blow any dust to the northeast of the site. Rainfall will also tend to reduce the rate of emission of dust. Wind direction and rainfall are discussed in greater detail in Section 3.2 - Climate.

3.1.1.2 Potential Emissions

The potential emission from the proposed development will be dust.

Dust emissions could potentially be generated from the following proposed activities:

- Further sand and gravel extraction
- Construction activities
- Excavation of previously deposited waste
- Recovery of previously deposited waste
- Traffic to and from the site
- Recovery of imported wastes
- Disposal of residual waste in a lined landfill
- Landfill capping and final site restoration activities

3.1.1.3 Description of Likely Impacts

It is expected that there will be some increase in dust generation as a result of the proposed activities; however, it is likely that dust generation will remain below the accepted EPA emission limit, with proper site management.

Dust concentrations may temporarily exceed the EPA emission limit at certain dust monitoring locations during potentially high dust generating activities (e.g. construction) and during dryer weather. The impact from these temporary exceedances will be short-term

3.1.1.4 Mitigation Measures

Mitigation measures will be put in place as required to avoid nuisance to surrounding residences and roadways. These will include the following where necessary:

- Providing macadam or similar material on access roads to the Resource Recovery Building (RRB),
- Using of dust suppression measures within the RRB,
- Retaining and enhancing existing vegetation at the site perimeter,
- Using dust suppression measures including temporary wheelwash facilities to prevent material being transferred to external roads during operations at the site,
- Using a bowser to distribute water on haul roads,
- Wetting down of dry areas during site construction,
- Limiting the use of the Mobile Recycling Unit (MRU) during extended periods of dry weather.

3.1.1.5 Likely Significant Impacts

It is predicted that there will be increased dust production upon commencement of the proposed development.

With the implementation of the mitigation measures however, the increased dust concentrations will not result in significant impacts on the surrounding environment.

Ultimately the proposed development (i.e. restoration of the pit) will have a net positive impact by replacing the existing area of bare exposed sand & gravels and soil with vegetated surfaces.

All of the likely impacts associated with dust have been addressed and mitigation measures proposed where necessary to ensure that the impacts remain at acceptable levels.

3.1.2 Odour

3.1.2.1 Existing Environment

During the December 2003 to February 2004 investigations, odours were observed during the excavation of trial pits in the vicinity of monitoring wells. These odours were associated with the previously deposited wastes.

3.1.2.2 Potential Emissions

A potential emission from the proposed development will be odour. Odorous emissions could potentially be generated from the following proposed activities:

- Excavation of previously deposited wastes
- Recovery and management of previously deposited materials,
- Recovery and management of incoming non-hazardous Commercial & Industrial, Household and Construction & Demolition wastes,

3.1.2.3 Description of Likely Impacts

It is expected that there will be some odorous emissions during the excavation, recovery and management of previously deposited materials. These processes will take place in phases over a total period of ca. 3 years; thus any adverse impact from odorous emissions will be short-term.

Odours may be generated as a result of the processing of wastes in the RRB.

3.1.2.4 Mitigation Measures

Mitigation measures will be put in place as required to avoid nuisance to surrounding residences and roadways. These will include the following operating procedures where necessary:

- Many of the waste handling procedures will be carried out indoors in the RRB.
- Extraction fans with filters will be in operation to control odour levels within the RRB.
- All putrescible wastes will be passed into the composting tunnels. These tunnels are kept aerated to avoid the generation of odours.
- The composting tunnels also have a biofilter to treat any odours coming off the process.
- As a contingency, a recognised odour suppressant product would be kept on the proposed site.
- All wastes will be covered on a daily basis following disposal in the lined landfill.
- A walkover survey of the site will be undertaken by personnel on the site on a daily basis. Any activities resulting in the generation of odours at the site boundary will be reviewed, with a view to eliminating the source of the odour.

It is noted that a baseline Odour Survey will be carried out at the facility, prior to commencement of waste management activities.

3.1.2.5 Likely Significant Impacts

Currently there are no activities on the site; however, odours were identified which are associated with the previously deposited wastes.

If the amount of putrescible materials in the waste is high, the potential for an environmental impact is greater than if there is little or no putrescible material backfilled (as is expected). Without the proposed mitigation measures, it is anticipated that that there will be an impact on the surrounding environment.

However, with the aforementioned mitigation measures in place, it is anticipated that there will be little or no impact on the surrounding environment but to the immediate area within the site.

3.1.3 Waste Biodegradation Gas

3.1.3.1 Existing Environment

As indicated in the Preliminary Risk Assessment Report (Appendix 9), landfill gas was observed from a number of borehole monitoring locations and from spike surveys undertaken in the waste zones A to C inclusive. In particular elevated levels of methane were observed at a number of locations.

3.1.3.2 Potential Emissions

There is the potential for the formation of Waste Biodegradation Gas at a number of locations at the facility as described in Section 2. The major source of gas will be from the wastes deposited in the lined landfill.

Biodegradable wastes that are not recovered during the processing of wastes at the site, which will result in the generation of gases include paper, wood, and a small percentage of putrescible wastes. The amount of gases generated from biodegradable wastes is quantified in Section 2 of this EIS.

3.1.3.3 Description of Likely Impacts

Due to the deposition of biodegradable wastes in a lined landfill, gases will be produced as a result of this development.

3.1.3.4 Mitigation Measures

Gases are likely to be generated in the landfill within ca. 2 years of initiation of disposal activities. At this stage gas will be extracted from the landfill using active systems. This system will be extended and maintained

for the duration of the project and for years following closure of the facility.

The 'Landfill Gas' will be passed through a flare system, and possibly through a gas utilisation plant, depending on the levels of gas extracted.

Where possible, biodegradable wastes will be recovered during processing at the RRB.

3.1.3.5 Likely Significant Impacts

It is predicted that there will be no significant impacts upon air quality caused by the generation of landfill gases. All of the impacts, which have been identified, have been addressed and mitigation measures proposed where necessary to ensure that the impacts remain at acceptable levels.

3.2 Climate

The Irish climate is subject to strong maritime influences, the effects decreasing with increasing distance from the Atlantic coast. Since no area of the country lies more than 120 km from the sea, the range of mean temperatures across the country is narrow.

Data from Met Éireann, the Irish meteorological service that operates monitoring stations at a number of locations around the country, indicates that December, January and February are generally the coldest months of the year. Most areas of the eastern half of the country (which includes the location of the proposed facility) experience rainfall in the region of 750-1100 mm per annum.

3.2.1 Existing Environment

There is no continuous meteorological monitoring station located uniquely close to the site of the proposed development. Comprehensive meteorological data is available for Casement Aerodrome, which is approximately 40 km northwest of the site.

An analysis of mean monthly temperatures and precipitation rates for Casement Aerodrome is presented in Table 3.2.1. Mean monthly temperatures for the area are in the range 4.6 to 15.2°C, with mean monthly precipitation rates in the range 50.7 mm in June to 73.1 mm in January. The average annual precipitation rate at Casement is 711.5 mm.

Table 3.2.1: Climate Data for Casement Aerodrome (1968 - 1996)

Month	Mean Temp °C	Mean Rainfall (mm)	Potential Evapo-transpiration (mm)	Effective Rainfall (mm)[1]
January	4.9	68.7	9.1	59.6
February	4.6	50.7	19.0	31.7
March	6.0	53.8	36.0	17.8
April	7.5	49.9	55.5	-5.6
May	10.1	56.6	77.0	-20.4
June	13.1	53.0	89.2	-36.2
July	15.2	48.9	87.9	-39.0
August	14.8	63.7	71.3	-7.6
September	12.6	58.7	47.4	11.3
October	10.1	67.2	23.6	43.6
November	6.7	67.2	8.9	58.3
December	5.6	73.1	5.2	67.9
Monthly Average	9.3	59.3	44.2	15.1
Annual Total	-	711.5	530.1	181.4

Note 1: Effective Rainfall = Mean Rainfall – Potential Evapo-transpiration

Analysis of the monitoring data from the meteorological station at Casement Aerodrome from 1968 - 1996 shows that the dominant wind direction is from the S-SW-W quadrant, with an annual incidence of about 55%. The annual average wind speed is approximately 5.6 m/s with wind speeds of < 5 m/s occurring for 33 % of the year and wind speeds in excess of 6 m/s occurring for 42 % of the year. Wind speed and direction can impact the dispersal of potential nuisances (e.g. dust, odour).

In addition, a small quantity of rainfall data was available for two locations close to the site i.e. Donard and Glen of Imall. This data is presented in Table 3.2.2. As the site is situated between approximately 140 to 165 mOD, the rainfall data recorded at these two nearby stations is considered to be more representative of the likely rainfall at the site.

3.2.2 Potential Emissions

Potential emissions are discussed in Section 3.1 (Air).

3.2.3 Description of Likely Impacts

Likely impacts from air emissions are discussed in Section 3.1 (Air).

Table 3.2.2: Rainfall Data for Donard and Glen of Imall

Location	Grid Reference	Height* (metres)	Time Period
Donard	S930977	183	1961 - 1984
Glen of Imall	S972946	213	1961 - 1990

Month	Rainfall (mm)	
	Donard	Glen of Imall
January	113	143
February	80	99
March	87	107
April	73	88
May	86	96
June	73	80
July	68	79
August	96	105
September	97	107
October	108	123
November	101	121
December	123	145
Monthly Average	92.1	107.8
Annual Total	1105	1293

*** Height above Sea Level**

3.2.4 Mitigation Measures

Mitigation measures to avoid impacts from air emissions are discussed in Section 3.1 (Air).

3.2.5 Likely Significant Impacts

Likely significant impacts from air emissions are discussed in Section 3.1 (Air).

3.3 Cultural and Archaeological Heritage

A full report on Cultural and Archaeological Heritage was prepared by Cultural Resource Development Services Ltd. (CRDS), of Dublin, and is included in Appendix 6, Volume II of the EIS.

3.3.1 Existing Environment

There are a number of archaeological sites and monuments within 1.5km of the site. They are summarised in the CRDS report.

There are no recorded archaeological monuments within the boundary of the proposed development at Whitestown Lower, Co. Wicklow and no unrecorded archaeological monuments encountered during fieldwork component of the cultural heritage assessment.

3.3.2 Potential Emissions

As there were no recorded or unrecorded archaeological monuments within the area proposed for restoration, there are no emissions associated with the proposed development.

3.3.3 Description of Likely Impacts

As there were no recorded or unrecorded archaeological monuments within the area for restoration, there are no impacts associated with the proposed development.

3.3.4 Mitigation Measures

As there were no recorded or unrecorded archaeological monuments within the area for restoration, no mitigation measures are necessary.

3.3.5 Likely Significant Impacts

There will be no impacts on Cultural and Archaeologic Heritage as a result of the proposed development.

3.4 Flora and Fauna

Natura Environmental Consultants Ltd. (Natura) was retained to undertake a detailed baseline ecological survey of the Whitestown site. This work was undertaken between December 2003 and March 2004. A copy of Natura's March 2004 Report is included in Appendix 7 of the EIS.

Roger Goodwillie & Associates was retained to review the baseline report and undertake an impact assessment of the potential impacts of the proposed development in terms of flora and fauna. A copy of the March 2004 Goodwillie Report is also included in Appendix 7 of the EIS.

A synopsis of the two reports is provided in the following sections.

3.4.1 Existing Environment

A detailed description of the receiving environment is outlined in the Natura Report entitled 'Whitestown Lower Gravel Pit Baseline Ecological Survey' March 2004 (Appendix 7).

In summary, as depicted in Figure 3.4.1, the site extends towards the southeast where it meets the Carrigower River. The Carrigower River and its adjacent floodplain are now included within the River Slaney candidate Special Area of Conservation (cSAC) (site code no.000781). It is understood that the River Slaney cSAC was extended in May 2003 to include the Carrigower River on account of its importance as a spawning tributary.

Following a detailed ecological baseline study, which was undertaken in January/February 2004, the study found that the Carrigower River and adjacent floodplain are part of the River Slaney cSAC and are thus of international importance (under EU Habitats Directive – 92/43/EEC). The presence of abundant salmonids spawning habitat in the river along with extensive signs of otter activity adds to the value and importance of this site (Reference - Natura March 2004 Report).

The EPA has undertaken river quality assessments between 1995 to 1997 and 1998 to 2000 in the River Carrigower ("Water Quality in Ireland" 1998 and 2002 references). For both EPA monitoring events, the river quality in the Carrigower was unpolluted for 5 km (Class A) and slightly polluted for 3 km (Class B). It is understood from these sampling events, that the unpolluted 5 km stretch of the Carrigower in the 1995 to 1997 and 1998 to 2000 assessments includes the river stretch adjoining the Whitestown Lower site.

A Q rating of 3-4 (slightly polluted status) in the March 2004 Natura Report, has subsequently been given to the Carrigower River, both upstream, adjacent and downstream of the site.

From the historical EPA results and the more recent Natura sampling event (10 February 2004), it is observed that the Carrigower river quality adjoining the site, which includes upstream and downstream, has deteriorated over the last ca. 10 years.

3.4.2 Potential Emissions

Potential emissions associated with the proposed development include:

- Surface water runoff during the initial construction phase. This runoff may include elevated levels of suspended solids.
- Leachate runoff during the excavation of previously deposited wastes.
- Surface water runoff during ongoing site development works.
- Dust generation during the construction phases and the processing on-site of previously deposited wastes.
- Leachate release from the fully engineered lined landfill.

3.4.3 Description of Likely Impacts

As the majority of the site will be backfilled over a ten-year period, any habitats found within the area for backfill will be removed. It is noted that the site is predominantly exposed sand and gravel (ED1) and recolonising bare ground (ED3) with some artificial surfaces (BL3). Proposed development at the site will include the removal of the following habitats:

- Small areas of scrub (WS1) (low to moderate impact of local significance).
- Nesting colony of sand martins (moderate negative impact of local significance).
- Badger sett (moderate negative impact of local significance).

As indicated in the Natura Report, the small areas of scrub are of moderate local ecological value. It is noted that ca. 50 sand martin burrows were identified and the badger sett was identified as disused.

3.4.4 Mitigation Measures

A comprehensive landscaping programme is proposed for the site during and upon completion of the proposed site development. This will include the development of additional tree lines, tree copses and well-managed hedgerows.

As indicated in the Goodwillie 2004 Report (Appendix 7), a sensible precaution would be to establish a natural willow wood on the floodplain. Movement of leachate, if any, would occur on the surface layer of the watertable and would therefore be available to tree roots. Willow beds are

currently being planted for waste-water treatment and are becoming accepted in Ireland. Without grazing they would also be a natural part of all river floodplains. In these situations they act as a filtration and nutrient extraction system, converting nutrient ions into biomass and reducing loading on surface waters. A wood using native species would be totally compatible with the cSAC status of the valley and would in fact enhance it.

All backfilling activities will be undertaken outside the sand martin breeding season. This will result in the sand martins finding suitable nesting areas in the locality as there are a number of well-established sand and gravel operations in the immediate vicinity of the Whitestown site.

If the identified badger sett is being used during the initiation of the proposed development, the sett will be relocated by an established ecologist using the best available methodology.

The proposed development will be designed in accordance with established EPA guidelines. This includes a fully engineered lining system, leachate management system, and surface water control infrastructure. All these engineering systems will be agreed with the Agency prior to acceptance of wastes at the proposed facility, and are intended to avoid any impacts on the adjoining surface water network.

During the construction of the facility, all steps will be taken to ensure that the adjoining surface water will not be impacted upon. This will include a comprehensive phasing programme to avoid the storage of soils, thus avoiding the potential for elevated suspended solids in the adjoining River Carrigower.

As described in the Air Section of the EIS, mitigation measures such as dust suppression measures using water bowsers will be used to reduce the potential of elevated dust levels during construction and operation of the proposed development.

In terms of positive impacts, the landscaping plans, as outlined in Section 3.8 of the EIS, will include the enhancement of existing hedgerows, and the planting of new hedgerows and wood stands and copses. This will provide additional habitat corridors thus enhancing existing flora and fauna. The planting of the flood plain as proposed by the Goodwillie report will further enhance existing species diversity in the environs of the site.

3.4.5 Likely Significant Impacts

The most likely scenario is for the development to operate properly and cause no significant impact on the river or the Slaney cSAC. However, as long as the waste material is breaking down there is always a risk of

leachate escape and migration into the river catchment. Engineering methods are available to recover such leachate but they are not always totally satisfactory. There is thus the possibility of a temporary negative impact on the River Carrigower and associated cSAC, which would continue for 10 years or so after the completion of the landfill (Goodwillie Report, March 2004).

The worst case is for the river to be polluted over an extended period by ammoniacal nitrate, which is harmful to fish and causes eutrophication. The material is also produced by farm wastes so that the Carrigower is likely to have had previous incidents of inflow. The egg and juvenile phase are the most sensitive stages of salmonid fish. Mature fish resist much higher concentrations, which they experience in the lower estuaries. The downstream effects of eutrophication could also affect the pearl mussel *Margaritifera* which is sensitive to increased algal growth. Dilution from the rest of the Slaney headwaters would, however, greatly decrease this impact (Goodwillie Report, March 2004).

However, if all the above mitigation measures are undertaken, there will be no significant impacts on the flora and fauna in the vicinity of the proposed development.

As the proposed development includes the excavation and processing of previously deposited wastes, and the placing of residual wastes in a fully engineering lined facility, the potential for leachate impacting on the adjoining Carrigower River is significantly reduced.

3.5 Human Beings

The human beings section addresses the following subjects:

- Population Statistics
- Land-use and housing
- Infrastructure
- County Development Planning
- Waste Management Planning
- Local Industry
- Tourism
- Traffic

An environmental assessment of the impact of the development on human beings is provided below. A separate environmental assessment of traffic has been prepared and is included in Section 3.6.

3.5.1 Existing Environment

3.5.1.1 Population Statistics

The 2002 Census report produced by the Central Statistics Office details population figures in terms of towns and their respective populations.

The site of the proposed development is located 5 km north of Baltinglass town. The townland of Whitestown Lower is located within the Donaghmore Rural Area. The Donaghmore Rural Area lies within the Baltinglass No. 1 Rural Area.

According to the Census 2002 report the Donaghmore Rural Area has experienced a population increase of 9.9% between the years 1996 and 2002. More regionally, the Baltinglass No. 1 Rural Area has experienced an increase of 15.2% between the years 1996 and 2002 see Table 3.5.1.

Table 3.5.1: Population Statistics - Census 2002

Rural Areas	1996	2002	% change
Baltinglass No. 1 Rural Area (Co. Wicklow)	12,749	14,685	15.2
Donaghmore Rural Area	324	356	9.9

3.5.1.2 Land-use and Housing

A field investigation of houses, farms and businesses surrounding the site was undertaken on the 22nd and 23rd of January 2004. The investigation was split into houses, farms and businesses within 500m of the site and

those beyond 500m, up to 750m from the site. Derelict houses were not included in the investigation. Special focus was placed on houses, farms and businesses that were adjacent to the site or those with clear views into the site.

Houses, farms and businesses are depicted on Figure 3.5.1. To facilitate the description of the various locales surrounding the site the area has been divided into quadrants. These are described in Table 3.5.2.

Table 3.5.2: Location and Number of Houses, Farms and Businesses Surrounding the Site.

Quadrant	Distance from site	Location	Townland	General description of views into site	No. houses/ Farms/ Businesses
1	<500m	North to east of site	Whitestown Lower, Road **L4320**	Site is visible from the business east of the site along road L4320	1
2	<500m	East to South of site	Whitestown Lower, Castleruddery Upper, Roads **L8320** & **L4320**	Site is visible from 4 houses southeast of site	5
3	<500m	South to West of site	Whitestown Lower, Castleruddery Upper, Road **N81**	House adjacent to site has view into site others do not.	3
4	<500m	West to North of site	Whitestown Lower, Road **N81**	Business opposite the site has view into site entrance	5
Total					**14**
1a	>500m	North to east of site	Newtown, Ballylion Lower, Deerpark, Road **L4320**	No views from houses into site	10
2a	>500m	East to South of site	Castleruddery Upper, Donaghmore, Roads **L8320** & **L4321**	No views from houses into site	16
3a	>500m	South to West of site	Randalstown, Roads **N81**, **L4321**, **L8299**, **L8321**.	No views from houses into site	16
4a	>500m	West to North of site	Whitestown Upper, Road **L8814**	No views from houses into site	13
Total					**55**

3.5.1.2.1. Houses, Farms and Businesses within 500m of site

Quadrant 1

There is one business in Quadrant 1, as denoted in Table 3.5.3 and depicted in Figure 3.5.1. This business, Chrysalis Holistic Centre, is located east of the site. The site is visible from the business.

Table 3.5.3: Houses, Farms and Businesses in Quadrant 1

Description	Quadrant 1	Quadrant 2	Quadrant 3	Quadrant 4
Houses	0	5	2	2
Mobile Home	0	0	0	0
Homes with Farms	0	0	0	2
Home with quarry	0	0	0	0
Quarry	0	0	1	0
Home with Business	1	0	0	1
ESB power station	0	0	0	0
House under construction	0	0	0	0
Total	**1**	**5**	**3**	**5**

Quadrant 2

There are five houses in Quadrant 2, as denoted in Table 3.5.3 and depicted in Figure 3.5.1. Two houses lie to the east of the site on Road L8320. The other three houses are along the Road L4320, southwest of the site. The site is visible from four of these houses.

Quadrant 3

There are two houses and a quarry in Quadrant 3, as denoted in Table 3.5.3 and depicted in Figure 3.5.1. Two houses lie immediately southwest of the site, along the main N81, one of which shares its property boundary with the site. The site is visible from this house. The quarry is at the junction of the N81 and Road L4321.

Quadrant 4

There are two houses, one business and two farms in Quadrant 4, as denoted in Table 3.5.3 and depicted in Figure 3.5.1. These are located along the N81. The site is not visible from these premises.

There is a business (Ellen Construction) on the N81, directly across the road from the site. The gateway into the site is visible from this business.

3.5.1.2.2 Houses, Farms and Businesses > 500m from Site

Quadrant 1a

There are eight houses and two farms in Quadrant 1a, as denoted in Table 3.5.4 and depicted in figure 3.5.1. Eight houses and one farm are located along the Road L4320 northeast of the site. A farmhouse is located to the

north of the site. The site is not visible from these houses. The other farm is located north east of the site.

Table 3.5.4: Homes and Businesses in Quadrant 1

Description	Quadrant 1a	Quadrant 2a	Quadrant 3a	Quadrant 4a
Houses	8	13	13	9
Mobile Home	0	0	0	0
House with Farm	2	1	1	4
Home with quarry	0	0	0	0
Quarry	0	0	0	0
Home with Business	0	2	1	0
House under construction	0	0	0	0
ESB power station	0	0	1	0
Total	**10**	**16**	**16**	**13**

Quadrant 2a

There are 13 houses, two houses with business and one house with a farm in Quadrant 2a, as denoted in Table 3.5.4 and depicted in Figure 3.5.1. Three houses are located along Road L8320, southeast of the site. Six houses, one house with a business and one house with a farm are located at the junction of Roads L8320 and L4321 to the southeast of the site. There are three more houses and one house with a business along Road L4321 to the southeast of the site. There is also a house south of the site along the Road L4320. The site is not visible from these premises.

Quadrant 3a

There are 13 houses, one house with a farm and one house with a business (timber yard) and one ESB power station in Quadrant 3a, as denoted in Table 3.5.4 and depicted in Figure 3.5.1. There are four houses along the Road L8299 to the south of the site. The ESB power station is located on Road L4321. A house with business (timber yard) and another house are located southwest of the site at the junction of roads N81 and L4321. There is a house to the south of the site on a private access lane off the N81. The remaining seven houses and one farm are located to the southwest of the site along Road L8321. The site is not visible from these premises.

Quadrant 4a

There are nine houses and four houses with farms in Quadrant 4a, as denoted in Table 3.5.4 and depicted in Figure 3.5.1. These houses are located alongside Road L8814 and L8321, north of the site. The site is not visible from these houses.

3.5.1.2.3 Summary

There are ca. 14 houses, farms and businesses within 500m of the site. There are a further ca. 55 houses, farms and businesses between 500m and 750m from the site. Views into the site are limited to houses directly adjacent to the site and on Road L4320. There are 11 houses and businesses on the main N81 road to the north and south of the site.

3.5.1.3 Infrastructure

The Dublin to Baltinglass Road (N81) runs along the western boundary of the site. All traffic for current and future operations at the site will access the site from this road.

The proposed facility will receive a water supply from the existing group water scheme, which is located along the existing N81 national secondary road. The predominant water demands at the site during the proposed activities will be for the offices and toilets, and dust suppression.

Sewage generated on-site by employees will be managed through an appropriately designed proprietary system (e.g. Puraflo, Biocycle).

The site will have a power connection from the existing Electricity Supply Board (ESB) single phase, which currently traverses the site from west to east along the northern boundary. This power source will be upgraded to a three-phase connection by means of an ESB transformer unit. Initial discussions have already been undertaken with the ESB. The site will also have a telephone and fax connection serviced from the existing infrastructure located along the N81.

3.5.1.4 County Development Plan

The Wicklow County Development Plan 1999 currently governs County Wicklow in terms of strategic development policies. Within this development plan, a number of policies are outlined which are relevant to the proposed remediation and restoration project at the site, and are detailed in this section.

3.5.1.4.1 Landscape Zone

The County Development Plan (1999) divides County Wicklow into four landscape zones:

1. Outstanding Natural Beauty
2. Special Amenity
3. Rural Area
4. Corridor Area

The site is located in a 'corridor area' zone, with medium vulnerability. According to the Development Plan (1999):

"This landscape zone covers the main access corridor areas of County Wicklow".

The 'corridor area' zone of County Wicklow is subdivided into two i.e. the Eastern Corridor and the Western Corridor. The Western Corridor is focused on the N81 road from Dublin, through Blessington on towards Baltinglass. The site is located along this road 2.5 km southwest of Donard and 5 km north of Baltinglass.

Section 3.3.14 of the Development Plan states that:

"The council will maintain the lands within 100 metres of the national routes (N11 and N81) free of development..."

3.5.1.4.2 Settlement Strategy

The settlement strategy for County Wicklow is also outlined in the County Development Plan (1999). The plan states that:

"The Council will encourage housing, industry and other development to locate in existing towns and villages that have the basic social, community and physical infrastructure or where these can be provided or expanded most economically or where there are specific zones for specific uses within the County."

The strategy identifies Baltinglass as a primary growth centre. Donard has been identified as a village housing, industry and other development will be encouraged.

3.5.1.4.3 Waste, Effluent and Emission Control

Section 2.6.4 of the County Development Plan (1999) outlines the Councils policy objectives with regard to waste, effluent and emission Control. Of particular reference are the following objectives:

- *"To protect existing groundwater aquifers, surface waters and coastal waters from pollution."*
- *"To have regard to its duty under section 38(1) of the 1996 Waste Management Act, to provide and operate or arrange for the provision and operation of, such facilities as may arise for the recovery and disposal of household waste arising within its functional area."*
- *"To monitor the production storage and movement of hazardous and dangerous waste within the county."*

3.5.1.4.4 Extractive Industry

Section 2.8.13 of the County Development Plan (1999) states that:

"The Council will facilitate the operations of the extractive aggregates industry where they conform to the principle of sustainability and do not adversely affect residential, environmental or tourism amenities."

Section 3.13.6 of the County Development Plan (1999) states that:

"The working, landscaping, restoration and after care of the site will be carried out to the highest standards in accordance with an approved scheme. The scheme will incorporate progressive restoration where practical".

3.5.1.4.5 Towns and Villages of Streetscape Value

A number of towns and villages are set out in the County Development Plan (1999) as "Towns and Villages of Streetscape Value". This means that *"Special consideration will be given to the protection of the existing streetscapes and urban design qualities"* of a number of towns and villages.

Baltinglass and Donard have been identified in the list of towns and villages of streetscape value. The proposed development will not impact on the streetscape value.

3.5.1.4.6 Waste Management

The County Development Plan (1999) states the following with regard to waste management:

- *"The Council will provide for waste disposal sites as necessary in accordance with the needs arising within County Wicklow and Council Waste Management Plans."*
- *The Council will enforce the provisions of the Waste Management Act 1996..."* (Section 3.7.2).
- *"The Council will ensure that the highest standards of the GSI Groundwater Protection Code of Practice (review) and the Draft Landfill Directive (review) (including amendments) are met" (Section 4.6.2).*

The development of this facility, including the lining of the site encompassing this existing landfill can assist the County in meeting its obligations under Section 38(1) of the Waste Management Act, *"to provide and operate or arrange for provision and operation of such facilities as may arise for the recovery and disposal of household waste arising within it functional area"* (Section 2.6.4).

3.5.1.5 Waste Management Plan for County Wicklow

The County Wicklow Waste Management Plan (2000-2004) states the following with regard to the management of wastes in County Wicklow.

"The proposed short term disposal solution is in keeping with National Policy on waste management in that it pursues greater private sector involvement..." (Section 4.5.3).

"There is a need to provide for landfill space in the County for the domestic, commercial and industrial waste it produces" (Section 4.7.4).

The County Wicklow Waste Management Plan (2000-2004) also sets out the following policy with regard to waste disposal, recycling and recovery:

"To ensure the provision of a new landfill for municipal and similar non-hazardous waste (household, commercial, industrial) in the County..." (Section 4.7.4).

"To provide for more recycling capacity for C/D waste. This should sort and recover aggregate and stones, and any other material present such as timber, metal, plastic etc." (Section 4.7.8).

"To seek to use recovered C/D waste (mainly aggregate) in so far as possible in building and development works carried out by the Council." (Section 4.7.8).

3.5.1.6 Public Consultation

A public consultation document was delivered to 37 premises in the vicinity of the proposed development on Friday 20 February 2004. The premises to which the document was delivered are depicted in Figure 3.5.2. The document outlined details of the proposed development, measures to minimise the environmental impact and details of the environmental benefits of proposed activities.

As part of the planning and waste licensing processes, the public were invited to submit their comments regarding the proposed development by post before 5 March 2004.

A copy of the public consultation document is included (overleaf).

A total of 6 objections were submitted. Table 3.5.5 depicts a summary of the objections raised by residents in the submissions.

Table 3.5.5: Objections submitted by residents in response to Public Consultation Document

Objection No.	Timescale	Health Concern	Traffic	Noise	Dust	Natural Environment	General Concerns
1	✓						
2	✓	✓	✓			✓	
3	✓	✓	✓			✓	
4			✓	✓	✓		
5		✓	✓			✓	
6							✓

3.5.2 Potential Emissions

Potential emissions i.e. dust (Section 3.1.1), odour (Section 3.1.2), noise (Section 3.9), groundwater (Section 3.7) and surface water (Section 3.10) are dealt with individually in this section.

Traffic is dealt with in Section 3.6.

It is not thought that the proposed development will negatively affect/contravene population, land-use and housing, County/Local Plans, local industry and tourism.

3.5.3 Description of Likely Impacts

The most likely impacts in relation to dust, odour, traffic, groundwater, noise and surface water. As mentioned previously, these impacts are dealt with in detail in sections 3.1.1, 3.1.2, 3.6, 3.7, 3.9 and 3.10.

3.5.4 Mitigation Measures

Mitigation measures for dust, odour, traffic, groundwater, noise and surface water are described in their respective sections.

In short, measures will be taken to minimise the aforementioned and reduce any potential impacts on human beings.

3.5.5 Likely Significant Impacts

If the appropriate measures are taken it is not envisaged that the development will have a significant impact on human beings.

It should be noted that the overall goal of the proposed development is to restore this site to its original or close to its original contours.

Proposed Rehabilitation and Restoration of O' Reilly's Pit, Whitestown Lower, Co. Wicklow.

Invitation for Public Comment

To Whom It May Concern:

Brownfield Restoration (Ire.) Ltd. are proposing to rehabilitate and restore a disused 14.6 ha site, known as O' Reilly's Pit, at Whitestown Lower, Co. Wicklow. A number of activities will be carried out during the course of the restoration programme as follows:

- *Development of site infrastructure i.e. roads, drainage systems, buildings and offices*
- *Excavation and processing of all wastes previously deposited at the site*
- *Processing and treating wastes, using appropriate technology, including household, commercial, industrial, and construction/demolition wastes*
- *Depositing the residues of the waste treatment processes in a fully engineered waste management facility on site*
- *Restoring the land to a greenfield, as it was prior to gravel extraction and waste disposal, within a 10 year period*

The extent of the proposed lands for which a Waste Licence Application and Planning Application will be lodged, is outlined on the attached drawing.

Measures to Minimise Environmental Impact

- *All elements of the development will meet the stringent requirements of the Environmental Protection Agency (EPA) in regard to design, operation and monitoring of waste management facilities.*
- *A full landscaping programme including planting and screening berms will be implemented throughout the restoration process.*

Environmental Benefits of Proposed Activities

- *The current environmental risks associated with previously deposited wastes on the site will be eliminated*
- *A disused visually unappealing site will be removed from the landscape*

As part of the planning and waste licensing processes, you are invited to submit your comments regarding the proposed development outlined above. Further details on the proposed development and an Environmental Impact Statement will be available for viewing at the offices of the EPA or Wicklow County Council in due course.

Please submit your comments by post before 5 March 2004 to the following address:

Brownfield Restoration (Ire.) Ltd.,
P.O. Box 719,
Naas, Co. Kildare.

3.6 Traffic

A full report on traffic assessment, prepared by Traffic Wise is included in Appendix 8, Volume II of the EIS. This report was prepared in March 2004.

3.6.1 Existing Environment

The existing environment is dealt with in Section 2 of the Traffic Wise March 2004 Report.

3.6.2 Potential Emissions

Potential emissions from the proposed development are considered in Sections 3 and 4 of the Traffic Wise March 2004 Report.

3.6.3 Description of Likely Impacts

Likely impacts are addressed generally in Sections 5 and 6 of the Traffic Wise March 2004 Report.

3.6.4 Mitigation Measures

There are no mitigation measures proposed as traffic volumes on the N81 as a direct result of the proposed development are likely to be less than 2.2%.

3.6.5 Likely Significant Impacts

It can be seen from Section 6 of the Traffic Wise March 2004 Report, that the forecast increases in traffic on the N81 as a direct result of the proposed development are likely to be less than 2.2%. Only during the early periods of construction (incl. import of materials) does the increase in traffic on the N81 exceed 2%. It is noted that this falls well below the threshold recommended by the IHT (Institution of Highways and Transportation) that would warrant detailed capacity assessment analyses to be carried out. Accordingly the increases in AADT on the N81 are not considered significant.

Similarly it can be seen in Section 6 of the Report that the increases in HGV content on the N81 are not likely to exceed 2.2% indeed the average increase in HGV content on the N81 over the life of the proposed scheme (including all construction periods) is shown to be marginally over 1%, which is considered insignificant.

3.7 Soils, Geology & Groundwater

This section assesses the impact of the development on the underlying and surrounding soil, geology, and groundwater.

3.7.1 Existing Environment

The existing overburden, geological and hydrogeological environments were explored by detailed desk studies and on site investigations. Desk studies were carried out into the general overburden, geology and hydrogeology of the site and surrounding lands. Site investigations were carried out between December 2003 and March 2004 by ERML staff and associated sub-contractors. Investigations included trial pitting, soil sample analysis, drilling of borehole/monitoring wells, groundwater sampling/laboratory analysis, and groundwater flow mapping. Findings from these investigations are included in the Preliminary Risk Assessment Report, Appendix 9, Volume II of the EIS and are summarised in the Sections that follow.

3.7.1.1 Overburden

The landscape in and surrounding the site derives its present morphology and its rich sand & gravel deposits from the influence of melt water channels (otherwise known as 'Eskers') from the Quaternary glaciation of Ireland.

The Geological Survey of Ireland (GSI) 'Quaternary Deposit Map' has classified the overburden of the area as "Gravel & Sand derived chiefly from Chert" (GCH), with the site in question marked as a "Sand & Gravel Pit in use". It should be noted that there is a lot of evidence of sand & gravel quarrying activity in the surrounding landscape. Figure 3.7.1 presents a Quaternary map for the area based on the information collected from the GSI.

Particle size distribution results from samples taken during the trial pit assessment and monitoring well installation confirm that the overburden across the site typically consists of sands and gravels with silts intermixed. Appendix 11, Volume II of the EIS includes the particle size distribution test results, in the form of a Factual Report on Laboratory Testing, produced by Geotesting Ltd.

The sand and gravel deposits have been worked from the site since the early 1900's, and more intensively in the last 30-40 years. Backfilling of sections of the void space with wastes is understood to have taken place between the 1970's and 2001. The Preliminary Risk Assessment Report includes details of the extent of these previously deposited wastes to the east of the 110kV power lines.

3.7.1.2 Site Geology

The site geology was researched using the Geological Survey of Ireland (GSI) Booklet – "Geology of Kildare – Wicklow" and associated Geological Map – 'GSI Sheet No. 16' (Scale map – 1:100,000). A bedrock geology map, for the area, based on the information gathered is attached on Figure 3.7.2.

The bedrock beneath the glacial sequence on the site comprises Lower Palaeozoic (Cambrian) Butter Mountain Formation. This consists of dark blue-grey slates, with thin interbedded grey quartzites in places (which may include beds, which are complexly folded and garnet rich, called "Coticules").

To the extreme southeast of the site, along the site contact with the Carrigower River, the bedrock changes to the Donard Andesite Member, as shown on Figure 3.7.2. This member of the main Butter Mountain Formation comprises fine-grained volcanic andesites.

A GSI 'Well Search', for information on wells within 2km of the site, listed twelve wells. They have varying depths to bedrock of 0.9m to 27m, which may be explained by the undulating glacial landscape of the area. The closest five of these wells to the site are shown on Figure 1.1.

Drilling on site in January 2004 confirmed that bedrock across the sand and gravel pit ranges from 0.4 to 8.2 metres below ground level. Subsequent information gathered from cores found on site indicated that bedrock is found as deep as 12.0 metres in the more elevated areas of the site. Borehole logs for the recent drilling and logs constructed using the cores from some of the boreholes from previous drilling activities are attached in Appendix 12, Volume II of the EIS.

3.7.1.3 Site Hydrogeology

3.7.1.3.1 Groundwater Classification

Based on desktop reviews, it is understood that three hydrogeological units underlie the site, namely:

- Shallow water table in overburden sand and gravels and upper fractured bedrock.
- Deeper bedrock aquifer – Butter Mountain Formation.
- Deeper bedrock aquifer – Donard Andesite Member.

The Geological Survey of Ireland has not classified the water-bearing sand and gravels at this site.

The Butter Mountain Formation, which underlies the majority of the site, is classified by the GSI as '**Ll**', which is a Locally Important Aquifer, with bedrock, which is moderately productive, only in Local Zones.

The Donard Andesite Member, which underlies only the southeast boundary of the site, is also classified by the GSI as a Locally Important Aquifer, with bedrock, which is moderately productive, only in Local Zones (**Ll**).

It is noted that according to the Wicklow Groundwater Protection Scheme March 2003, more than 90% of the rock units in the County are classified as either moderately productive only in local zones (Ll) or generally unproductive only in local zones (Pl).

The two bedrock aquifers are shown on the Bedrock Geology & Draft Aquifer Map, on Figure 3.7.2.

3.7.1.3.2 Groundwater Vulnerability

The assessment of groundwater vulnerability for the area is based on guidelines issued by the Geological Survey of Ireland (Groundwater Protection Schemes 1999), and Map 7 (N) of the Groundwater Protection Scheme for Co. Wicklow. These guidelines and Protection Maps evaluate the natural protection of an area against contamination through the overburden characteristics of the area.

As defined by the GSI, *'vulnerability is the term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities'.*

The GSI classify both the Butter Mountain Formation & the Donard Andesite Member as having High Vulnerability. However, as bedrock has been identified on the site within 3.0 metres of the surface (where sands and gravels have been extracted), a vulnerability rating of '**Extreme**' is more appropriate.

3.7.1.3.3 Groundwater Protection Responses for Landfills

Based on the GSI Booklet entitled *Groundwater Protection Schemes*, 1999, Section *Groundwater Protection Responses for Landfills – Response Matrix for Landfills,* the aquifer classification **'Ll'** and the '**Extreme**' vulnerability rating, results in a protection response of **R2**[2] for landfill. As outlined in the GSI response matrix, the following guidelines apply:

Acceptable subject to guidance outlined in EPA Landfill Design or conditions of waste licence:

- *Special attention should be given to checking for the presence of high permeability zones. If such zones are present, then the landfill*

should only be allowed if it can be proven that the risk of leachate movement to these zones is insignificant. Special attention must be given to existing wells down gradient of the site and to the projected future development of the aquifer

- *Groundwater control measures such as cut-off walls or interceptor drains may be necessary to control high water table or the head of leachate may be required to be maintained at a level lower than the water table depending on site conditions.*

3.7.1.3.4 Groundwater Usage

Two public water supplies are located within 4km of the site (Freynestown & Eadestown), both of which are supplied by springs.

Site walkover surveys and discussions with the Local Authority indicate that there is no groundwater users between the site proposed for development and the Carrigower River (i.e. a hydraulic divide) located ca. 200 metres south east of the site.

It is understood that the two residences located immediately south of the site (see Figure 3.5.1) are supplied by the Eadestown Public Water Supply. This mains water infrastructure runs from Eadestown, which lies ca. 4km south of the site, south of the Rivers Slaney and Carrigower. A small domestic pipe runs north from the Whitestown crossroads to supply these two residences. This information is based on discussions with the Local Authority.

The two surface water features described above are understood to act as groundwater divides, thus reducing the potential of impact on groundwater users south of these river features. It is noted that there are no known groundwater users immediately down-gradient of the site and north of the Carrigower River.

3.7.1.3.5 Groundwater Flow

Groundwater levels were taken at the site between December 2003 and February 2004. Table 3.7.1 enclosed (overleaf) summarises the available data pertaining the groundwater monitoring boreholes. A general groundwater flow map for the site and surrounding area was drawn up using the 3 February 2004 data set (Figure 3.7.4). The groundwater was shown to be flowing in a general northwest to southeast direction.

The average hydraulic gradient across the site is calculated to be in the range of 0.02 and 0.03.

3.7.1.3.6 Groundwater Quality

In general, the majority of parameters measured in the groundwater were below the EC (Drinking Water) 2000 Regulations for a broad range of parameters. However, some parameters were elevated above background, in particular those parameters which may be associated with leachate contamination.

Details of the groundwater quality and a description of the leachate indicator parameters are included in the Preliminary Risk Assessment Report (Appendix 9, Volume II of the EIS).

The general groundwater quality upgradient of the site is good, and typically reflects this type of agricultural setting.

The quality of groundwater located immediately downgradient of the waste zones is typically poorer than the upgradient wells, with elevated concentrations for the leachate indicator parameters including Conductivity, Ammoniacal Nitrogen, Potassium and Chromium.

3.7.2 Potential Emissions

Leachate is produced in landfills from infiltrating rainwater interacting with and extracting substances from deposited wastes. Typically the organic fraction of the waste biodegrades as a result of chemical and biological processes. Leachate from a waste landfill can have a number of dissolved chemical and organic substances at concentrations, which renders such leachate a potential threat to groundwater quality.

3.7.2.1 Present Emissions

Leachate is currently being generated from the previously deposited wastes, as indicated in the Preliminary Risk Assessment Report. A review of leachate indicator parameters in groundwater below the waste zones confirms the presence of indicator parameters elevated above background concentrations.

As these wastes were deposited in unlined areas, the potential for ongoing emissions into the groundwater / surface water environments is likely to continue.

Table 3.7.1: Well Dip Data (December 2003 – February 2004)

WELL I.D.	Well TOC (mOD)	10/12/2003		22/12/2003		03/02/2004		13/02/2004		25/02/2004	
		Dip Water Level (m BTOC)	Water Levels (mOD)	Dip Water Level (m BTOC)	Water Levels (mOD)	Dip Water Level (m BTOC)	Water Levels (mOD)	Dip Water Level (m BTOC)	Water Levels (mOD)	Dip Water Level (m BTOC)	Water Levels (mOD)
MW-1	136.32	1.18	**135.14**	1.10	**135.22**	0.64	**135.68**	0.73	**135.59**	-	-
MW-2	154.03	5.53	**148.50**	5.08	**148.95**	4.18	**149.85**	4.11	**149.92**	-	-
MW-3	156.22	6.05	**150.17**	5.49	**150.73**	4.00	**152.22**	3.94	**152.28**	-	-
MW-4	141.58	1.34	**140.24**	1.28	**140.30**	1.03	**140.55**	1.32	**140.26**	-	-
MW-5	141.34	2.53	**138.81**	2.48	**138.86**	2.07	**139.27**	2.20	**139.14**	-	-
MW-6	140.34	2.59	**137.75**	2.23	**138.11**	1.22	**139.12**	1.39	**138.95**	-	-
MW-7	140.06	2.02	**138.04**	1.88	**138.18**	1.25	**138.81**	1.40	**138.66**	-	-
MW-8	138.74	1.08	**137.66**	0.99	**137.75**	0.76	**137.98**	0.91	**137.84**	-	-
MW-9	138.76	1.81	**136.95**	1.73	**137.03**	1.39	**137.37**	-	-	-	-
MW-10	137.98	1.05	**136.93**	1.01	**136.97**	0.77	**137.21**	0.68	**137.30**	-	-
MW-11	143.58	2.08	**141.51**	1.71	**141.87**	2.75	**140.83**	1.26	**142.32**	-	-
MW-12	143.38	dry	-	dry	-	dry	-	dry	-	-	-
MW-03-1	147.17	dry	-	dry	-	8.09	**139.08**	dry	-	-	-
MW-03-2	143.98	6.75	**137.23**	6.63	**137.35**	6.30	**137.68**	6.40	**137.58**	-	-
MW-03-3	149.21	10.99	**138.22**	10.86	**138.35**	10.17	**139.04**	10.16	**139.05**	-	-
MW-03-4	144.76	3.58	**141.18**	3.23	**141.53**	1.22	**143.54**	2.77	**141.99**	-	-
MW-03-5	143.64	3.48	**140.16**	3.12	**143.60**	2.39	**141.25**	2.38	**141.26**	-	-
MW-04-1	140.11	-	-	-	-	1.11	**139.00**	1.20	**138.92**	1.51	**138.60**
MW-04-2	144.48	-	-	-	-	1.40	**143.08**	1.07	**143.42**	1.12	**143.36**
MW-04-3	143.84	-	-	-	-	1.15	**142.69**	1.15	**142.70**	1.24	**142.60**
MW-04-4	146.90	-	-	-	-	7.91	**138.99**	7.94	**138.97**	8.11	**138.79**
MW-04-5	143.71	-	-	-	-	4.76	**138.95**	4.92	**138.79**	5.09	**138.62**

3.7.2.2 Future Emissions

Future emissions to groundwater from the proposed development could include:

- Leachate released during removal of previously deposited waste;
- Leachate released from the fully engineered lined landfill facility;
- Machinery and operational vehicle fluid losses in parking areas, in refuelling areas, and in maintenance areas;
- Vehicle and machinery fuel storage;
- Hardstand area runoff.

3.7.3 Description of Likely Impacts

The likely impacts from the present situation include leachate from previously deposited wastes migrating vertically into the underlying saturated zone in the sands and gravels and weathered bedrock, and travelling in a south easterly direction.

In terms of impacts associated with the proposed development, the author has interpreted 'Likely Impacts' as those impacts likely to take place in the event that the necessary containment and preventative measures are not incorporated in the development design. In such an event the likely impacts of the development on soil, geology, and groundwater would be as follows:

- Changes are likely in the static water table elevation in the immediate vicinity of the pit. Due to the truncation of permeable sand lenses by the landfill, mounding of groundwater on the upgradient side of the pit and a depression of the local water table on the downgradient side is likely to occur. Any such changes in the static water table elevation will not be of significance.
- Mounding of groundwater may also occur in the vicinity of soakaways taking surface water and roof runoff. Such mounding will not be of significance.
- In the event that the composite clay / geomembrane liner and proposed mitigation measures are not incorporated in the development, it is likely that there will be a localised potential impact on soil quality as a result of potential emissions in certain areas of the pit. This impact is likely to be short term since the contaminant sources will gradually be attenuated by natural effects over time.
- Similarly there would be a likely but virtually undetectable reduction in groundwater quality downgradient of the site in the event that uncontrolled potential emissions were released due to a breach of the liner system.

- It is noted that a theoretical computation suggests a potential leakage of <100m³/year, if such a breach of the liner system was to occur. However, it is estimated in the Preliminary Risk Assessment Report March 2004 (Appendix 9, Volume II), that up to 12,000m³/year of potentially contaminated groundwater could result from the unlined previously deposited wastes ('worse-case' scenario).

3.7.4 Mitigation Measures

Strict mitigation measures to protect the groundwater from leachate and other potential contaminant sources will be put into place once the proposed development works begin.

These mitigation measures will include:

- Appropriate techniques, such as temporary bunds, pumps and silt fences will be employed to avoid the potential runoff of leachate during the excavation of previously deposited wastes
- Where possible, the handling, recycling and recovery of previously deposited wastes and new incoming wastes inside a recovery building to prevent leachate generation;
- The emplacement of a composite liner comprising compacted clay and a HDPE geomembrane beneath the landfill and the installation of a conventional leachate collection system and a stringent CQA/CQC programme will ensure that insignificant leachate leakage occurs from the landfill area. Handling of leachate from the collection system for offsite disposal will take place in a concrete paved area centrally drained to the leachate tank;
- To minimise the impact on the static water level such as the mounding and lowering as mentioned previously, a high permeability drainage layer will be installed outside and beneath the landfill liner. This will allow groundwater from truncated sand and gravel layers along the northern slope to flow beneath the landfill without obstruction and will prevent significant changes in the current static water level around the perimeter of the landfill area;
- An engineered leachate collection system associated with the development of all new lined landfill cells;
- Fuel and lubricant storage for site vehicles and machinery will be stored in appropriately bunded fuel tanks;
- Liquid from all hardstands will pass through a grit chamber and oil interceptor, prior to disposal to an on-site soakaway;
- Operational waste will be segregated for offsite disposal into canteen, waste oils, non-recyclable plant waste, and other miscellaneous waste;

- An integrated groundwater-monitoring programme (in accordance with EPA requirements) will monitor any changes in static groundwater levels and groundwater chemistry potentially associated with the proposed development.

3.7.5 Likely Significant Impacts

In the event that the mitigation measures identified in Section 3.7.4 are implemented, it is predicted that there will be no measurable or significant impacts to soils, geology or groundwater quality as a result of the proposed site development.

3.8 Landscape

A full report on Landscape and Visual Impact Assessment, prepared by Michael Cregan and Associates, in association with Martin Murray Architects, is included in Appendix 13, Volume II of the EIS. This report was prepared in March 2004.

3.8.1 Existing Environment

The site is located in southwest Wicklow adjoining the N81 in the townland of Whitestone Lower and ca. 8 km north of Baltinglass. The site is a disused sand /gravel pit, ca. 14.6 ha in extent. A portion of the lands was backfilled with imported wastes in the recent past. The site has never been subjected to remedial measure and in consequence has disfigured the otherwise attractive and valuable landscape with exposed faces and substantial piles of deposited debris and previously deposited wastes.

3.8.2 Potential Emissions

Potential emissions from the proposed development are considered in Section 3 of the March 2004 Murray Report.

3.8.3 Description of Likely Impacts

Likely impacts are also addressed in Section 3 of the March 2004 Murray Report.

3.8.4 Mitigation Measures

Mitigation measures are included in Section 4 of the March 2004 Murray Report.

3.8.5 Likely Significant Impacts

The temporary construction impacts will have visual and disturbance effects in a number of categories: -

- The main contractors compound and its use as a temporary storage and work area.
- The resource recovery building and other built structures on site.
- The movement of plant and vehicles in an out of the site during construction along the road system.
- The operation of plant on the site during the course of the contract.

Proper selection of location for the built elements will reduce the degree of impact, which will be temporary in duration as indicated previously.

The impacts will reduce significantly as the planting matures. The planting which will be installed around the perimeter and along the previous field boundaries will be extensive and dense and have a considerable effect in reducing the visual impact of the scheme and screen it from adjoining properties and from the identified critical receptors. The choice of plant materials will be indigenous to the region and thus harmonise generally with the landscape.

In the medium term as the proposed new landscape treatment matures, the impacts will gradually reduce and be increasingly perceived as neutral.

A 'worst case' scenario would arise only if the site was left in its present condition or if the finished grades were, in terms of size and bulk unsympathetic to the ambient landscape upon completion. Implementation of the remedial measures and the associated planting works will ensure a very significant reduction of the current impacts, and the harmonious reinstatement of the landscape.

3.9 Noise

3.9.1 Introduction

A Cirrus CK:831A sound level meter was used to take the noise measurements at the site. This instrument is a Type 1 data logging integrated sound level meter and is in accordance with the requirements of *IEC Publication 651.*

Prior to each monitoring round, the instrument is calibrated at 94 dB using a Cirrus CR:513A acoustic calibrator.

Prior to each measurement the instrument was mounted on a tripod at approximately 1.4 – 1.5 metres above ground level and 3.5m away from any sound reflecting objects as specified in *ISO 1996: Acoustics – Description and Measurement of Environmental Noise (Part 1)*. The Time Weighting used was 'fast' and the Frequency Weighting was 'A weighted'.

In addition, a wind shield was used to reduce potential wind interference during measurements. The wind speed at each location was less than 5 metres/second as required in *ISO 1996: Acoustics – Description and Measurement of Environmental Noise (Part 2).*

3.9.2 Existing Environment

This report presents the findings of a baseline Environmental Noise Survey carried out at an existing sand & gravel pit in Whitestown Lower, County Wicklow on the 22nd January 2004. It is noted that there were no activities taking place at the site during the field measurements.

The site is located approximately 2.5 km southwest of Donard and 5 km north of Baltinglass along the N81.

3.9.2.1 Monitoring Locations

Monitoring locations were chosen in accordance with *ISO 1996: Acoustics – Description and Measurement of Environmental Noise.* Six boundary locations were selected for this noise survey.

The monitoring locations are depicted in Table 3.9.1 and Figure 4.1.

Table 3.9.1: Monitoring Locations

Monitoring Location	Description of Location
N1	North-western corner of the site
N2	At entrance to site (inside gate)
N3	Southern site boundary
N4	South-eastern site boundary close to the river
N5	Eastern site boundary
N6	North-eastern site boundary

Due to the fact that there are no activities currently taking place at the site noise readings were not taken at any noise sensitive receptors. Noise sensitive receptors will be identified as required.

3.9.2.2 Parameters Measured

The following parameters were measured at each of the six locations:

- $L_{Aeq,\ 30\ min}$ - the equivalent continuous noise level in dB(A) over a specified measurement interval i.e. 30 minutes.
- $L_{A10,\ 30\ min}$ - the noise level in dB(A) equalled or exceeded for 10% of the measurement interval i.e. 30 minutes.
- $L_{A90,\ 30\ min}$ – the noise level in dB(A) equalled or exceeded for 90% of the measurement interval i.e. 30 minutes.
- Frequency Analysis i.e. $^1/_3$ octave band analysis (duration 3 minutes).

3.9.2.3 Results

The measurement results are presented in Table 3.9.2.

The results from the $^1/_3$ octave band frequency analysis are included in Table 3.9.3.

3.9.2.4 Evaluation of Results

For the purposes of this survey, the Environmental Protection Agency (EPA) *"Integrated Pollution Control Licensing – Guidance Note for Noise in Relation to Scheduled Activities"* (EPA, 1995) was consulted. The objective of this guidance note is to provide practical information and advice for those activities, which are listed in the First Schedule of the EPA Act of 1992.

Table 3.9.2: Results of the Environmental Noise Survey

Monitoring Location	Date/Time	Wind Speed m/s*	$L_{Aeq, 30\ min}$ dB(A)	$L_{A10, 30\ min}$ dB(A)	$L_{A90, 30\ min}$ dB(A)	Noise Sources
N1	22/01/04 12:00:24	0.8	47.6	51.6	34.6	• Traffic on the N81 • Birds in the trees
N2	22/01/04 12:50:46	1.5	63.6	66.4	34.3	• Traffic on the N81 • Birds in the trees • Tractor on farm across the road • Airplane flying overhead
N3	22/01/04 15:53:22	1.5	41.2	43.6	36.9	• Activities at Quarry south of the site • Traffic on the N81 • Birds in the trees • Activities at the residence south of the site • Chainsaw operating in the distance
N4	22/01/04 14:28:48	1.8	43.8	46.7	37.9	• Activities at Quarry south of the site • Traffic on the N81 • Birds in the trees • Ripple of the river • Chainsaw operating in the distance
N5	22/01/04 15:12:10	0.9	39.5	41.9	35.4	• Traffic on the N81 • Traffic along the local road on other side of river • Birds in the trees • Chainsaw operating in the distance
N6	22/01/04 13:42:22	0.8	32.2	34.0	26.6	• Traffic on the N81 • Traffic along the local road on other side of river • Birds in the trees • Chainsaw operating in the distance

***Wind Speed m/s = 60 second average measured at a height of 3 metres above ground**

The guidance note indicates that day-time noise levels for the aforementioned activities should be kept below an $L_{Ar\ T}$ value of 55 dB(A). It should be noted however, that the proposed operations at the site are not described in the list of scheduled activities and the EPA Guidance note is used for reference purposes only.

Table 3.9.3: 1/3 Octave Band Frequency Analysis Results

Frequency Band Hz	N1	N2	N3	N4	N5	N6
25	65.30	55.20	49.10	51.00	45.50	47.50
31	50.00	43.50	50.30	52.10	46.10	48.60
40	51.70	48.10	44.10	48.60	44.40	44.90
50	51.00	41.30	49.10	45.10	46.60	44.60
63	50.40	41.80	45.70	56.90	43.30	44.80
80	49.10	40.20	37.90	57.10	40.00	42.10
100	49.90	35.40	39.40	46.40	33.80	33.00
125	37.50	31.40	33.20	34.90	25.60	27.80
160	32.40	49.00	30.90	28.30	20.50	24.10
200	28.90	42.40	25.70	26.10	26.50	23.10
250	31.30	50.40	25.90	31.10	23.90	25.30
315	38.70	61.30	28.20	32.90	25.60	18.60
400	31.80	57.60	28.50	34.40	27.00	21.20
500	31.80	51.40	29.40	40.90	27.20	17.90
630	24.60	38.50	36.10	40.80	26.90	17.30
800	27.30	50.80	34.10	45.70	31.00	25.60
1000	29.80	57.90	35.90	45.30	33.50	20.30
1250	32.60	36.50	33.90	37.20	31.40	25.70
1600	40.90	30.60	31.00	30.80	28.00	25.40
2000	31.90	29.10	30.40	33.90	33.10	22.40
2500	28.90	31.10	26.10	33.90	26.70	18.70
3150	29.00	29.20	21.90	29.70	20.90	19.90
4000	25.90	21.10	20.10	23.80	14.20	23.60
5000	16.50	20.40	20.30	27.50	20.60	24.80
6300	15.30	39.30	21.60	19.70	23.70	20.00
8000	14.00	14.10	19.70	19.40	12.10	13.10
10000	17.10	14.90	14.90	17.90	15.40	12.80
12500	16.40	15.20	13.70	13.40	13.20	13.30
16000	16.80	22.10	18.70	12.70	15.80	13.00

The EPA *"Landfill Monitoring"* Manual (2nd edition), (EPA, 2003) was also consulted. This document also indicates that day-time noise levels should be kept below 55 dB(A).

The noise levels recorded at the site ranged between 32.2 dB(A) and 63.6 dB(A). The baseline ambient day-time noise level of 55 dB(A) was exceeded at one of the six locations.

The L_{A10} values, which are representative of intermittent, high energy noise levels, ranged between 34.0 dB(A) and 66.4 dB(A).

The L_{A90} values, which are representative of background noise levels, ranged between 26.6 dB(A) and 37.9 dB(A).

3.9.2.5 Existing Noise Sources at the Site

The dominant source of noise at the site is traffic flow on the N81. During the noise survey, traffic flow averaged 5 cars per minute. It is important to note however that the survey took place during the off peak hours of 12:00 and 16:30. The N81 is the main road to Dublin from Baltinglass therefore, traffic flow would likely be greater during peak hours.

The quarry, located south of the site, was not operational for the entire duration of the noise survey however, when it was operational it contributed significantly to the noise environment in the area.

Other noises at the site consisted of typical countryside noises i.e. birds chirping, tractors etc.

Note: A breakdown of the dominant noise sources at each individual noise monitoring location is depicted in Table 3.9.2.

3.9.3 Potential Emissions

The potential emission from the proposed development will be noise. The sources of the noise emissions will depend on the stage of the development i.e. excavation, construction, and operation processes.

3.9.3.1 Noise Emissions during Excavation of the Previously Deposited Wastes

Excavation of the previously deposited wastes will take place in phases over a total period of 1 to 3 years. Excavation activities will take place between the hours of 8am to 5:30pm, Monday-Friday and 8am to 4pm on Saturdays. Noise impacts associated with the excavation and processing of wastes will arise mainly from the following sources:

- Excavators and dumper trucks operating within the site (approximately 4 to 6 No.)
- Site personnel vehicles entering and leaving the site from the N81 (approximately 15 vehicles per day).
- Screening plant and intermittent use of a crusher (MRU).

It is anticipated that up to 10 items of plant machinery or vehicles, some stationary, some mobile, may be in use during the excavation phase but it would be unlikely that all would operate simultaneously at one location.

3.9.3.2 Noise Emissions during Construction

Construction of the proposed development will take place in three to six-month periods over the life of the facility. Noise impacts associated with construction will arise mainly from the following sources:

(a) Excavators, bulldozers, dumper trucks, compactors and tractors operating within the site (approximately 10 No. items).
(b) Site personnel vehicles entering and leaving the site from the N81 (approximately 15 vehicles per day).
(c) Movement of delivery vehicles associated with site buildings and materials to construct the landfill liner.

It is anticipated that up to 10 items of plant machinery or vehicles may be in use during the construction phase but it would be unlikely that all would operate simultaneously at one location.

3.9.3.3 Noise Emissions during Waste Recovery and Disposal Processes

The waste recovery and disposal processes will comprise a resource recovery building enclosing the waste recovery plant and equipment, a mobile recovery unit and a landfill facility. Waste recovery activities will generally take place between the hours of 8am to 5:30pm, Monday-Friday and 8am to 4pm on Saturdays. The recovery facility will be located in the north-western part of the site. The landfill will encompass the remaining void. It will be developed in 6 phases and filled over a period of approximately 8 years. Noise impacts associated with the operation of the recovery and disposal facilities will arise mainly from the following sources:

(a) Movement of Heavy Goods Vehicles (HGVs) entering and leaving the site from the N81;
(b) Movement of site personnel vehicles entering and leaving the site from the N81;
(c) Operation of plant and equipment within the RRB. Up to 8 items of plant machinery and vehicles may be operating on the site at any period of time.
(d) Operation of the MRU plant within the first 3 years of operation whilst previously deposited wastes are being excavated.
(e) Operation of waste compactors, excavator, bulldozer, dumper trucks and tractor within the landfill site. Up to 4 items of plant

machinery and vehicles may be operating on the site at any period of time.

Note: It is very unlikely that all of these sources of noise would operate simultaneously. In addition, their operation will be limited to the opening hours of the site.

3.9.4 Description of Likely Impacts

It is expected that there will be some increase in ambient noise as a result of the proposed activities. However, there are only 2 No. residences within 250 metres of the proposed waste management activities at the facility, located to the south.

3.9.4.1 Likely Impacts during Excavation and Construction

The noise impacts resulting from excavation and construction activities will not adversely affect any residences in the vicinity of the site. Machinery and vehicles associated with earthmoving and excavation will be located below the level of the surrounding surface and residences will therefore be shielded from any noise emissions. It should be noted that construction activities will not be continuous throughout the life of the proposed development.

3.9.4.2 Likely Impacts during Operation of the Waste Recovery and Disposal Processes

Noise impacts may arise as a result of vehicles entering and leaving the site via the access point on the N81. During the operational phases, up to approximately 50 HGV vehicles will carry waste to the site or recovered materials from the site each day. The relatively low number of vehicle movements in comparison to general traffic flow along this route indicates that no adverse impacts on the noise environment in the vicinity of the site are expected as a result of the proposed development.

In addition, there is the potential for noise nuisance to arise from incidental activities such as tonal reversing warning indicators, excessive engine revving and use of air brakes. The area where the reverse warning tones may be used most frequently includes the site of tipping in the landfill void itself and the turning area in the northwest corner of the site. The turning area at the RRB is located over 300 m away from the nearest dwelling and is not expected to impact on the noise environment in the area due to its low elevation and distance from residences. However, the site entrance is 150 m away and the closest point of the lined landfill is approximately 50 m away.

Noise impacts may also arise from the use of waste recovery equipment i.e. waste compactor, screener, crusher and excavator. These pieces of

equipment will be located within the waste recovery building in the north-western corner of the site and will not all run simultaneously.

3.9.5 Mitigation Measures

3.9.5.1 Mitigation Measures During Construction

The construction phases of the development will each span less than 3 to 6 months; thus any adverse noise impacts due to construction will be short-term.

Vehicle and machinery noise associated with the construction is the only predicted impact on the noise environment in the area. The following mitigation measures will assist in attenuating noise levels at the site boundary:

- Plant activity during construction of the initial lined area will be located up to 7 metres below the level of the surrounding land.
- Screening mounds approximately 1 to 2 m high will be constructed along boundaries where possible at an early stage in the construction phase.
- An acoustic barrier will be installed in the south-western corner of Phase 1 in the early stages of construction (See Drawings BRI/103 – BRI/108, Volume III of EIS). This barrier will mitigate against any noise generated during construction/operation activities for the duration of the project.
- Plant used on site will be of low noise emission type. And should comply with Statutory Instrument No. 320 of 1988 "European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988" on noise emission limits. Care will be taken to ensure that silencers and engine covers are kept in good and effective working order.
- Drivers of HGVs and other vehicles will be required to use reverse warning indicators with care with respect to the location of sensitive receptors. (Such measures will not compromise safety requirements on or off the site).
- All excavation and construction activities will be restricted to daylight hours; therefore, there will not be any night-time noise emanating from the site.

3.9.5.2 Mitigation Measures During Operation of the Waste Recovery and Disposal Processes

Vehicle and machinery noise associated with the operation of the waste recovery and disposal processes is the only predicted impact on the noise environment in the area. The following mitigation measures will assist in attenuating noise levels at the site boundary:

- Screening mounds approximately 1 to 2 m high will be constructed along boundaries where possible.
- An acoustic barrier will be installed in the south-western corner of Phase 1 in the early stages of construction (See Drawings BRI/103 – BRI/108, Volume III of EIS). This barrier will mitigate against any noise generated during construction/operation activities for the duration of the project.
- Excavation and Recovery of the previously deposited wastes will be carried out in areas in excess of 100 m from the closed residence over a short time frame.
- Waste recovery activities will occur mainly indoors at the RRB. Cladding with noise reduction (i.e. insulation) qualities will be used if required.
- Plant used on site will be of low noise emission type. And should comply with Statutory Instrument No. 320 of 1988 "European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1988" on noise emission limits. Care will be taken to ensure that silencers and engine covers are kept in good and effective working order.
- The access road to the site will be levelled and covered with a macadam surface. This will result in reduced noise levels.
- Drivers of HGVs and other vehicles will be required to use reverse warning indicators with care with respect to the location of sensitive receptors. (Such measures will not compromise safety requirements on or off the site).
- All excavation and construction activities will be restricted to daylight hours; therefore, there will not be any night-time noise emanating from the site.

In the event that noise levels result in complaints, further mitigation measures will be considered. These measures could include additional barriers, sound insulation etc.

3.9.6 Likely Significant Impacts

It is predicted that there will be no significant impacts upon the noise environment caused by the construction and operation of the proposed development. All of the likely impacts, which have been identified have been addressed and mitigation measures proposed where necessary to ensure that the impacts remain at acceptable levels.

In the absence of the proposed development, it is predicted that noise from existing site activities would be expected to cease after the site restoration work was completed. However, road traffic noise would become increasingly dominant in the noise environment.

3.9.7 Vibration

The most likely source of vibration will be from HGV traffic movements to and from the site during construction and operation. As outlined in the Traffic Section of the EIS, Volume I, Section 3.6, current HGV increases on the N81 are not likely to exceed 2.2%, and over the lifetime of the project are shown to be marginally over 1%, which is considered insignificant. Resulting vibration from these marginal traffic increases are therefore considered insignificant.

3.10 Surface Water

3.10.1 Existing Environment

The site is situated on the western border of the Carrigower River Valley (See Figure 3.10.1 & 3.10.2). Beyond the northeastern boundary of the site, the ground slopes steeply down to the flood plain of the river, which is a wet grassland area. The southeastern section of the site encompasses a section of the river's flood plain and the site boundary is the river itself, as shown on Figure 3.10.2.

The extent of the Carrigower River catchment up-gradient of the site for proposed development is depicted in Figure 3.10.1.

The site boundary encompasses part of the Carrigower River Candidate Special Area of Conservation (cSAC), which has been included in the River Slaney cSAC (May 2003). The cSAC is discussed further in Flora and Fauna Section 3.4 of the EIS. Figure 3.4.1 is an aerial photograph taken in August 2000 and includes an interpreted outline of the current cSAC boundary.

The Carrigower River flows in a southwest direction and joins the River Slaney ca. 2.1 km southwest of the site boundary.

3.10.1.1 Surface Water Flow

The total surface water catchment for the Carrigower River lying above the site is estimated to be 49 km^2 in area. An outline of the Carrigower catchment is depicted in Figure 3.10.1.

Flows in the River Carrigower at the downstream corner of the site may be estimated by reference to two gauged stations.

Table 3.10.1: Flows at Nearby Gauged Stations

Hydrometric Station No.	River	Catchment Area	Average Runoff (m^3/sec)	95% Flow (m^3/sec)	Dry Weather Flow
12013	Slaney	18,500	4.39	1.540	0.640
12028	Carrigower	5,300	0.98*	0.350	0.140

*** Based on pro-rata calculation from existing data.**

The estimated flows in the Carrigower River at the downstream corner of the site are as summarised in Table 3.10.2.

Table 3.10.2: Estimated Flows for River Carrigower

Flow	(m^3/sec)	(m^3/sec)	mm/ year *
Average Runoff	0.905	78,192	582
95 Percentile Flow	0.320	27,648	206
Dry Weather Flow	0.129	11,146	83

*** Based on 4,900 hectare catchment area.**

3.10.1.2 Arterial Drainage

Five arterial drainage channels drain from the wet grassland area between the site and the River Carrigower. These drainage channels are shown on Figure 3.10.2. The most northern channel (DC-1) is shallow (<0.3m in depth) and runs from the northeastern corner of the site, in a southerly direction, to join with the Carrigower River. During all site visits, throughout December 2003 & January 2004, this channel was dry.

Drainage channels DC-2 and DC-3 (ca. 0.3 deep, 0.5m wide) run either side of the site boundary and drain towards the Carrigower River in a southeastern direction. During the January 2004 site visits, water was observed in both channels, however flow was slight to absent.

Drainage channels DC-4 and DC-5 run along the southern boundary of the site, again draining in a south-easterly direction. During the January 2004 site visits, water was observed in both channels, however flow was slight to absent.

The five channels described are believed to be man-made, developed in order to drain the low-lying wet grassland area.

3.10.1.3 Surface Water Quality

The visual examination, which took place on 26th November 2003, involved a walkover survey of the Carrigower River and associated floodplain ca. 500m to the north and 500m to the south of the site boundaries. The river appeared moderate-flowing, clear and clean.

Surface water samples (grab samples) were taken at four monitoring locations (SW1 to SW4 inclusive) on 12 December 2003. These samples were forwarded to Alcontrol Geochem Ireland Ltd. for detailed analysis. A summary table of all analysis for each monitoring location is included in Table 8.1. of the Preliminary Risk Assessment. Results for Ammoniacal Nitrogen are also included in this Table for the 25 February 2004 sampling event, which includes an additional sampling location SW-5.

With the exception of some bacteriological parameters, the surface water quality both upstream and downstream of the site is generally of good

quality. Detected concentrations for Faecal Coliforms and Faecal Streptococci were elevated above background, and typically reflect an agricultural setting. Full details of the surface water analysis are included in the Preliminary Risk Assessment Report (Appendix 9, Volume II of the EIS).

3.10.2 Potential Emissions

The five surface water drainage channels connect the site to the Carrigower River to the east and during periods of very heavy rainfall, these may carry surface water emissions from the site directly into the Carrigower River, in particular suspended solids and potentially leachate from the previously deposited wastes.

However, it is noted that during the winter months of 2003/2004, surface water was not observed travelling from the site to the River Carrigower through these river channels.

In terms of the proposed development, there is potential for emissions as a result of these proposed activities, which may include:

- Leachate generation & release as a result of disturbing the previously deposited wastes;
- Surface water runoff due to site contouring, in particular elevated suspend solids in any discharges;
- Leachate released from the fully engineered lined landfill facility;
- Machinery and operational vehicle fluid losses in parking areas, in refuelling areas, and in maintenance areas;
- Vehicle and machinery fuel storage;
- Hardstand area runoff.

3.10.3 Description of Likely Impacts

A potential impact from the present situation includes leachate from previously deposited wastes seeping into lower lying areas of the site and subsequently into the River Carrigower. It is noted that no surface water was observed directly flowing into the River Carrigower from the adjoining site for proposed development during the December 2003/March 2004 field observations.

It is also noted that little or no liquid was observed during the Trial Pit Investigation (December 2003) of the previously deposited wastes and most of these wastes are contained by earth berms on the eastern boundary of the site.

Likely impacts on the adjoining surface water are interpreted as those impacts likely to take place in the event that the necessary containment

and preventative measures are not incorporated in the development design. These are as follows:

- Uncontrolled releases of surface water runoff from areas of potentially contaminating activity such as the excavation of previously deposited wastes, leachate handling and vehicle maintenance
- The worse-case scenario of potential surface quality deterioration as a result of the non-implementation of the proposed containment measures would cause a deterioration in the quality of water, resulting in an impact on the aquatic life of the Carrigower River

3.10.4 Mitigation Measures

The proposed development includes the development of a fully engineered lined landfill with full leachate collection systems and surface water management systems. These systems are designed to ensure no adverse impacts on the river. The following mitigation measures will be included in the proposed future development:

- Excavation, recovery and disposal in lined cells of previously deposited wastes;
- Fully engineered lining system with residual waste disposal facility;
- Leachate containment system on-site;
- Surface water management system including petrol interceptors, silt settling tanks and surface water management ponds;
- Maintenance programmes will be in place to ensure surface water runoff does not erode the capping soils and flow into the waste;
- Fuel will be stored in appropriately designed bunds;
- All surface water produced onsite will be directed to a grit chamber, followed by an oil interceptor, before being discharged into a soak away pit or surface water management ponds;
- A surface water-monitoring programme will monitor any changes in water levels and water chemistry potentially associated with the proposed development;
- The proposed development footprint does not include any part of the wetland area located to the southeast of the site, and this area will be protected as part of the River Carrigower cSAC.

3.10.5 Likely Significant Impacts

In the event that the mitigation measures identified in Section 3.10.4 are incorporated in the landfill design, it is predicted that there will be no impacts to surface water, significant or otherwise, as a result of this site development.

Nonetheless, even if the precautionary principle is adopted and all the potential impacts are considered without the implementation of the proposed mitigation measures, the impact of the proposed development on surface water will not be significant and is unlikely to be measurable as a change in surface water chemistry and the aquatic habitat.

3.11 Material Assets

3.11.1 Existing Environment

In the vicinity of the proposed development there are private residences, farms and active and inactive sand and gravel quarries.

The ultimate goal of this project is to excavate and treat the previously deposited wastes and restore this existing sand and gravel pit to conform with the contours of surrounding landforms through the deposition of residual wastes in a fully lined and engineered facility.

The local road network (N81 National Secondary Road) is currently used to access the site. No other material assets i.e. water supply, foul sewers, public buildings or telephone lines are currently used at the site.

A 110kV National Grid power line transects the site (See Figure 3.1.1). Consultations were undertaken in March with ESB International regarding the raising of the line. A proposed alteration to the power line has been agreed in principle. The proposed alterations are dealt with in Section 2.11.17.

In addition, a 10kV power line also crosses the site from west to east along the northern boundary.

3.11.2 Potential Emissions

The potential emissions from the proposed development are as follows:

- **Dust and Noise** - Construction and operation of the facility will result in dust and noise emissions. Lorries travelling to and from the site will result in increased dust and noise emissions along public roads.
- **Litter** – Litter will arise from lorries or from the landfill operations, in particular during high wind periods.
- **Sewage** – Sewage will be generated from on-site personnel (ca. 10-15 employees
- **Leachate** – Leachate will be generated from wastes being placed in lined landfill cells

3.11.3 Likely Impacts

The site is already largely disturbed therefore there are not likely to be any significant deterioration on the landscape as viewed by neighbours looking towards the site. It is noted that the landform will change as the site is restored to previous elevations prior to sand and gravel extraction.

This will result in a positive impact as the site will be returned to an agricultural landscape

During construction and operation the existing public road system will be utilised. This will result in a slight increase in traffic volumes.

During the proposed development activities, there may be some infrequent and minor inconveniences due to dust and noise. Any of these inconveniences will take place during day-time hours. These potential inconveniences are discussed in previous sections. It is not thought that they will detract from property values.

The existing 110kV National Grid power line will be raised to the height it was prior to sand and gravel extraction. It is not thought that this will have a negative impact on the environment. It is noted that during extraction activities at the site, the 110kV power line was reduced in height by ESB on two occasions.

Ultimately, the goal of the project is to restore the site and enhance the material assets of the area.

3.11.4 Mitigation Measures

Mitigation measures are discussed in a number of sections as depicted in Table 3.11.1.

Table 3.11.1: Mitigation Measures

Section	Location
Dust	Section 3.1
Traffic	Section 3.6
Landscape	Section 3.8
Noise	Section 3.9

The applicant will seek to meet with local residents and interest groups regularly to ensure issues relating to nuisances that may affect their material assets do not arise.

3.11.5 Likely Significant Impacts

The quantity of water and electricity used will be measurable but not significant. The duration of the use will be approximately 10 years.

The local road network may be slightly affected due to an increase in traffic volumes.

Leachate will be tankered away to the public treatment works for a number of years perhaps 20 years or more. The quantity and strength will diminish over time as the site will be capped and restored.

In the long-term the impact of this development will be positive because of the following:

- the previously deposited wastes will be excavated, processed, recovered where possible, and the residual wastes deposited in a fully engineered lined landfill facility.
- the disturbed sand and gravel pit will be restored to conform with the contours of surrounding landforms.

It is not expected that there will be any negative impact on material assets during the development of this site.

3.12 Interrelationships

Table 3.12.1 depicts potential interrelationships of the various factors described in this section of the EIS. This table should be read such that the item in the most left hand column interacts or affects one of the items to the right (e.g. air (dust & odour) can interact/affect human beings).

Air (dust & odour), Cultural Heritage, Traffic, Groundwater, Landscape, Noise and Material Assets may affect human beings. The impact of the proposed development as it pertains to the aforementioned is dealt with in Sections 3.1, 3.3, 3.6, 3.7, 3.8, 3.9 and 3.11 respectively.

The climate (i.e. precipitation) can potentially affect groundwater and surface water. This has been discussed in Sections 3.7 and 3.10 respectively.

The change in landscape as a result of proposed activities could affect the flora and fauna at the site. This is addressed in Section 3.4.

It is unlikely that there will be any significant adverse environmental impacts due to interactions as a result of the proposed development.

Table 3.12.1: Interrelationship of the Factors

	AIR	CLIMATE	CULTURAL HERITAGE	FLORA AND FAUNA	HUMAN BEINGS	SOILS, GEOLOGY AND GROUNDWATER	LANDSCAPE	NOISE	SURFACE WATER	MATERIAL ASSETS
AIR (DUST)					X		X			X
AIR (ODOUR)					X					X
CLIMATE						X			X	
CULTURAL HERITAGE					X					
FLORA AND FAUNA										
HUMAN BEINGS (TRAFFIC)					X					X
SOILS, GEOLOGY AND GROUND WATER					X				X	
LANDSCAPE				X	X					X
Air (NOISE)					X					X
SURFACE WATER				X						
MATERIAL ASSETS					X					