

**Figure 3.3.1 – View from boundary road looking north**

The extension will result in the loss of vegetation, earth-works, fencing and landfill activities. Receptor groups include residents, and road users. There are currently wide-open views because there is no road side vegetation or topographical features to limit views. The overall visual impact at this point would be considered moderate to slight.

**Figure 3.3.2 View from east of site.**

Perimeter fencing and screening/landscape/buffer areas will be within 300 meters of this site. There are no open views towards the site from this point except where there are breaks in the hedgerows. The proposed development will result in a slight impact on views to road users.

**Figure 3.3.3 View looking west**

This view was taken to the east of the site. The electricity pylons, which run across the centre of the view, are a notable feature as are the forestry plantations on the hills in the background. The existing landfill is visible but is not the dominant feature. Residents in the adjacent house and road users, where gaps in the road-side vegetation allow, will be affected by changes to this view. The overall visual impact of the development from this point would be considered moderate reducing to slight once mitigation is implemented.



**Figure 3.3.4 View looking south**

In the initial stages of the proposed development of the extension material will be deposited in the foreground fields approximately 200 meters from the road. This together with the fencing will result initially in a major impact on this view. The overall visual impact will be of moderate significance during the life of the site with a slight residual impact after restoration.

**Figure 3.3.5 View from road to the north of existing landfill**

Earth mounding created by excavated material deposits will be initially created in the middle ground of this view approximately 200 meters from the road. Beyond this excavation activities will be visible in the early stages of the development. It is considered that the visual impact will be of moderate to high significance for the medium term. However, this will reduce overtime.

**Figure 3.3.6 View looking south**

The existing landfill is clearly visible and the electricity pylon is the dominant feature. Hedgerows and mature gardens generally limit views from this section of road although there are a number of residences overlooking the existing site. The proposed extension will be obscured from this location and the overall visual impact will be considered of low significance.



**Figure 3.3.7 View from the north west**



This viewpoint is 600 meters from the existing landfill. The proposed extension extends back from this point along the pylon. Earth works activities will be visible in the distance. The overall visual impact of the landfill during its active phases will be of moderate to slight significance from this location.

**Figure 3.3.8 View from the west just north of the burial ground**



Excavations and landfill operations will be visible from this point. On completion a natural hillside will be formed, similar in height and shape to the existing completed landfill. It is considered that the visual impact would be of moderate/high significance in this location for the medium term reducing to slight over time.

**Figure 3.3.9 View looking north east**



The majority of the works in the proposed extension will be clearly visible from this location with clearance of earth, depositing excavated material and landfilling. It is considered that the overall visual impact from this location will be of moderate significance.



**Figure 3.3.10 View looking east**

This view is taken from the western approach to the site and can be viewed by road users from about 100 meters. There is also a residential property to the right of this view. Excavations and landfill works will be clearly visible from this location and the overall impact would be considered moderately significant.

**Figure 3.3.11 View close to the entrance of existing landfill**

The proposed extension works will be clearly visible from this location therefore the overall visual impact would be considered of moderate to high significance for the medium term. With the establishment of suitable screening the impact will be reduced.

**Figure 3.3.12 View looking north east towards the site**

Excavations will extend from the existing site on the left of this view approximately half across the hillside to the right. The overall visual impact would be considered moderately significant.



**Figure 3.3.13 View from approximately 2 km south of the site**

The works will be visible during clear weather conditions. However, it will not form the dominant feature in the view and will appear as an extension of the existing works. The overall visual impact would be considered of slight significance from this location.

### 3.3.5 Mitigation

Proposed mitigation measures include:

- Establishment of suitable plant species on the screening/landscape areas to the north and east of the site, as shown on **Figure 2.6**, to provide increasing visual enclosure during the operational phase of the landfill site;
- Retention and enhancement of as many existing trees and hedgerows possible including replanting and management of "gappy" hedgerows or boundaries currently comprised of banks and fences around the site;
- Minimising the visual impact of the boundary fencing by establishing hedgerow planting at the outside of the fence to soften and screen it from external viewpoints;
- Creation of flowing contours to landforms on the restored site, which will blend into the surrounding topography creating a natural appearance; and
- Establishing planting on the restored site using plant material matured on mounds in the screening/landscape/buffer areas during the operational phase of the works, restoring the former field pattern of the site before development.

### 3.3.6 Summary

In the local area the visual impact of the proposed development will vary depending upon the stage of the development, construction, operation or restoration. They are generally of moderate significance where clear views of the site are obtained (i.e. where views are not enclosed by roadside hedgerows). Planting on the outside of the fences will soften the visual impact and the screening/landscape/buffer mounds themselves will reduce the impact of the landfill operations. These visual impacts are medium term. Once the site has been restored, the residual visual impact from these viewpoints will be of slight significance and neutral. The proposed extension will have little or no impact upon surrounding character areas.



## 3.4 AIR QUALITY

### 3.4.1 Introduction

An assessment of the potential impact on air quality by the proposed extension of Gortadroma Landfill was undertaken by Envirocon Ltd.

### 3.4.2 Methodology

The assessment of the existing environment for this EIS has been based on monitoring studies of dust, particulates and odours undertaken as part of the Waste Licence conditions and the assessment of ambient sulphur dioxide and nitrogen dioxide concentrations carried out in 1997. An evaluation of the potential impact of the operation of the planned extension was based on a review of the present operating procedures in relation to cell management and infrastructural requirements and the operation of the gas collection/flare-stack system.

### 3.4.3 Existing Environment

#### 3.4.3.1 Dust

Dust deposition monitoring was carried out at four locations near the site boundary as required under Schedule D of the Waste Licence, 17.2 (See Figure 3.2.1) The monitoring examined both soluble, i.e. dissolved salts present in rainwater, as well as un-dissolved material such as particulate material and biological debris. The dust deposition limit specified in Schedule C of the Waste Licence 17-2 is 350 mg/m<sup>2</sup> day, expressed as a monthly average over a 30-day period. The results of the dust deposition survey during the past three annual periods indicate that measured deposition rates are less than 31% of the emission limit specified in the licence.

#### 3.4.3.2 PM<sub>10</sub>

The survey measured PM<sub>10</sub> (particulate material with a mean diameter of < 10 µm) as required under Schedule D of the licence. The monitoring occurred at three of the locations used to monitor dust, D1, D3 and D4 (See Figure 3.2.1).

A daily average PM<sub>10</sub> trigger value of 50 µg/m<sup>3</sup> is specified in Condition 6.6 of the Waste Licence, which if exceeded requires remedial measures to be carried out to reduce emissions of particulates. None of the locations exceeded this trigger value with the maximum concentration 58% of the value. Due to the short-term nature of the monitoring programme, no comparison can be made in relation to compliance with the future National Air Quality Standards.

#### 3.4.3.3 Odour

Malodorous compounds generated within a landfill include hydrogen sulphide, organic sulphides (mercaptans), amines and other volatile organic compounds, some of which have very low odour detection levels. These compounds are generated during the anaerobic decomposition of the waste



deposited in the landfill cells and when they are released to the atmosphere from borehole vents and other sources can result in highly pungent malodours within a landfill.

As part of the ongoing environmental monitoring a programme of odour monitoring involving regular inspection of certain boundary locations by staff and recording details of complaints reported by nearby houses is carried out (See Figure 3.2.1). The boundary survey is carried out at Gortadroma four times a day (8.00,11.00,14.00 and 16.00). Five locations are inspected, coinciding with the direction towards the nearest houses as well as at the site entrance. A monthly log is also kept of all nuisance complaints by the local community (including details of location, nature of odour complaint, times and weather conditions) as part of Condition 8.11 of the Waste Licence. The monthly registers indicate that during 2003 there has been a considerable reduction in the number of reports of malodours at the houses to the east, northeast and west of the landfill boundary.

During the site visit undertaken as part of the EIA in June 2003, malodours consistent with landfill gas were identified on the walkover near the capped area of the existing landfill. However, no malodours could be detected along the roads running near the western and northern site boundary. A subsequent independent short-term survey using an H<sub>2</sub>S field monitor, capable of measuring concentrations below 1ppb, was carried out in June 2003. At all the monitored locations around the site boundary, the ambient levels were below the analytical detection level of the equipment.

Due to the nature of the activity at Gortadroma, it is not possible to eliminate all sources of malodours from the landfilling operation. However, with ongoing improvements being made to reduce and contain potential malodorous emission sources the potential for nuisance complaints at nearby houses will decrease. This trend is evident from a review of the records of odour complaints kept by the site office that the incidence of malodours is decreasing, in particular as a result of the improvements recently made to the gas collection system.

#### 3.4.3.4 Sulphur dioxide and Nitrogen oxides

Ambient concentrations of sulphur dioxide would be very low and typical of measurements obtained in rural locations in Ireland. There are no significant emission sources of sulphur dioxide in the area, as the fuel sources for the houses in the locality would be either low-sulphur distillate oil or peat. Diesel fuel used by road vehicles also has a very low sulphur content. Maximum daily sulphur dioxide concentrations would be generally below 10 µg/m<sup>3</sup> and so well below 10% of the current and future NAQS.

#### 3.4.4 Potential Impacts

There are five principal air pollutants emitted from a landfill and subsequently five potential impacts emitted from landfills – dust, PM<sub>10</sub>, aerosols, odours and landfill gas. The sources of these pollutants can vary.

Potential sources include uncontrolled landfill gas emissions from fissures in completed cells and emissions from recently tipped waste in operational cells. These areas of the landfill will also be sources of dust and volatile organic compounds. The latter type of emissions can be highly odorous. The contribution of these types of sources to total VOC's from a landfill will depend on the efficiency of any installed gas collection system.

Line emission sources are the emissions generated from trucks and other vehicles travelling along the access and internal haul roads to the tipping area. Depending on the road surface conditions, fugitive dust and PM<sub>10</sub> emissions caused by the re-suspension of particulates from the road surface by the vehicles travelling along the road may be significant. The expected change in road traffic numbers for



the proposed development is low therefore dust-blow is likely to remain short-term and intermittent and would be referred to as fugitive emissions.

Point sources are specific emission points within the landfill extension and include uncapped boreholes and landfill gas flare stack, or generating plant exhausts. These types of emissions tend to be relatively continuous. Emissions associated with such sources are typically VOC's, methane and inorganic gases associated with landfill gas.

### 3.4.5 Mitigation

The operation of the landfill extension will be carried out in accordance with the requirements specified in Condition 6 of the current waste licence (17.2) with regard to controlling and reducing atmospheric emissions.

#### 3.4.5.1 Operation Mitigation

The measures to control and reduce emissions include: -

- Tipping of waste material shall be controlled within the landfill extension;
- Waste material will be covered daily with hessian sheeting or suitable inert material, such as stone, rocks, bricks, crushed concrete etc., to control emissions of dust and malodours from the surface of the active cell. At the end of each week, the tipped material will be covered with a layer of inert material, with a minimum depth of 150mm;
- When the surface of the cell has reached the design height it will be capped, restored and re-seeded with grass;
- Burning of any waste material on-site shall be prohibited;
- Sewage sludge will be deposited by spreading over a small designated area and promptly covering with inert material. Where practicable, disposal should not take place during poor (wind) dispersal conditions;
- Mobile plant equipment used on-site will be regularly maintained to prevent excessive exhaust emissions of particulates and other pollutants;
- Haul roads within the landfill extension will be covered with compacted hardcore to reduce dust emissions from trucks travelling to and from the tipping area;
- The public road near the entrance to the landfill and hard-paved road surfaces within the site reception area will be maintained to ensure any spillages of material from vehicles entering or leaving the site will be promptly removed to reduce dust emissions from the road surface;
- A mobile water sprayer will be employed during dry weather conditions to reduce dust emissions from the access road and haul roads within the landfill site;
- All trucks departing from the site will pass through the existing wheel wash, which shall be maintained with the silt removed on a regular basis;
- All boreholes will be capped and inspections carried out at regular intervals to inspect the completed cells for leaks and uncontrolled venting of landfill gas;



- Regular inspections will be carried out of capped areas to identify and eliminate, where practicable uncontrolled emissions of landfill gas; and
- Landfill gas generated from the completed cells will be collected and piped to the flare-stack installation or future energy utilisation plant.

#### 3.4.5.2 Construction Mitigation

Dust emissions would occur in dry weather conditions during the construction phase as a result of the movement of overburden, boundary bund and cell construction and also from machinery travelling along the temporary haul roads within the extension area. On-site construction equipment will comprise heavy earth moving equipment, including 50 tonne earth-removal excavators and dozers and this machinery will be kept on-site during the construction phase. Operation of the plant machinery and equipment during the construction phase will generate particulate and gaseous emissions from the exhausts of the diesel engines. Mitigation for construction includes:

- Control of dust emissions from the surface of temporary haul roads used by machinery preparing the landfill extension area will be carried out with a mobile water sprayer during dry weather conditions;
- All construction vehicles will use the existing construction site entrance which incorporates a wheel wash facility; and
- Construction machinery will be kept on-site reducing potential impacts from additional vehicles on the public road.

#### 3.4.6 Summary

The mitigation measures that are proposed for the new extension cells of the landfill will substantially reduce potential emissions of odours and dust from these areas. Daily cover of the deposited waste material will significantly reduce the quantity of potential malodours being released from the surface of the waste and along with the installation of a landfill gas collection network potential with gas flaring/utilisation emissions from the landfill will be reduced. Due to the nature of the activity, it is possible odorous emissions from the operational landfill will occasionally be detected in the area, with a slight to moderate short-term impact depending on weather conditions. However, with the continuing improvements being carried out and regular inspections for odours at the boundary as required under the conditions in the Waste Licence, it is predicted that impacts of malodours will continue to decline from current levels.

The dust control measures, such as a wheel-wash, construction of paved internal haul roads and spraying road surfaces with water during dry weather conditions should effectively control dust emissions from the landfilling activities at Gortadroma. With these measures, the impact of dust emissions will be slight with no significant impact beyond the landfill boundary.

### 3.5 NOISE

#### 3.5.1 Introduction

This study was undertaken by Enterprise Ireland to assess noise and vibration aspects for a proposed extension to Gortadroma Landfill Site in County Limerick.



### 3.5.2 Methodology

Baseline noise measurements were made close to the nearest residences and at other locations around the site at locations A, B, C, and D shown in **Figure 3.5.1**. These residences and sampling locations are close to the proposed boundary of the extension.

Noise measurements were made 1.5 m above the local ground level at locations B to D and 3 m above ground level at location A. The following parameters were measured:

- $L_{Aeq,T}$  the equivalent continuous noise level for the measurement period. This parameter is very sensitive to local high-level short time sources, e.g. local traffic, etc.;
- $L_{A01,T}$  the sound level equalled or exceeded for 1% of the measurement period, the maximum levels;
- $L_{A10,T}$  the sound level equalled or exceeded for 10% of the measurement period, the parameter usually used for traffic noise assessment; and
- $L_{A90,T}$  the sound level equalled or exceeded for 90% of the measurement period. This level is sometimes taken to represent the “background” noise level.

### 3.5.3 Existing Environment

The Gortadroma Landfill Site hours of opening are from 8:00am to 4:30pm on weekdays and from 8:00am to 4:30pm on Saturdays preceding a bank holiday (otherwise closed on Saturday).

There are a number of residences located to the north, south and east of the boundary of the proposed extension. There is little other noise producing activity in the immediate area and the adjacent land is principally agricultural with some afforestation. Road traffic is the greatest background source of noise in the area. There is no additional night-time activity proposed for the landfill extension although a gas flare in continuous use is located on the existing site.

The existing noise environment is principally controlled by the present facility and road traffic in the area. The on-site machinery consists of a CAT D9N dozer and a CAT 826G compactor. There is also an excavator, a JCB and a dump truck operating on the site. The dozer and compactor are the principal on-site sources of noise and they operate in unison to level and compact the landfill material.

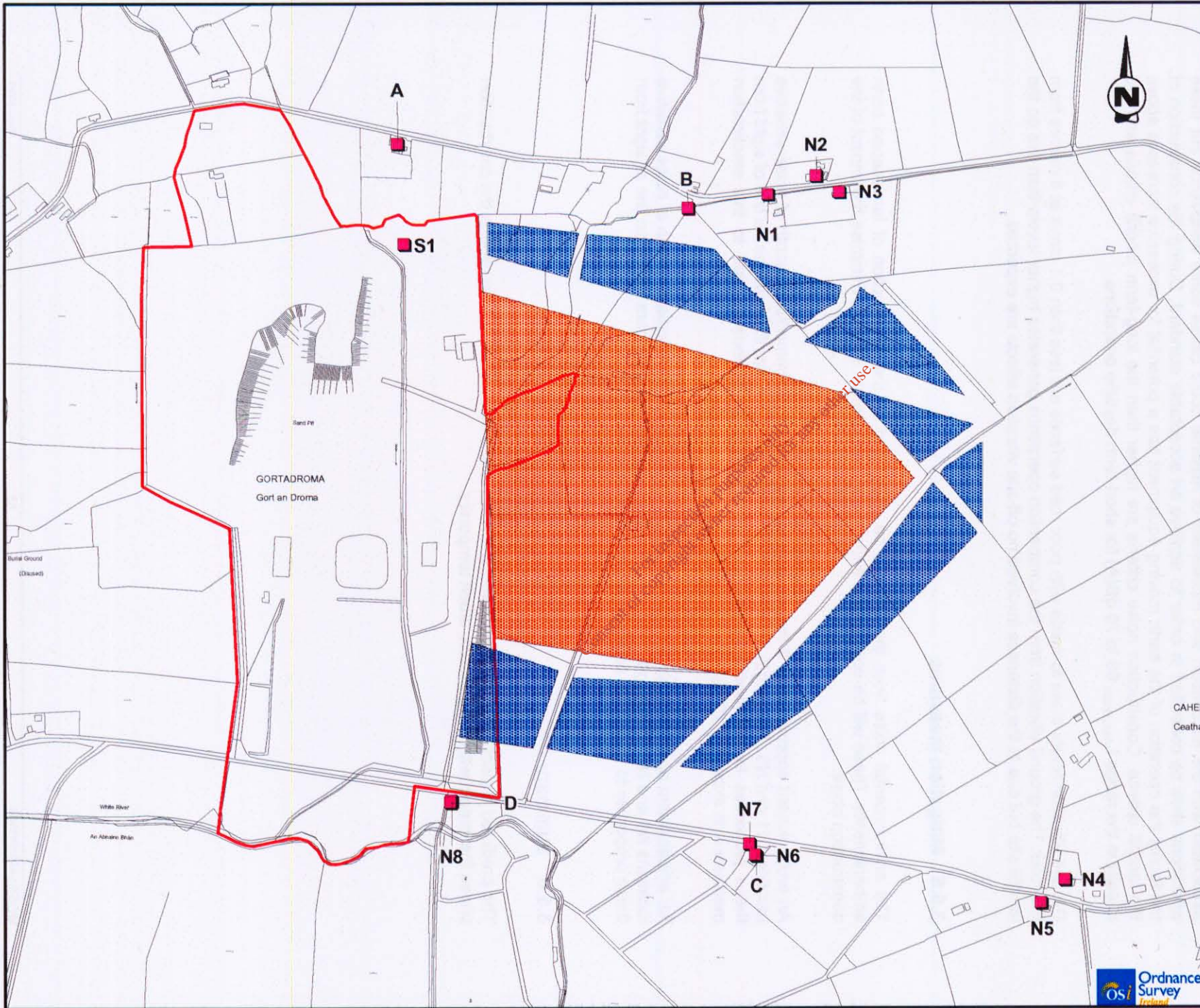
The measured noise level results are shown in **Table 3.5.1**. The noise levels at locations A and B were principally due to landfill operation with a small number of vehicles passing location B. A safety bleeper from some of the reversing lorries was audible at times at both these locations. The measured noise levels at locations C and D were principally due to traffic on the adjacent road.

The daytime  $L_{Aeq,30min}$  levels at location A were in the range 50 to 54 dB(A). This measurement location had clear line of sight to the landfill compaction operation. The corresponding noise levels at location B were estimated to be in the range  $L_{Aeq,30min}$  48 to 50 dB(A), allowing for the passing local traffic. This measurement location also had clear line of sight to the landfill compaction operation.

### 3.5.4 Potential Impact of Proposal

A daytime limit of 55 dB(A) and a night-time limit of 45 dB(A) are suggested by the EPA as the target levels appropriate for noise sensitive locations. These levels are not exceeded by current noise emissions from the Landfill Site. However, the proposed landfill extension will move the centre of





**Legend**

- Existing Landfill Site
- Screening/Landscaping Buffer Areas
- Waste Disposal Areas
- A-D & S1 = Sampling Locations
- N1- N8 = Residences

**Limerick**

**Limerick County Council**

Project: **Gortadroma Landfill Extension EIS**

Title: **Location of Noise Baseline Monitors**

Figure 3.5.1

**Issue Details**

Drawn: CW	Project No: MDE0148
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activity to within c.420 metres of the nearest residences both north, locations N1 to N3, and south, locations N6 to N8. Therefore the noise levels due to the current operation, when interpolated to the distances from the proposed development, have a potential to equal the criterion limit of 55 dB(A) at the nearest residences. An increase in landfill activity on the Site could cause the noise emissions to exceed this criterion at the nearest houses.

Construction work will increase the noise level in the immediate vicinity of the site. Higher noise levels associated with the excavation and movement of material could cause some annoyance but these operations shall be controlled in order to achieve an acceptable standard. During the construction of the facility the operation of the earth moving equipment has a potential for excessive increases above the landfill criteria. Construction noise criteria are higher than the long-term landfill criteria and are usually in the range  $L_{Aeq,1hour}$  65 to 70 dB(A) for short-term daytime operations.

Ground vibration levels close to roads with poor road surfaces are less than 0.1 mm/s at 4 metres from the road. The ground vibration from the compaction operations generates higher levels than this on the landfill site but due to the distances involved no off-site vibration effects are expected.

### 3.5.5 Mitigation measures

The environmental noise from the site will be attenuated by the construction of landscaped earth embankments. These will be constructed early in the development stage to minimise the impact of the construction noise.

An embankment approximately 3 metres high will be constructed immediately south of noise sensitive locations N1 and N3. The length of the embankment will be such that there will be no line of sight from these properties to the landfill activity area. The estimated attenuation due to this amelioration measure is in excess of 10 dB(A).

An embankment approximately 3 metres high will be constructed immediately north of noise sensitive locations N6 and N7. The length of the embankment will be such that there will be no line of sight from these properties to the landfill activity area.

### 3.5.6 Summary

The predicted impact of the proposed landfill extension will be slight. However, during the construction phase the impact will be significant, albeit temporary.



**Table 3.5.1 Noise Measurement results**

Location (see Fig 3.5.1)	Date	Time end	Duration minutes	L <sub>Aeq</sub> dB	L <sub>A01</sub> dB	L <sub>A10</sub> dB	L <sub>A90</sub> dB	Comments T = 30 mins
A	30/04/03	13:30	30	50	61	54	37	No landfill machinery operating
	30/04/03	14:00	30	52	60	55	43	Landfill activity
	30/04/03	14:30	30	54	62	58	46	Landfill activity
	01/05/03	14:30	30	51	59	55	44	Landfill activity
	01/05/03	15:00	30	50	58	54	44	Landfill activity
B	30/04/03	13:40	30	42	51	45	35	No landfill machinery operating, 1 local car, distant traffic, birds
	30/04/03	16:00	30	49	58	52	43	Landfill machinery operating, 3 local cars, distant traffic, birds
	30/04/03	16:30	30	53	63	51	44	Landfill machinery operating, 2 local cars, distant traffic, birds
	01/05/03	12:20	30	48	56	51	40	Landfill machinery operating, No local traffic
	01/05/03	14:00	30	50	59	51	39	Landfill machinery operating, 1 passing tractor
C	01/05/03	12:00	30	63	77	57	37	Road traffic noise
	01/05/03	12:30	30	65	80	62	40	Road traffic noise
	01/05/03	13:00	30	62	77	54	36	Road traffic noise
	01/05/03	13:30	30	63	76	52	32	Road traffic noise
	01/05/03	14:00	30	65	79	56	38	Road traffic noise
D	01/05/03	12:00	30	61	75	58	37	Road traffic noise

**Table 3.5.2 Noise Emissions**

Sources 30/04/03	Time end	Duration minutes	L <sub>Aeq</sub> dB	Distance metres	L <sub>A1</sub> dB	L <sub>A10</sub> dB	L <sub>A90</sub> dB
Dozer & compactor +	15:00	30	54	180	61	57	48
Dozer & compactor +	15:30	30	52	180	61	56	45
Dozer & compactor +	16:00	30	52	180	61	56	43
Dozer & compactor +	16:30	30	48	180	56	51	44
Dozer & compactor +	17:00	30	50	180	58	43	43

Note: The noise levels are due to the entire operation, trucks reversing, unloading and landfill machinery in operation. At times they operate in close proximity to each other, on the eastern end of the current activity site.

**Table 3.5.3 Octave Band Levels**

Sources 30/04/03	Location	L <sub>Aeq1min</sub> dB	Distance metres	Octave bands (Hz)								Impulsive/ Tonal	Periods of Emissions	
				Sound Pressure Levels, dB										
				32	63	125	250	500	1k	2k	4k	8k		
Dozer & compactor +	Mobile	54	180	68	63	54	52	52	49	46	37	28	no	daytime
Gas Flare		58	25	80	67	59	59	55	54	51	43	31	no	continuous

## 3.6 CLIMATE

### 3.6.1 General

Envirocon Ltd undertook an assessment of the potential impacts on climate from the proposed extension.

The climate of the Co. Limerick region is characterised by the frequent passage of Atlantic low pressure weather systems and associated frontal rain belts from the a westerly direction, especially during the winter period. Over the summer months the influence of anticyclonic weather conditions can result in drier continental air, in particular when winds are from the east, interspersed by the passage of Atlantic frontal systems. Occasionally, the establishment of a high pressure area over Ireland and Britain will result in calm conditions and during the winter months these are characterised by clear skies and the formation of low level temperature inversions with slack wind conditions at night-time. Prolonged dry weather conditions are relatively infrequent but should continental air masses dominate over Ireland a period of drought conditions may occur which could last up to 2 or 3 weeks.

### 3.6.2 Contribution to Greenhouse Gases

Under the 1997 Kyoto Protocol on Climate Change, Ireland agreed to limit an increase in its greenhouse gas emissions to 13% above 1990 levels in the period 2008-2012. An even more ambitious strategy to reduce National green house gas emissions by over 20% in the next ten years has been set under the National Climate Change Strategy. Methane is one of the principal greenhouse gases. Based on National emission estimates for 1998 published by the EPA, methane emissions were approximately 649,000 tonnes/year with about 88% originating from agricultural sources and 12% or 76,000 tonnes from solid waste landfill disposal.

The annual rate of landfill gas generated in the Gortadroma landfill is calculated to be about  $17.09 \times 10^6 \text{ m}^3$  in 2003. The volume of gas generation is based on the GasSIM model used to simulate the rate of gas production at the landfill and the potential for generating electricity in an utilisation plant. The projections indicate a maximum gas generation rate of  $26.00 \times 10^6 \text{ m}^3$  in 2020 declining to  $4.2 \times 10^6 \text{ m}^3$  by 2030. Assuming a methane composition of 65% of the landfill gas volume, with  $10^3 \text{ m}^3$  equivalent to 714 kg of methane (derived from the molar weight, 1 mole = 22.4 l = 16g), this equates to 7,931 tonnes in 2003. By 2020, the methane generation rate is projected to increase to 12,067 tonnes per year. Thereafter, it is projected to decrease rapidly. Compared to the National total for methane emissions the rate from the landfill is equivalent to about 1% in the event that emissions were uncontrolled. Therefore, with the gas collection system in place at Gortadroma methane emissions will be substantially lower and well below 1% of the estimated National total emission rate.

The National Climate Change Strategy estimate that a substantial reduction of 50% in methane emissions from landfills can be achieved by flaring (converting the methane to carbon dioxide), or used to produce electricity. With the continued installation of a gas collection network and flaring or burning it in the energy utilisation plant, emissions of methane and other greenhouse gases will decrease dramatically from the waste facility. These local measures will help meet the target of reducing methane emissions to 60% below the 1990 levels from the waste sector in Ireland by 2010.

### 3.6.3 Summary

The proposed development will have no impact on the current climate experienced in the Gortadroma area. Uncontrolled methane emissions from the Gortadroma Landfill would contribute approximately



1% to National levels by 2020 if no measures were taken. However, with the installation of a gas utilisation plant these emissions will be reduced by approximately 60%.

## 3.7 TRAFFIC

### 3.7.1 Introduction

RPS-MCOS Ltd. undertook a transportation assessment of Gortadroma Landfill Site to assess the potential impact of the operational generated traffic on traffic levels on the surrounding network and to review the suitability of the road network to cater for the vehicles accessing the site over the lifetime of the proposed landfill extension.

### 3.7.2 Methodology

A traffic survey was completed to establish current traffic levels on the existing network. A site visit was carried out to assess the suitability of existing junctions, including checking visibility standards and kerb radii. Furthermore the site visit considered carriageway condition, signing and carriageway markings. Traffic movements in and out of the landfill were ascertained from the weighbridge log.

### 3.7.3 Existing Environment

The landfill is currently licensed to accept a maximum of 130,000 tonnes of waste per annum and it is proposed to maintain this figure. The landfill has accepted the maximum licensed amount of waste over the last few years but the annual intake for 2003 was 82,183 tonnes. The landfill currently accepts waste from Limerick City and County. There are two main routes, which are used to gain access to the landfill site, as follows:

- From Limerick City via the N69 Limerick to Foynes road westbound, to the junction with the R521. South on the Regional Road, R521 through the village of Shanagolden to the junction with CR306. Westbound on the County Road, CR306 to the entrance of the Gortadroma Landfill Site. County Road CR306 is referred to locally as the 'Kerry Line'.
- Other traffic arrives at the landfill by travelling northbound on the R521 through Ardagh village, as far as the junction with the CR306, where traffic travels westbound as far as the landfill entrance.

A small quantity of waste also arrives at the landfill site by travelling eastbound on the CR306 as far as the landfill entrance.

### 3.7.4 Potential Impacts

#### 3.7.4.1 Operational Impacts

As the landfill is currently operating at the same capacity proposed for the extension it is anticipated that existing movements to and from the site will be representative of future movements. **Table 3.7.1** shows the traffic movements expected at the landfill in a worst-case scenario, which equates to the maximum annual tonnage accepted.

**Table 3.7.1: Future Landfill Traffic - Estimated for the worst case scenario.**

Maximum tonnage per annum =	130,000 tonnes
Assuming approximately 255 working days in a year i.e. 255 days when the landfill would be accepting waste	255 days
Average tonnage per day =	510 tonnes/day
Worst Case Scenario. Movements include 26 articulated/HGVs, 12 compactor's HGVs, 4 skips, 9 roll-on-roll-off, 19 car/vans and 16 subsoil trucks.	
Traffic generation to the site will be	86 Vehs/day

The following **Tables (3.7.2 – 3.7.4)** compare AADT (Annual Average Daily Traffic) traffic turning movements with and without the associated landfill traffic at the Corbally T-Junction, the Ardagh Cross Roads and the Shanagolden Cross Roads for both the existing and design years. It shows the total number of vehicles and in brackets the numbers of HGVs. This allows comparisons between traffic levels on the road network with and without the landfill and the impact the landfill traffic has on the network.

Whilst it can be seen from **Tables (3.7.2 – 3.7.4)** that the landfill traffic can contribute significantly in percentage terms to a number of movements at the junctions particularly with regard to HGV movements, the actual volume of traffic is very low and no delay or congestion will be resultant over the lifetime of the landfill.

#### 3.7.4.2 Construction Traffic

At the Landfill cells are used to contain the waste. In all 11 cells must be constructed. The construction of these cells will be on a phased basis with 2 – 3 cells under various stages of construction in each phase taking approximately nine months to construct. During the construction phases there will be a certain amount of construction traffic. There will be approximately 63 truck movements per day. These movements will be spread out over the course of the day.



**Table 3.7.2: Corbally T junction**

Movements	Existing without Landfill	Existing with Landfill	% traffic increase due to landfill	Design Year without Landfill	Design Year with Landfill Worst Case Scenario	% traffic increase due to landfill
Right Turn From R521 To CR306	211 (48)	232 (63)	10 (30)	268 (61)	296 (81)	10 (33)
Left Turn From R521 To CR306	127 (15)	148 (29)	17 (93)	161 (19)	189 (39)	17 (105)
Right Turn From CR306 To R521	127 (11)	148 (25)	17 (127)	161 (14)	189 (34)	17 (143)
Left Turn From CR306 To R521	236 (45)	257 (60)	9 (33)	300 (57)	328 (77)	10 (35)

**Table 3.7.3: R521 Ardagh Cross Roads**

Movements	Existing without Landfill	Existing with Landfill	% traffic increase due to landfill	Design Year without Landfill	Design Year with Landfill Worst Case Scenario	% traffic increase due to landfill
Right Turn From R521 To R523	82 (5)	83 (6)	1 (20)	104 (6)	106 (8)	2 (33)
Straight ahead R521 Southbound	1412 (208)	1429 (221)	1 (6)	1793 (264)	1819 (282)	2 (7)
Left Turn From R521 To R523	56 (2)	57 (2)	2 (0)	71 (2)	71 (2)	0 (0)
Left Turn From R523 To R521	151 (9)	153 (10)	1 (11)	192 (11)	195 (13)	2 (18)
Right Turn from R523 to R521	76 (5)	77 (6)	1 (20)	97 (6)	98 (7)	1 (17)
Straight Ahead R521 Northbound	1293 (210)	1311 (222)	1 (6)	1642 (267)	1666 (283)	2 (6)

**Table 3.7.4: Shanagolden Cross Roads**

Movements	Existing without Landfill	Existing with Landfill	% traffic increase due to landfill	Design Year without Landfill	Design Year with Landfill Worst Case Scenario	% traffic increase due to landfill
Right Turn From GR To R521	62(0)	63(0)	2 (0)	79(0)	79(0)	0 (0)
Straight ahead R521 Southbound	956(198)	970(208)	2 (5)	1214(251)	1231(263)	2 (5)
Left Turn From CR To R521	518(6)	524(11)	1 (83)	658(8)	668(15)	2 (88)
Left Turn From R521 To CR	83(2)	84(2)	1 (0)	105(3)	106(4)	1 (33)
Straight Ahead R521 Northbound	1012(181)	1026(191)	14 (6)	1285(230)	1303(243)	1 (6)
Right Turn from R521 to CR	518(6)	524(11)	1 (83)	658(8)	667(17)	3 (113)

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### 3.7.5 Summary

It is proposed that the extension life will be phased in over the lifetime of the landfill with 2 to 3 cells constructed in every phase. During the construction phases there will be approximately 63 truck movements per day. These movements will be spread out over the course of the day.

The impact of the extension of the landfill will not be noticeable as the landfill is currently operational and the associated traffic is already on the road network. The analysis demonstrates that whilst the extension of the Gortadroma Landfill site will continue the generation of operational traffic movements on the surrounding road network, it is clear that the network will continue to operate with acceptable capacity limits. The operational traffic will not significantly impact on the surrounding road network and there are no mitigation measures required.

## 3.8 GEOLOGY/HYDROGEOLOGY

### 3.8.1 Introduction

A geological and hydro geological assessment has been undertaken by RPS-MCOS of the proposed extension of Gortadroma Landfill as part of the preparation of the EIS.

### 3.8.2 Methodology

This assessment is based on a review of the available information on the existing landfill site and proposed extension area. Site investigation work involved the drilling of boreholes (November, 2002) and geophysical surveying. Earlier site investigation data from the existing landfill site has also been reviewed as part of the assessment.

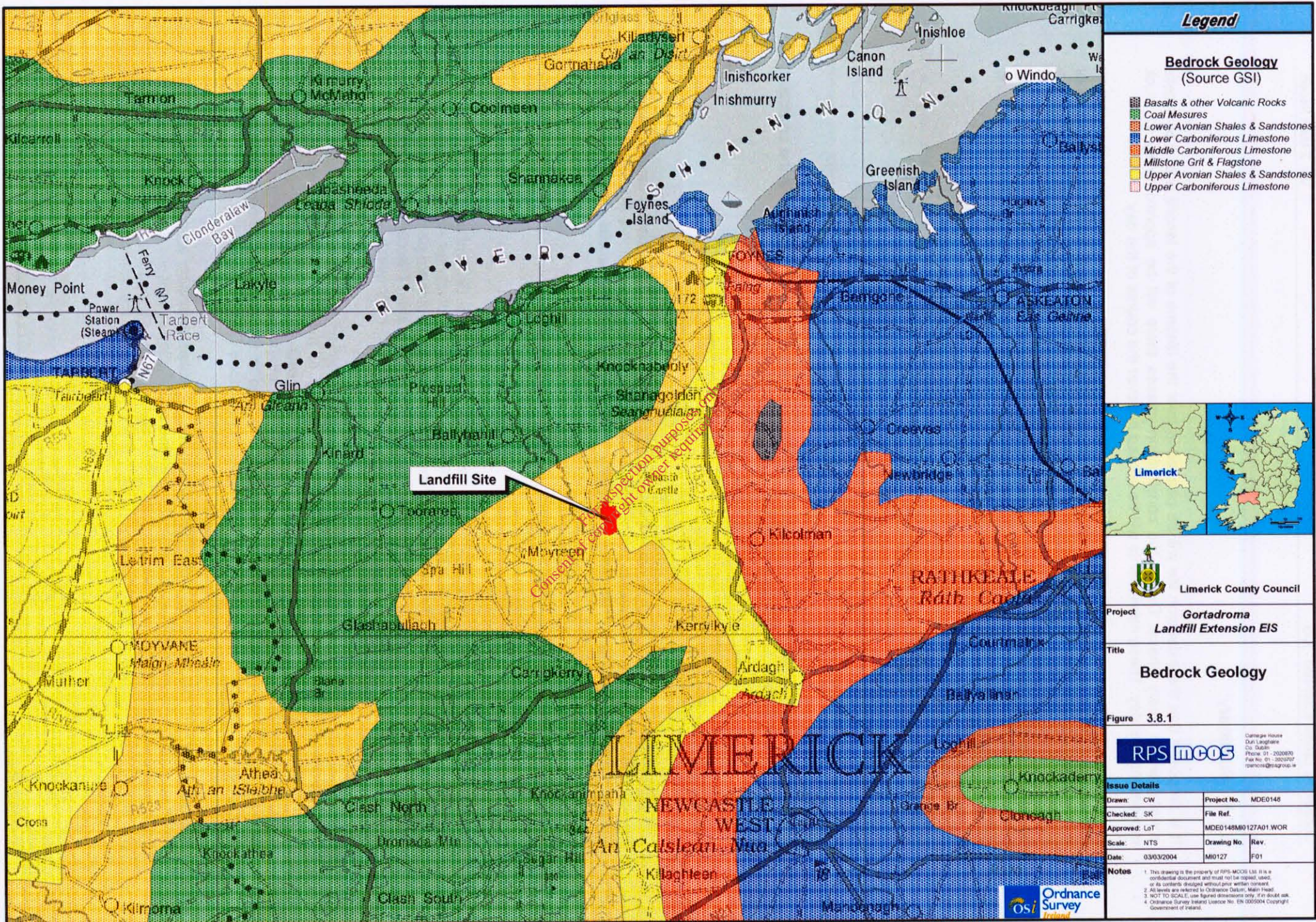
### 3.8.3 Existing Environment

The proposed extension area is located to the east of the existing site. Ground elevations within the proposed extension area range in height from 105m in the south west corner to 158m in the north east. The site is located within the catchment of the White River. The southern portion of the proposed extension area is wet and boggy and dissected by a series of land drains. The centre of the site is flat lying and made up of boggy, poorly drained fields. The east and north west parts of the site are located on higher ground with better drained fields.

The bedrock geology map of the area (Geological Survey of Ireland, Sheet 17 Geology of the Shannon Estuary, 1999) indicates that the proposed extension area and existing landfill site is underlain by the Shannon Group (SHG) and is composed of mudstone, siltstone and sandstone. The north eastern corner of the proposed extension area is located on the Clare Shale Formation (CS) and is composed of dark grey shales with bands of siliceous mudstone (See Figure 3.8.1).

The results of the site investigations undertaken in the proposed extension area indicate a subsoil thickness of between 10m to 30m in the western portion with shallower subsoils (bedrock < 10mbgl) in the eastern portion. The subsoil deposits are composed of peat, silt and clayey sand and clayey gravel.







Confined groundwater was encountered during drilling in the overburden deposits. There is no evidence at this time to suggest that the subsoil deposits constitute an aquifer in the vicinity of the site. No information is available on the potential groundwater yields from these subsoil deposits within the proposed extension area. Additional information will be gathered during the site investigations in advance of the detailed design phase for the proposed cells. Earlier site investigation data from the existing landfill site indicated no significant inflows of water from these isolated pockets of sand and or gravel. Confined groundwater was encountered in the bedrock aquifer in borehole BHRC2 (See Figure 3.8.2) with the groundwater level rising above ground level (artesian conditions). The groundwater flow direction corresponds to the surface water drainage pattern and the topography of the site i.e. in a south westerly direction.

### 3.8.4 Potential Impacts

The proposed development will involve the construction of lined cells. This will involve excavation works below existing ground level and the compaction of soils. This change in the local geology will not result in a significant or adverse impact, as the overburden deposits and bedrock are not of geological significance or intrinsic scientific value.

The groundwater table will be locally lowered during the construction of the new cells. This will be of a temporary nature and the groundwater conditions will equilibrate after cell completion. Due to the naturally high groundwater levels control measures such as interceptor drains and / or a sub cell drainage system will be required to locally control the high water table.

The operation of the landfill site has the potential to contaminate the groundwater and surface water. Groundwater is used as a source of water supply by local householders (26 private boreholes). The potential contamination of groundwater may impact on surface water where groundwater discharges to the surface water in the vicinity of the site.

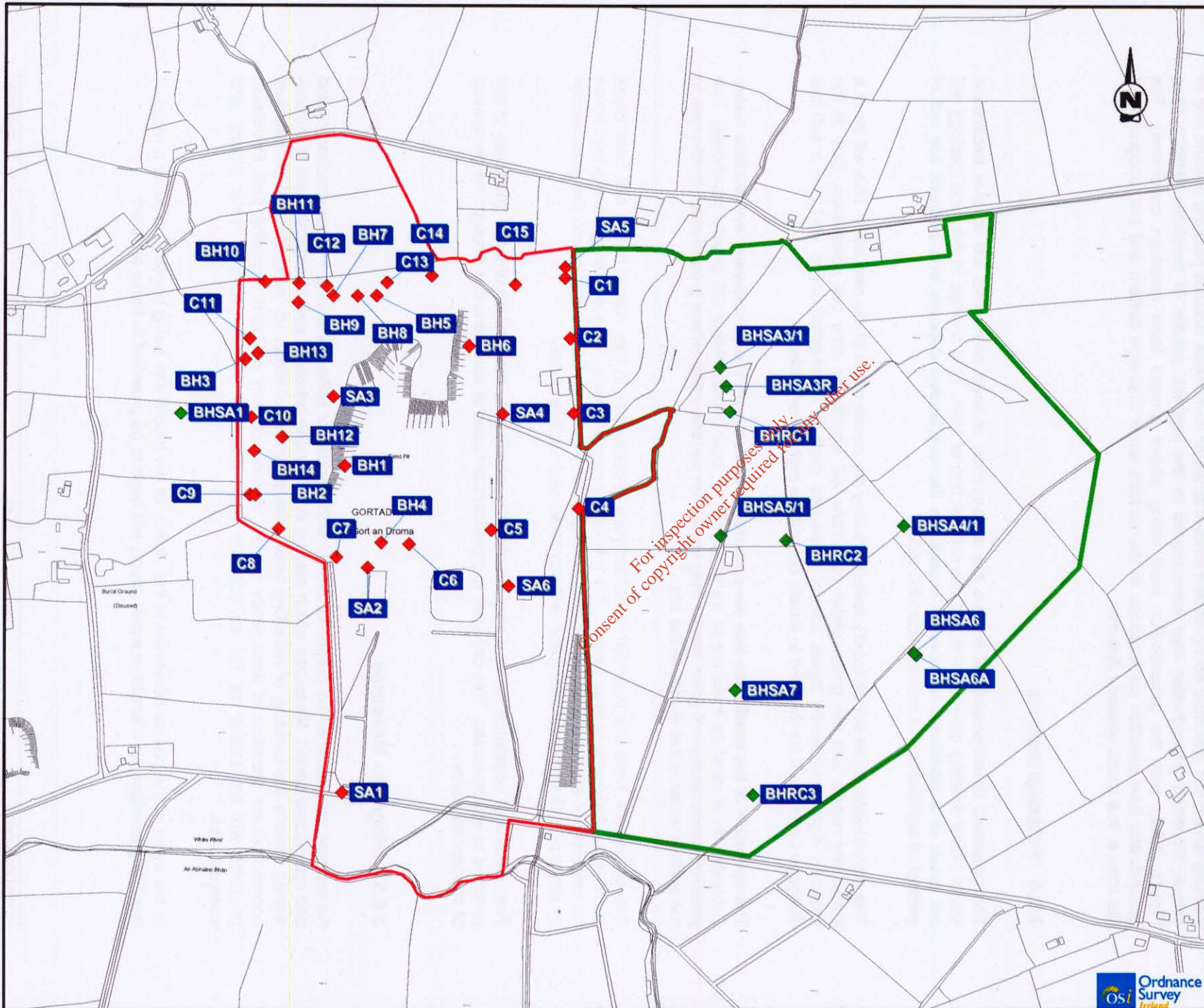
Site operations have the potential to contaminate groundwater in the vicinity of the site from areas such as the leachate storage lagoon, the leachate treatment plant, the fuel storage areas and areas for refuelling of site machinery. Accidental spillages have the potential to contaminate the groundwater by direct percolation or by interaction with contaminated surface water.

The removal of vegetative cover during construction can lead to the erosion of large quantities of soil particles to watercourses. This can lead to significant pollution of surface water through the generation of suspended solids.

### 3.8.5 Mitigation Measures

An emergency plan shall be prepared to deal with accidental spillages during the construction period and operational period. Measures which may be employed to prevent / avoid contamination of groundwaters include the bunding of refuelling areas, the provision of clean up materials and containment booms and the provision of emergency pumps to deal with any spillages including fuel. Petroleum products will be stored as far as possible from drainage ditches, surface water drains and watercourses.

In the event of the private boreholes in the vicinity of the landfill site being contaminated as a result of landfilling activities an alternative water supply will have to be provided to those affected.



**Legend**

- Existing Landfill Boundary
- Proposed Extension
- ◆ Borehole Location Earlier Site Investigations
- ◆ Borehole Location Summary of Results of Site Investigations 2002



Project **Gortadroma Landfill Extension EIS**

Title **Boreholes Locations**

Figure 3.8.2



Issue Details	
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The proposed future cells are to be lined and incorporate a leachate collection system. The leachate from the cells will be pumped to the on site leachate treatment plant. This will reduce the head of leachate above the basal liner of the lined cells and reduces the potential leakage of leachate from the lined cells. The provision of a leachate treatment plant will significantly reduce the strength of the leachate and its potential to contaminate surface water and or groundwater.

It is proposed that the existing environmental monitoring programme will be extended to include the extension area. This will facilitate monitoring of the impact of the landfilling activities on the groundwater and any down gradient private groundwater sources.

The excavation of the cells below existing ground level increases the vulnerability of the groundwater to contamination. In order to mitigate against this impact all of the cells shall be lined in accordance with the requirements of the Environmental Protection Agency and waste licence for the site in order to safeguard the quality of the groundwater.

Stockpiles will be located as far as possible from drainage ditches, surface water drains and watercourses. The stockpiles shall be covered where practicable with suitable sheeting or grassed. Disturbed areas will be stabilised as soon as construction is finished. Where possible excavated material will be stored and stockpiled for re use in future landscaping works at the site.

### 3.8.6 Summary

The existing landfill site and much of the proposed extension area, including the area proposed for the construction of the future lined cells, is located on bedrock of the Shannon Group (SHG). The GSI have assigned a provisional aquifer classification of LI for the Shannon Group. This relates to bedrock, which is moderately productive only in local zones. The Clare Shale Formation (CS) forms the bedrock in the north eastern corner of the proposed extension area and is provisionally classed as a poor aquifer by the Geological Survey of Ireland.

The construction of the lined cells is likely to involve the excavation of subsoil deposits. As the proposed formation levels have not been finalised at this time the removal of up to 8m of subsoil has been used in the assessment of the potential vulnerability of the groundwater to contamination following the construction of the cells. Based on the site specific data from the investigations to date i.e. the subsoil type, permeability and thickness, the site would have an extreme to high vulnerability rating based on the depth to bedrock aquifer following the excavation of the cells.

The Department of Environment and Local Government, Environmental Protection Agency and Geological Survey of Ireland (1999) have developed a groundwater protection response matrix in order to assess the location and management of potentially polluting activities in order to protect groundwater resources. These guidance notes provide a response matrix for assessing the suitability of a site for the development of a landfill. The response category for the proposed site indicates that the site is considered suitable for the development of a landfill site subject to guidance in the EPA Landfill Site Design Manual or the conditions of a waste licence.

## 3.9 AQUATIC ECOLOGY

### 3.9.1 Introduction

A baseline aquatic survey was carried out by Conservation Services Ltd. on sections of the White River surrounding the proposed site for the landfill extension. The principal requirements of this survey were to assess the present water quality, the current status of salmonid fish stocks, and the potential impact the proposed extension may have on the ecology of the White River.

### 3.9.2 Methodology

#### 3.9.2.1 Habitat Assessment

An assessment of the habitat and its suitability for salmonids species (trout, sea trout and salmon) was carried out on different sections of the White River from upstream of the landfill to the Shannon Estuary at Loughill (See Figure 3.9.1) including the area of the proposed landfill extension. This assessment examined stream width and depth, substrate type, flow type and dominant bankside vegetation.

These sites were rated as habitat for salmonid adult, nursery and spawning on a scale of None/ Poor/ Fair/ Good/ Very Good/ Excellent broadly based on a qualitative procedure described by Kennedy (1984).

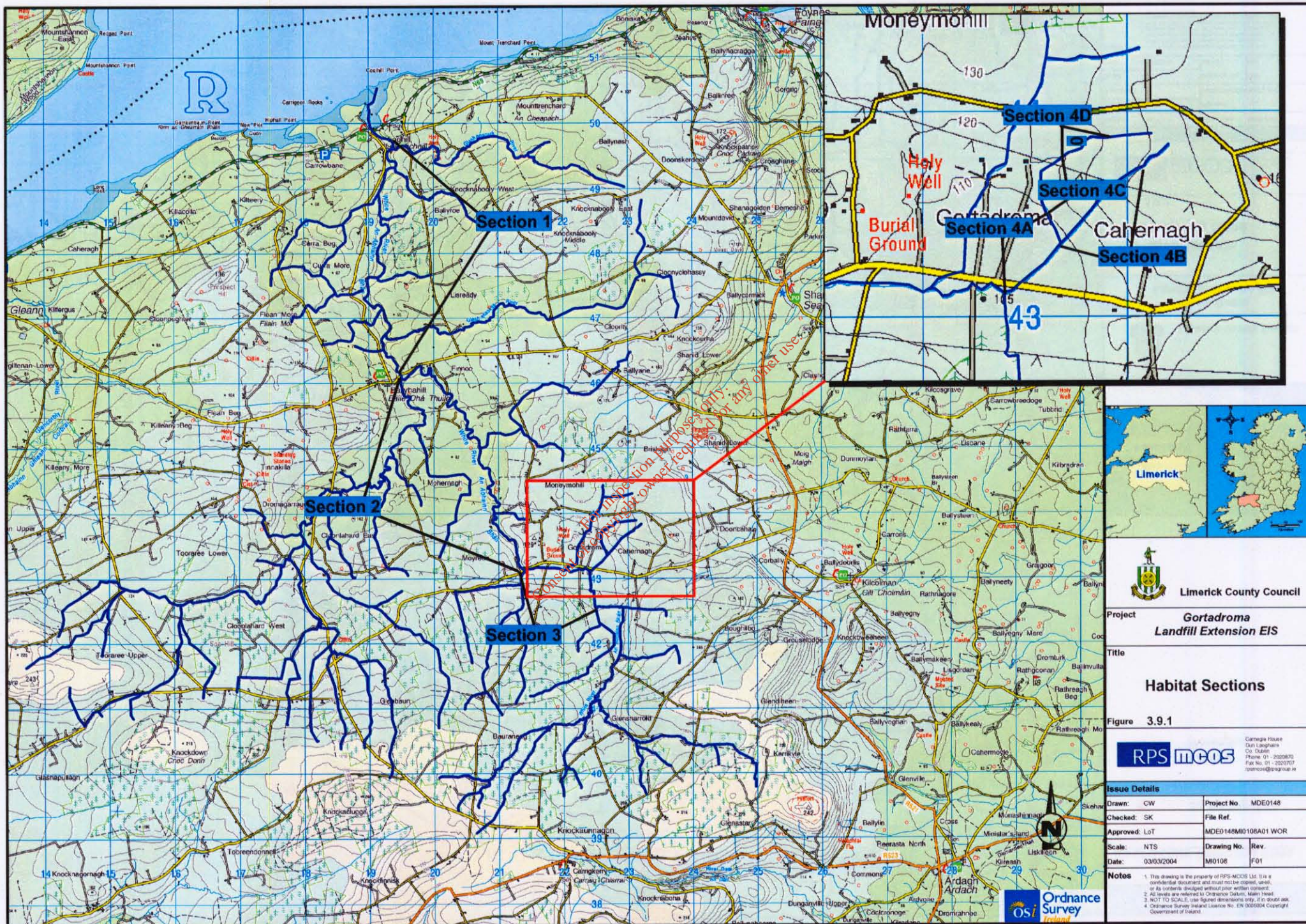
#### 3.9.2.2 Invertebrate sampling and water quality assessment

Seven sites were selected for invertebrate sampling in May 2003. Figure 3.9.2 shows all sites surveyed over the last three decades by both Conservation Services and the EPA. A five-minute kick and stone wash sample was taken at each of the seven sites (ISO 7828:1985). Each sample was live sorted for 30 minutes (ISO 5667-3:1994), and macroinvertebrates were stored in 70% alcohol. Invertebrates were identified to the level required for the EPA Q-rating method (McGarrigle *et al*, 2002).

#### 3.9.2.3 Assessment of Fish stock

Five sites were selected for fish assessment in May 2003 (Figure 3.9.3). Timed electrofishing was carried out at each site to provide a Catch Per Unit Effort (CPUE) index of the fish population density. Fish were identified, and fork length of salmonids was measured to the nearest mm. Salmonid age was determined by length frequency distribution combined with scale reading using a high power binocular microscope. Salmonids were classified according to age as fish spawned last winter (0+), 1 year old (1+), 2 years old (2+), etc.





Limerick County Council

Project **Gortadroma Landfill Extension EIS**

Title **Habitat Sections**

Figure 3.9.1



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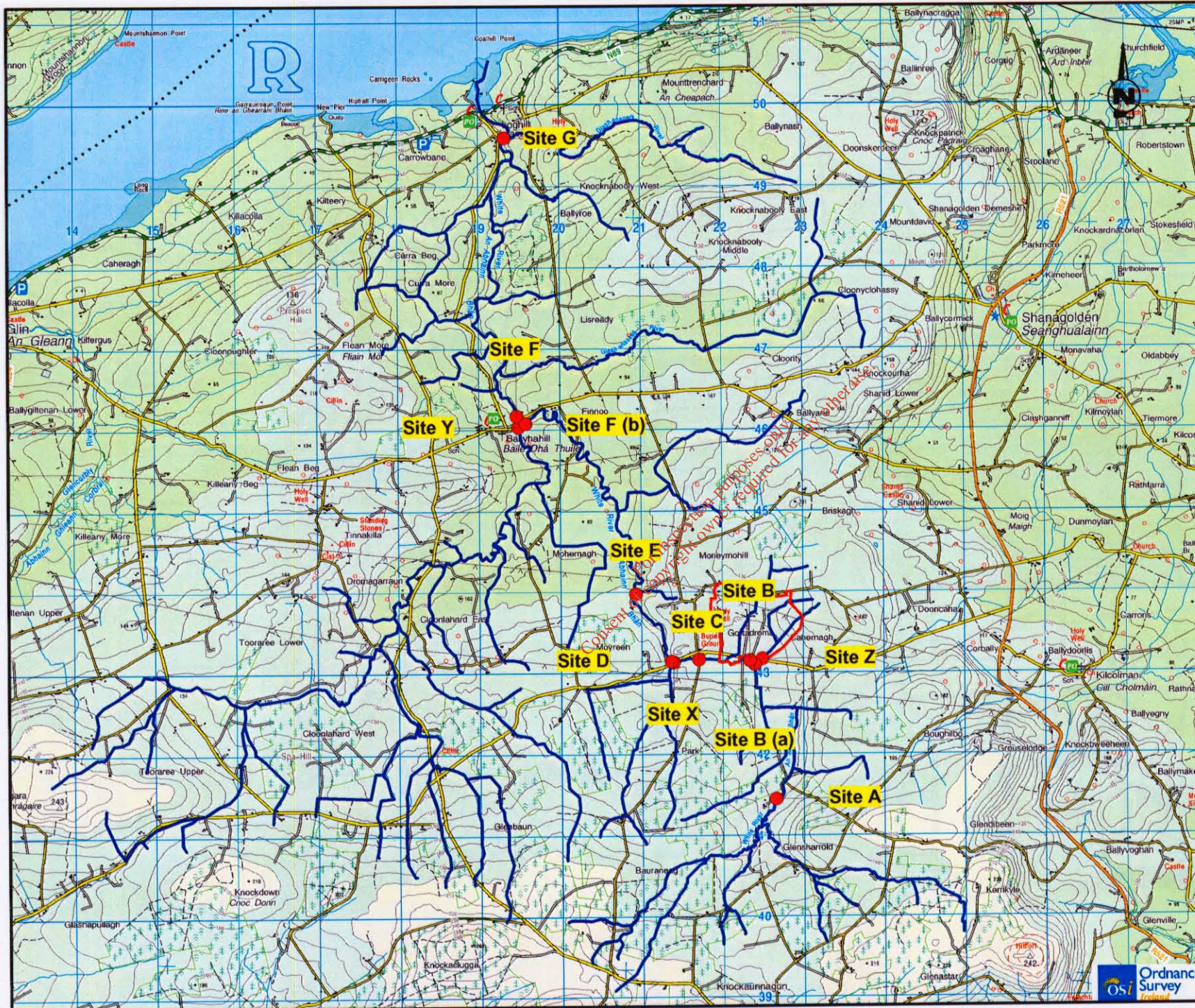
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**Legend**

**Invertebrate Sampling Sites**

- Sampling Site
- Landfill Boundary



Limerick County Council

Project **Gortadroma Landfill Extension EIS**

Title **Invertebrate Sampling Sites**

Figure 3.9.2



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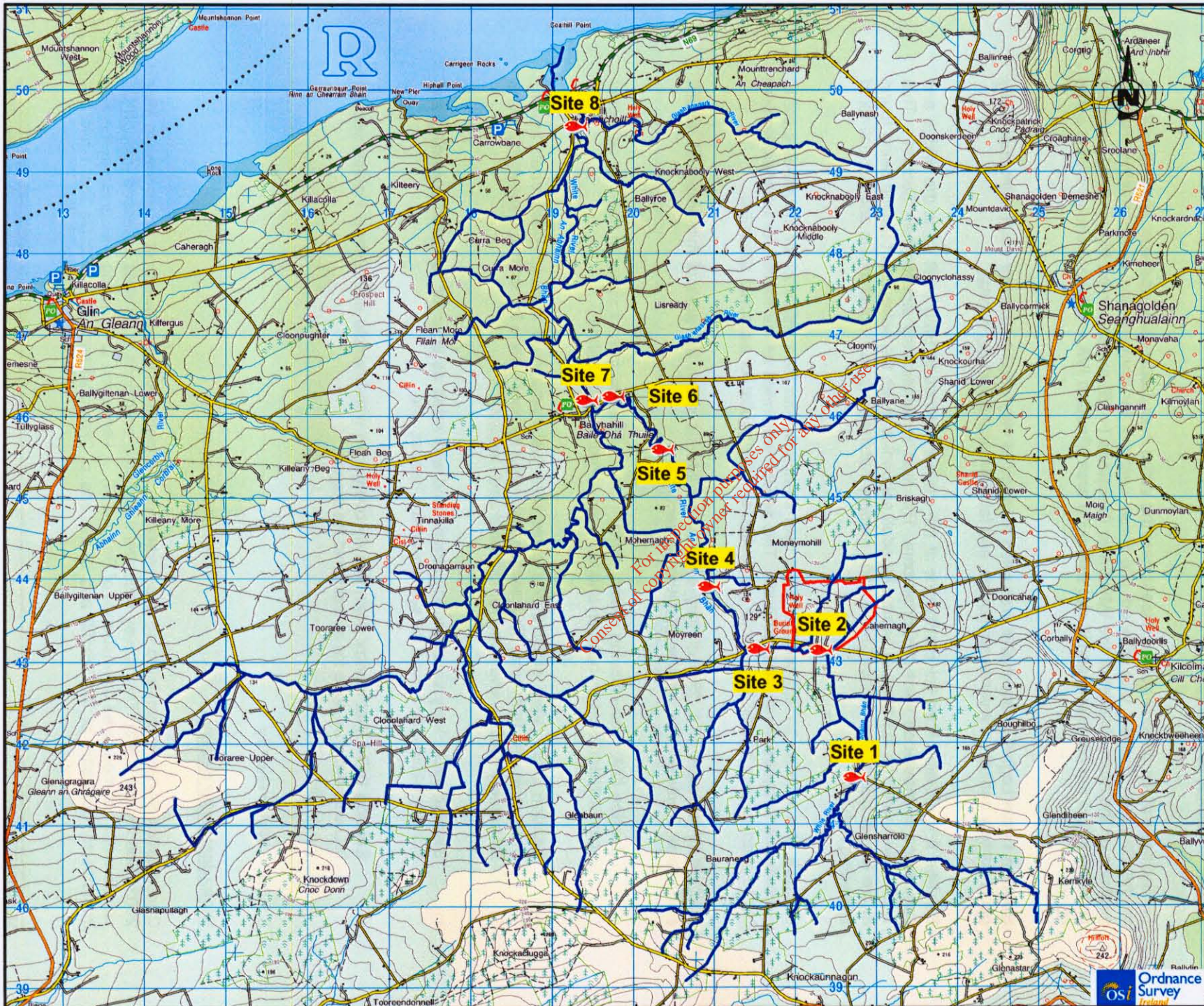
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**Legend**

**Fish Survey Sites**

**Sampling Site**

**Landfill Boundary**

**Limerick**

**Limerick County Council**

**Project** Gortadroma Landfill Extension EIS

**Title** Fish Survey Sites

**Figure** 3.9.3

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### 3.9.3 Existing Environment

#### 3.9.3.1 Habitat assessment

On the basis of the general habitat assessment the White river, from 0.5km upstream of the landfill site to the Shannon Estuary was divided into three sections for convenience of description. Habitat sections on the main channel of the White river (**Sections I – III**) are shown on **Figure 3.9.1**. Habitat sections within the proposed landfill site extension area (**Section IVA – IVD**) are shown on the same figure.

**Section I** from Loghill to Ballyhahill was rated as good to very good habitat for adult salmonids, very good nursery habitat for juvenile salmonids, and fair salmonid spawning habitat.

**Section II** is situated from the confluence of the main tributaries at Ballyhahill up to the bridge and confluence of tributaries west of Gortadroma. The river is significantly smaller than Section I. This section was rated as fair to good habitat for adult salmonids, (with the better adult habitat being found in the lowest part of the section), very good nursery habitat for juvenile salmonids and fair salmonid spawning habitat.

**Section III** is approx. 1.7 km section of the river stretches from the confluence of tributaries west of Gortadroma to upstream of the landfill site. This section was rated as fair habitat for adult salmonids, fair to good nursery habitat for juvenile salmonids, and fair habitat for salmonid spawning.

**Section IV** consists of c. 2km of very small stream/drains within the area of the proposed landfill extensions. It was divided into the following subsections.

- **Section IVA:** Slow flowing muddy drain. This section was rated as poor to none for salmonid spawning and nursery habitat, and none for salmonid adult habitat;
- **Section IVB:** Very small trickle sometimes just damp mud in deep sided drain heavily overgrown with hawthorn. This section was rated as poor - none for salmonid spawning, none for nursery habitat, and none for salmonid adult habitat;
- **Section IVC:** Very small muddy stream and was rated as poor for salmonid spawning and nursery habitat, and none for salmonid adult habitat; and
- **Section IVD:** Wet muddy drain heavily overgrown with bramble and rushes. Habitat section IVD was rated as none for all salmonid life stages.

#### 3.9.3.2 Water Quality

##### Biological water quality

Conservation Services completed an assessment on the biological water quality at seven sites in May 2003 (See **Figure 3.9.2**). This survey recorded unpolluted conditions at all sites assessed (though Q-values were not measured downstream of Ballyhahill). A very good Q4-5 rating was given at the site immediately upstream of the landfill and at the site c. 2km upstream. It is notable that while the



downstream site retained its unpolluted rating, there was a small decline ( $\frac{1}{2}$  a Q-rating point) between the sites immediately upstream (Site B) and downstream (Site C) of the landfill. At Site D, c.600m downstream of the landfill, the river had returned to a Q4-5 rating. The rating at Site C may be indicative of some low level of contamination from the landfill.

Biological results for the last three decades are shown in **Table 3.9.1**. From these results it can be seen that unpolluted conditions were not always achieved and Q values of 3-4 indicating slight pollution have been recorded at a number of sites on the White River.

### Physico/chemical water quality

Limerick County Council quarterly water chemical monitoring 2000–2002 indicates generally satisfactory conditions in the White River downstream of the landfill. Some low level influence, possibly from the landfill is however indicated by the fact that higher ammonia concentrations at the downstream site, Site S1 compared to the upstream site, Site 6 have been recorded in 50% of the samples analysed over the period 2000 to 2002 (See **Figure 3.2.1**). The average ammonia concentration of the downstream site was 0.47 mg/l ammonia-N whereas the upstream site was 0.17 mg/l ammonia-n. The Salmonid Waters Regulations set a limit of 1.0 mg/l total ammonia as N. This parameter was exceeded twice at the downstream site over the period 2000 to 2002.

### Fish Stocks

Conservation Services assessed fish numbers at eight sites in August 1997 and five of these sites were resurveyed in May 2003. The complete 2003 fish survey data is given in Volume 3. The sites electrofished are shown on **Figure 3.9.3**.

Findings from the 1997 survey indicate that juvenile trout were present in high densities at all sites surveyed. Adult brown trout were recorded in low numbers upstream of the landfill and were virtually absent in the 4 kilometre section downstream of the landfill. However, in the lowest 5 kilometres of the river good numbers of adult fish were recorded. The virtual absence of adult trout, and the relative abundance of juveniles in 1997, would be in keeping with trout having recolonised these waters after recent improvement in water quality, as trout occupying new territories are usually young fish. Small numbers of sea trout were recorded in the lower 8km of the river. The size of the sea trout run could not be determined from the survey, which may not have corresponded with the main period of upstream migration.

The 1997 survey indicated a small run of salmon into the lowest section of the White River. Whereas it was possible that salmon ran and spawned further upstream, no juvenile salmon were recorded except at the lowest site.

Findings from the 2003 survey showed good populations of adult and juvenile brown trout at all sites surveyed. A single sea-trout smolt was recorded at Site 8. Because of high water levels, conditions were poor for electrofishing at this site, and it was likely that a larger number of sea trout would have been recorded under more suitable conditions. In 1997 juvenile salmon were only recorded at Site 8. No salmon were recorded at this site in 2003; however, it cannot be concluded from this that salmon are no longer present at the site, as water conditions were unsuitable for the capture of juvenile salmon at the time of the survey. The May 2003 survey recorded good densities of juvenile salmon at Site 1, where no salmon were recorded in 1997. This section of river has been stocked with salmon fry by the Abha Bhán Fishing Club with the assistance of the Shannon Regional Fisheries Board. The fact that good densities of 1 year old salmon were recorded at this site indicates that the stocked fish have successfully colonised this section of stream. Salmon are listed in Annex II of the Habitats Directive.

The White River system, which includes the Cloonlahard, is the only river system in Co. Limerick which is recognised as a sea trout fishery. At present the White River is a significant leisure resource for local anglers. Overseas anglers formerly visited the river in significant numbers. It seems that few

anglers now visit the river from outside the area, perhaps due to fish kills downstream of Ballyhahill in 1987 caused by pollution from agricultural sources. The section of the river from Ballyhahill to Loghill is notably picturesque with numerous attractive cascades and pools in a setting of mature deciduous woodland composed predominantly of native tree species. This combined with the facilities of the adjacent villages of Ballyhahill and Loghill, makes the river a potentially significant attraction for angling tourists. Significant expenditure has taken place in the last four years to improve the angling amenity value of the river and to restock the river with salmon.

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Table 3.9.1 – Q ratings in the White River 1971 – 2003

EPA Site No.	CS Site Code	Site location	EPA 1971	EPA 1975	EPA 1979	EPA 1986	EPA 1988	EPA 1994	EPA 1996	CS 1997	EPA 1999	EPA 2002	CS 2003
0040		<i>West Branch (Cloonlahard River)</i> Bridge upstream of Cloonlahard Bridge	-	-	-	-	-	4	4	-	4	4	-
0050	Y	0.1 km upstream of confluence with main channel	-	-	-	-	-	4	-	3-4	-	-	-
	Z	<i>Tributary drain/stream on proposed landfill extension area</i> Upstream of road	-	-	-	-	-	-	-	-	-	-	4*
	X	<i>Tributary d/s of landfill</i> On tributary just upstream of the confluence with the white river	-	-	-	-	-	-	-	3-4	-	-	4
	A	<i>Main Channel</i> Bridge north of Glensharrold	-	-	-	-	-	-	-	4	-	-	4-5
	B(a)	Upstream of landfill and stream from proposed extension area	-	-	-	-	-	-	-	-	-	-	4-5
0070	B	Upstream of landfill	-	-	-	-	-	-	-	4	4-5	4	-
0075	C	(West) Bridge South of Gortadroma just downstream of landfill	-	-	-	-	-	3-4	3-4	4	4	4	4
	D	Second Bridge downstream of landfill. Downstream of confluence with small tributary	-	-	-	-	-	-	-	4	-	-	4-5
	E	Bridge on private Cul de Sac	-	-	-	-	-	-	-	4	-	-	-
0090		Bridge upstream of Ballyhahill Bridge	-	-	-	-	4	4	4	-	4	4	-
	F(b)	Ballyhahill upstream of Cloonlahard confluence	-	-	-	-	-	-	-	-	-	-	4
0100	F	Ballyhahill Bridge	5	4-5	4-5	4-5	3-4	-	-	4	-	-	-
0120		0.5 km downstream of Ballyhahill Bridge	-	-	-	-	-	4	3-4	-	4	3-4	-
0200	G	Bridge upstream of Loughill	5	4-5	4-5	4	3-4	4	3-4	3-4	4	4	-

\* Tentative

### 3.9.4 Potential Impacts

The future impact of the landfill on the White River will depend on the quantity of treated or untreated leachate, if any, which enters the river in future years.

#### 3.9.4.1 Leachate

One of the consequences of the disposal of wastes in landfills is the generation of leachate, which is the noxious liquid that is produced as a result of the interactions in the waste as water passes through it. Since any proposed new cells are constructed using 100% containment methods no unaccounted loss of leachate to surface or ground waters is expected.

The amount of leachate generated by the landfill can be broken down into phases. The quantity of leachate is a factor of the rainfall percolating through the waste. In the early phases when the cell has less than 1 meter of waste along the bottom the amount of leachate generated is 100% of rainfall amounts. Because the proposed cells are totally contained this is all pumped from the cells and treated. In the last phase when the cells are capped the amount of leachate generated and subsequently pumped is between 1 – 10% of rainfall amounts depending on the capping system used.

The concentration of various potentially polluting substances in leachate varies depending on a variety of factors such as the type of waste being disposed of, moisture of the waste, rainfall, design and operation of the site, and the age of the waste.

A wide range of substances potentially harmful to the aquatic environment are present in landfill leachate, the concentration of which varies depending on a variety of factors such as the type of waste being disposed of, moisture of the waste, rainfall, design and operation of the site, and the age of the waste. Results from the ground and surface water monitoring in the vicinity of Gortadroma in 2001 and 2002 indicate that pesticides, volatile organic compounds and semi volatile organic compounds were all below detectable range.

#### 3.9.4.2 Worst case scenario for pollution by leachate

If leachate containment, collection and treatment measures were to fail or not be implemented, very significant quantities of leachate would enter the White River resulting in contamination of the entire aquatic food chain with a variety of pollutants, a general impoverishment of aquatic flora and fauna, and the depletion or elimination of salmonid fish from some or all of the White River downstream of the landfill.

#### 3.9.4.3 Pollution with suspended solids during construction and operation of the landfill

In the absence of adequate mitigation measures, suspended sediment due to runoff of soil from construction, excavation and landscaping areas could have severe negative impacts on invertebrate and plant life and on all life stages of salmonid fish.



#### 3.9.4.4 Pollution of river with other substances associated with the construction process.

In the absence of adequate mitigation measures the potential exists for a range of serious pollutants to enter watercourses during the construction and operation of the landfill extension.

#### 3.9.5 Pollution of river with contaminated water draining from parking and delivery areas and other paved areas

The most serious risk posed would be from accidental spillages of transported materials with high B.O.D. or other polluting potential.

#### 3.9.5.1 Loss of Habitat

The proposed landfill extension would result in the loss of up to 2km of watercourse within the landfill extension area. This consists of habitat sections IVA – IVD. Most of this watercourse would be most accurately described as a drain and would be rated as having no potential salmonid habitat value. No section is rated higher than poor as potential salmonid nursery habitat. Overall this watercourse would rate as of low ecological value and the potential impact on the watercourse would rate as either slight or not significant.

#### 3.9.6 Mitigation Measures

##### 3.9.6.1 Mitigation of leachate pollution

If adverse impacts on the ecology, fish populations and amenity value of the White River are to be avoided, it will be necessary to prevent biologically significant quantities of leachate pollutants from reaching the river over a prolonged period of time. This is currently accomplished by collecting, treating and removing all leachate for disposal elsewhere. However, there are potential impacts on the environment due to the haulage of leachate by road tanker and subsequent treatment and release of treated effluent. It is proposed that all leachate will be collected, treated and discharged to the river. The leachate will be treated to such a standard before releasing to preclude adverse biological impacts to the river

All new cells will be lined using a composite system to meet the requirements of the EU Landfill Directive and the EPA standards and Licence conditions thus ensuring capture of all leachate produced.

Each new cell will be designed to have its own leachate collection system. Collected leachate will be pumped to a treatment plant. The dry weather flow of the White River at Gortadroma is estimated as 0.003 cubic metres per second. This constitutes a low flow volume offering limited dilution when compared with a maximum treated effluent discharge of 0.00138 cubic metres per second. However, the simultaneous occurrence of maximum leachate production and minimum river flow is unlikely as both are reliant on rainwater volumes. Treated leachate will not be released to the river in low water conditions (less than 0.05 m<sup>3</sup>/sec), but will be returned and stored in the treated leachate lagoon until suitable conditions prevail. Should any deterioration occur in the effluent quality or if the treated leachate lagoon has reached capacity, leachate will be removed by road tanker.

The proposed leachate treatment facility on site will provide the necessary protection to the river provided that treatment standards preclude adverse biological impacts on the river. For many potential contaminants maximum acceptable levels have been established in EU regulations such as the Salmonid Waters Regulations.

### **3.9.6.2 Mitigation of non-leachate pollution generated during construction and operation of the landfill**

Release of suspended solids to surface waters should be kept to a minimum by ensuring good on-site erosion and sediment control. Both runoff and surface erosion control are used in Gortadroma together with settlement lagoons to prevent sediment contamination of receiving surface waters.

Raw or uncured waste concrete shall be disposed of by removal from the site or by burial on the site in a location and in a manner that will not impact on the watercourse.

Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks shall be trapped on-site to allow sediment to settle out and reach neutral pH before clarified water is released to the stream or drain system or allowed to percolate into the ground.

Fuels, lubricants and hydraulic fluids for equipment used on the site shall be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice.

Fuelling and lubrication of equipment shall not be carried out close to water courses.

Any spillage of fuels, lubricants or hydraulic oils shall be immediately contained and the contaminated soil properly disposed of.

Waste oils and hydraulic fluids shall be collected in leak-proof containers and properly disposed of.

### **3.9.6.3 Mitigation of pollution from runoff from paved areas**

A spill response action plan shall be put in place, and spill response materials kept on site, to ensure that any spills of potentially polluting materials are prevented from entering surface waters.

## **3.9.7 Summary**

The impacts of the proposed landfill extension on the flora, fauna and habitats of the White River will be slight or insignificant if the mitigation measures outlined above are fully implemented.

## **3.10 TERRESTRIAL ECOLOGY**

### **3.10.1 Introduction**

Roger Goodwillie and Associates undertook the assessment of potential impacts on the terrestrial ecology from the proposed extension of Gortadroma Landfill.



### 3.10.2 Methodology

Habitat identification was carried out during a walkover survey of the site in June 2003. Habitats description corresponds to a Phase I Habitat Survey (JNCC, 1990) but uses the classification of Fossitt (2000).

### 3.10.3 Existing Environment

#### 3.10.3.1 General

The habitats in the proposed site are typical of the shale uplands of west Limerick and north Kerry where the wet soil is a dominant factor in controlling the type of land use that is possible and the plant and animal communities that occur. In the absence of intensive farming a significant amount of wildlife persists in the fields with the bird fauna in particular being well developed.

Although the habitats and species found are widespread in the surrounding area the site does include significant diversity with peaty as well as mineral communities. The cutover bog is a small feature of local ecological interest though its persistence in the absence of development is unlikely. It is becoming overgrown by scrub. The badger sett is also a feature of note: although the animals are by no means rare in the general area there are relatively few sites that are suitable for sett construction.

These items are not of significance in county or regional terms. There are no scarce or rare species of plant or animal as far as is known.

#### 3.10.3.2 Flora

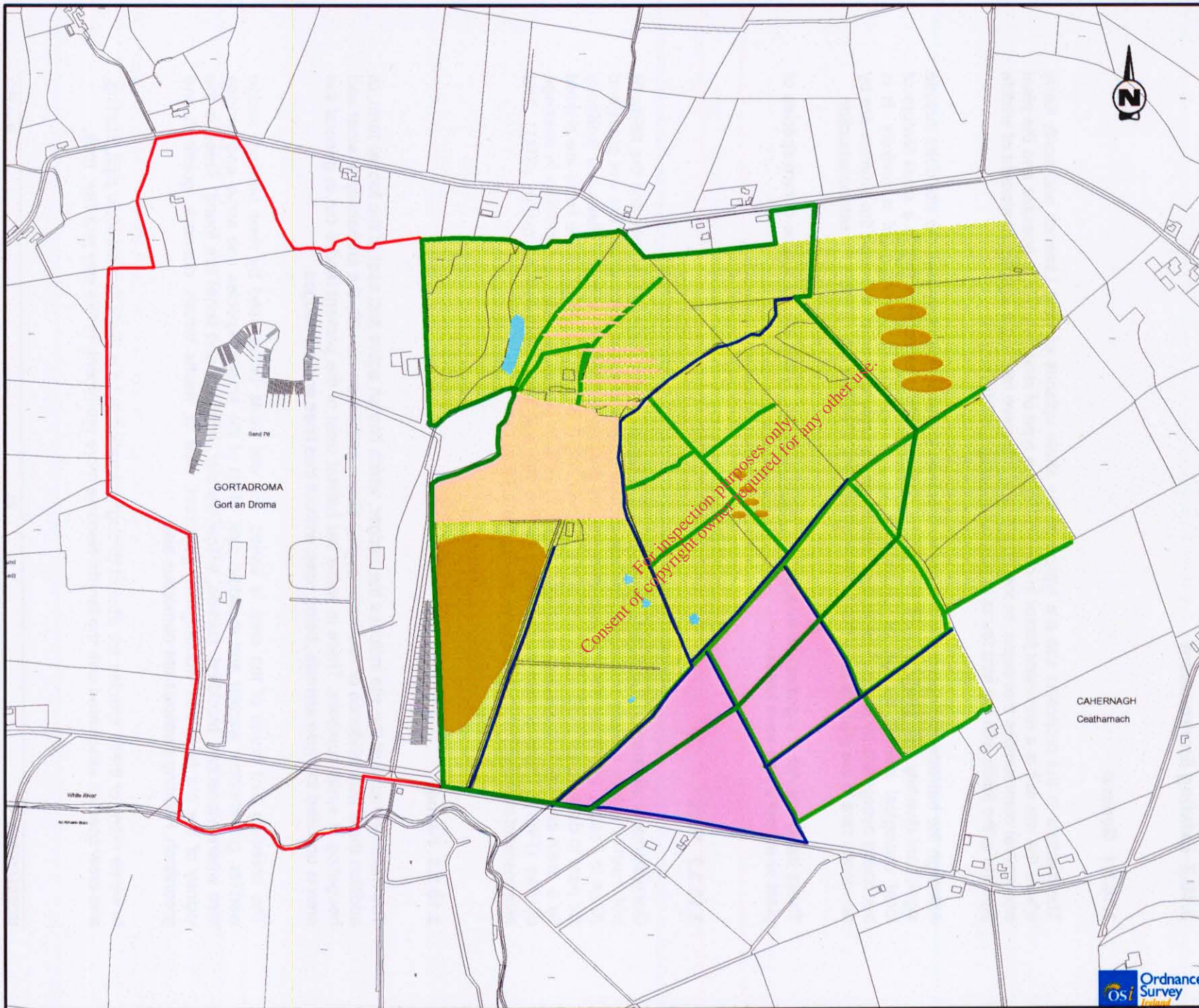
Gortadroma is situated on the shaley soils of west Limerick where drainage is poor and the fields fill with rushes unless actively managed. The site includes many of these fields which are wet grassland (GS4 in Fossitt, 2000) but there is also drier neutral grassland (GS1) on slopes. There is a tendency for peat to develop on most areas and some cutover bog (PB4) occurs. Most of the fields are divided by a drain and bank supporting a hedgerow (WL1) and, in places, aquatic communities in drainage ditches (FW4). There is also some seepage into the soil best described as marsh (GM1). The arrangement of these habitats is shown on **Figure 3.10.1**.

#### 3.10.3.3 Fauna











The mammal fauna of the site includes the badger, which has an active sett east of the former farm. In addition there was evidence of fox, hare, pygmy shrew and brown rat with the probability of stoat and hedgehog in small numbers. There is some bat habitat west of the present landfill but in general the area is unsuited to these animals, being open without tree lines and tall hedges.

The breeding bird fauna of the area is varied, the wet fields being used by reed bunting, sedge warbler, grasshopper warbler and meadow pipit. Most of the smaller species use scrub and hedges also where stonechat, blackbird, cuckoo, willow warbler, bullfinch and linnets are found. Trees in the vicinity of the old farm add woodpigeon, goldcrest, blue tit, mistle thrush, dunnock, goldfinch and greenfinch. Feeding swallows are numerous also.

In winter many of these species are absent through migration but it is likely that meadow pipit, starling, and crow species associated with the landfill become more prominent. In this way jackdaw, rook,



**Legend**

-  Drains
-  Existing Landfill Boundary
-  Proposed Extension
-  Hedgerow
-  Broken Hedgerow
-  Cutover Bog
-  Marsh
-  Neutral Grassland
-  Woodland
-  Wet Grassland



Limerick County Council

Project **Gortadroma Landfill Extension EIS**

Title **Habitat Arrangement**

Figure **3.10.1**



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hooded crow and magpie would spend some time in the fields, occasionally with black-headed or lesser black-backed gulls. Hen harrier and merlin are likely to be occasional visitors also but would not spend significant time in the area.

### 3.10.3.4 Designations

No parts of the area or its surroundings have been included in an ecological designation (Natural Heritage Area, Special Area of Conservation or Special Protection Area) and none are likely to be so. There are no habitats or species listed as of special concern in the EU Habitats Directive (92/43/EEC) or Birds Directive (79/509/EEC) and no plants included in the Flora Protection Order 1999. The badger and most of the bird species mentioned are protected under the Wildlife Act 1976.

### 3.10.4 Potential Impacts

#### 3.10.4.1 Construction & Operation

The landfill operation involves three main parts - the removal and storage of excavated material to level the site, the construction of refuse cells and the final capping and restoration of these when they are filled. The overall effect is one of obliteration: the habitat underlying the new landfill will be permanently removed while that beneath the stored soil will be covered for several years. After that time restoration measures will be able to restore a balanced ecology to the surrounding fields. Grassland or other vegetation will also be re-established on the capped landfill.

The presence of refuse and disturbed soils will continue the attraction for opportunistic species of plant and animal and the birdlife is likely to be skewed in this direction as long as the site operates. A landfill in this location is unlikely to be critical to the survival of most species but by making food readily available it concentrates a number of birds that would otherwise be spread out over a much greater area of countryside.

All the birds have an ecological effect in enriching the surrounding area with their droppings, encouraging vegetative growth.

### 3.10.5 Mitigation Measures

The badger sett will be dealt with before the construction of cells in conjunction with the Heritage Service of the Dept of the Environment (Dúchas) by either re-establishing it outside the site or by trapping and removing the animals.

Effective sediment traps will be constructed to prevent all export of suspended solids in the outflowing streams.

Soil storage will be kept a suitable distance away from the main stream flowing NE-SW through the site and its bankside growth of scrub will be maintained.

The site will be restored with additional planting of native woody species to form scrub and woodland.

### 3.10.5.1 Restoration after site closure

The flora and fauna dependent on the landfill is a transitory feature that will die out or move away after site closure.

No special measures are required during the restoration phase on ecological grounds though the use of the naturally occurring trees, especially birch *Betula pubescens* and willows *Salix cinerea*, *S.caprea* would do much to camouflage its presence.

### 3.10.6 Summary

There will be no impact on a national or regional scale from the proposed development. The impact will be significant from a local level due to the total loss of habitat for the medium term. This will reduce to slight on the long-term with the re-establishment of the capped landfill.

## 3.11 MATERIAL ASSETS - AGRICULTURE

### 3.11.1 Introduction

This study was carried out by RPS-MCOS Ltd. to assess the impact, if any, an extension to the Gortadroma landfill would have on agriculture in the surrounding area.

The area investigated for this report covers an area of approximately 105 hectares, which incorporates land holdings to north, west and east of the existing landfill and incorporates the site of the proposed extension.

### 3.11.2 Methodology

Two methods were used to examine agriculture in the proposed site: -

1. Desktop study – Examining both aerial and ordinance survey maps;
2. On Site Study – This was carried out in the spring/summer of 2003. All the lands were walked over and possible land uses and enterprise type were identified. Fields with obvious paddock grazing systems and/or yards observed with milking facilities were assumed to be involved in dairying. Other grass fields with no evidence of being used for dairying or that had sheep or beef animals grazing were assumed to be involved in drystock. These were later confirmed with discussions with landowners in the area. Lands under forestry were also identified.



### 3.11.3 Existing Environment

#### 3.11.3.1 General

The site is located in the townland of Gortadroma in north west Limerick between 110 and 120 meters O.D with a southerly aspect and an average annual rainfall figure of 1000 – 1250 mm.

Figures from the 2000 census indicate that the principal agricultural enterprises for Limerick are grass based and are split evenly between dairying and specialised beef production. The average farm size for Limerick, based on Agricultural Area Utilised (AAU) is 32.6 hectares.

#### 3.11.3.2 Soils

The soils at the site are predominantly gleys, belonging to the Kilrush Series of soils. These soils have a limited agricultural use due to their high clay content, weak structure, low porosity and slow permeability. These soils are generally suited to grass production only. The extensive occurrence of rushes throughout the area reflects the poor drainage status of these soils.

#### 3.11.3.3 Landuse

Grass production is the principal agricultural landuse in the area of investigation, with dairying and beef the principal enterprises. There are also a number of fields with both deciduous and coniferous plantations. **Table 3.11.1** and **Figure 3.11.1** shows the area of the different agricultural landuses within the area of investigation.

**Table 3.11.1 Landuses and Areas**

Landuse	Area (ha)	Percentage of Agricultural Area
Good Grazing	44.8	42
Moderate Grazing	15.5	15
Poor Grazing	34.6	33
Forestry	10.4	10
Total	105.3	100
Area of Current Landfill	35	

### 3.11.4 Potential Impacts and Mitigation

There are a number of potential impacts that landfills may impose on agriculture in a region: -

- Loss of land which may reduce the holding to such an extent as to make it non viable;
- Severance of the holding by the landfill. This may range from a minor severance causing only slight inconvenience to a major severance that may threaten the practicability of current enterprises on the holding; and

- Increased traffic levels in the environs of the agricultural holding causing problems with the day-to-day management, from moving stock to moving large machinery. Increased traffic may also cause elevated noise and dust levels. These may cause disturbance and subsequent loss of performance in more sensitive stock such as horses and dairy cows.

There may also be problems with animal health and welfare due to such factors as: -

- Contaminated water supplies (surface and ground);
- Noise;
- Spread of litter and debris;
- Scavenging birds may cause the spread of certain diseases such as salmonella; and
- Vermin, pests and insects may all have a negative affect on animal health and welfare.

The proposed development at Gortadroma is an extension of the existing landfill facility. The area of the proposed extension will be approximately 41 hectares and will impact on 7 different landowners to the east of the existing landfill (of which one is Limerick County Council)

Table 3.11.2 shows the percentages and areas of lands that may be acquired in relation to the proposed extension site and the site investigated. From this table it can be seen that a significant proportion of the site is “good grazing” and will have an impact on farming in the local area but from a regional or national scale the impact will not be significant.

**Table 3.11.2 Percentage landuse**

Landuse	Area of lands to be acquired	Percentage of lands to be acquired of proposed extension site
Forestry	3.0	7
Good grazing	13.9	34
Moderate Grazing	7.1	17
Poor Grazing	17.2	42

**Landtake:** From Table 3.11.3 it can be seen that the land take from a number of the land parcels within the investigated area will be such that farming will no longer be able to continue on these and therefore the impact will be “severe”. It should be noted that one of the land parcels, E002 has very limited agricultural usage as much of this land parcel is particularly wet due to a high water table and would be only suitable for very poor grazing during a dry period. Mitigation of landtake will be addressed in compensation.

**Severance:** No right of ways will be obstructed by the extension of the landfill and no lands will be left isolated by the extension therefore, severance by the proposed landfill extension will not be significant and will not require mitigation.

**Traffic:** Traffic for the landfill currently travels along the Kerry Line (County Road 306) south of the landfill site and four landowners have access to this road. The levels of traffic are not expected to increase with the extension of the landfill, as the annual intake to the plant will remain the same. Therefore the impact of traffic associated with the landfill extension will not be significant on agriculture in the area.

**Noise:** Noise can be an issue with certain types of livestock such as dairy cows and horses. There were no horses within the area of investigation when surveyed and the nearest dairy farm was 200



meters (distance to nearest dairy paddocks) from the outer boundary of the proposed site. Therefore it is unlikely that noise will be an impact on agriculture in the area.

**Litter etc:** The control of litter, debris, birds and vermin are all dealt with under the current EPA license for the landfill. The license will be reviewed for the extension and these matters will be regulated to ensure that they will not have an impact on agriculture.

**Surface/ground waters:** All surface and ground waters will be monitored and landowners whose current water supply may be affected by the proposed extension will be provided with an alternative source.

#### 3.11.4.1 Construction Impacts and Mitigation

There are a number of specific issues that may impact on agriculture during the construction phase of the proposed development. These are: -

**Traffic:** If there is an increase in traffic during the construction phase of the landfill extension both on site and along the Kerry Line discussions will take place with local landowners to ensure that construction traffic does not interfere with movements of stock nor hinder farm operations such as silage/hay making.

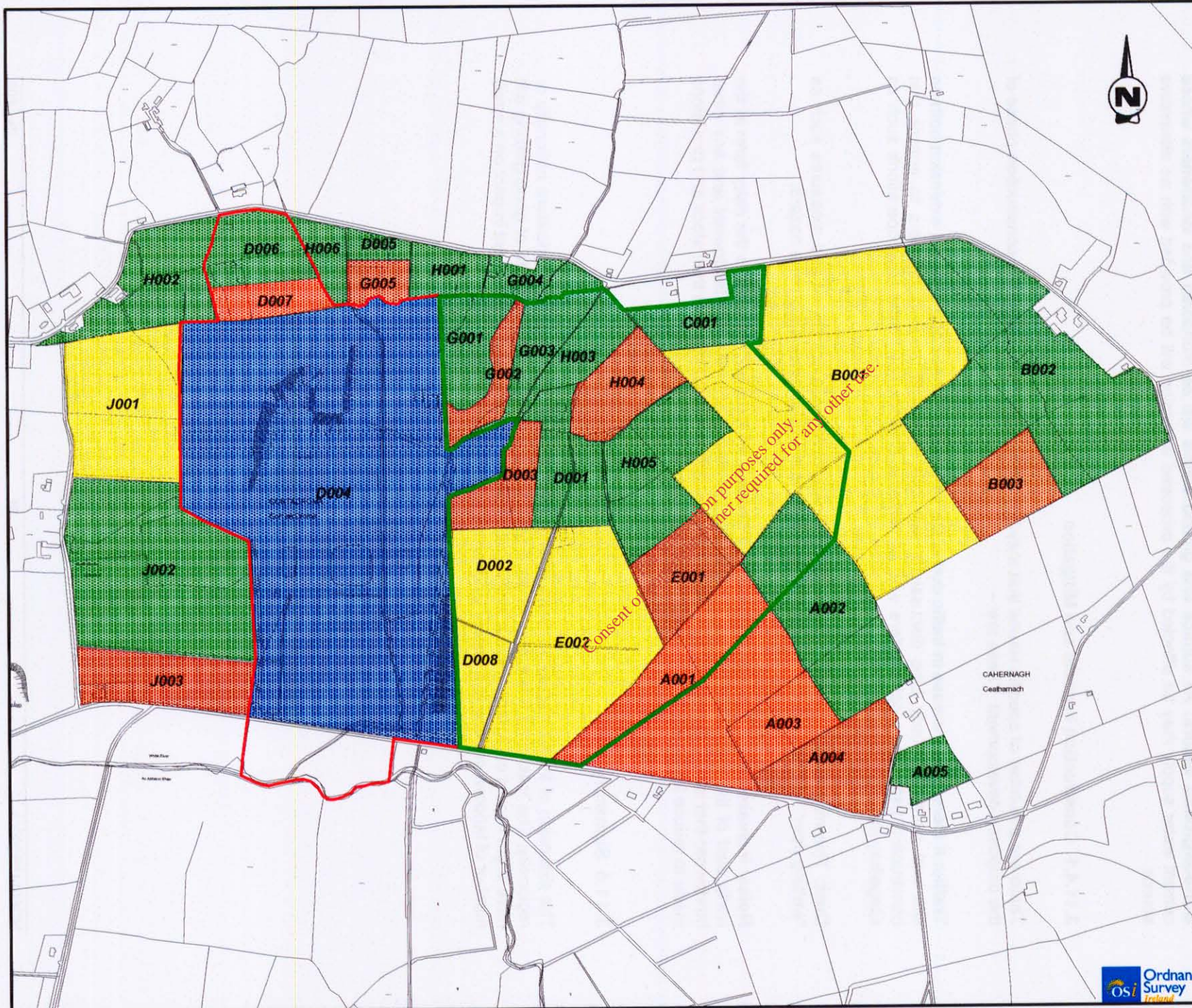
**Dust:** This may be a particular issue with construction during a dry period and measures such as "wetting down" will be implemented to ensure that dust is neither a nuisance nor a hazard.

**Noise:** Increased noise from construction may become an issue with respect to the dairy farm in the north east of the investigated area. Discussions will take place with this landowner and any other landowner that is concerned that noise levels are causing a disturbance with their stock and provisions made to reduce levels of noise in certain areas for certain periods of time.

#### 3.11.5 Summary

The extension of the Gortadroma Landfill will not have a significant impact on agriculture nationally or regionally. The loss of 13.9 hectares of good grazing from an area with a dearth of good grazing will have slight impact on agriculture at a local level. However, there will be a significant impact on a small number of landowners due to a loss of land for the proposed extension.





**Legend**

- Existing Landfill Site
- Proposed Extention
- Forestry
- Grazing Good
- Grazing Moderate
- Grazing Poor
- Landfill



Limerick County Council

Project **Gortadroma Landfill Extension EIS**

Title **Landuse Within Investigated Area**

Figure 3.11.1



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Table 3.11.3 Overall Impact on Individual Landowners Within the Investigated Site

Owner Id	Land Parcel (LP) Id	Landuse	Area (ha)	Approx. Land Take (ha)	Impact on LP	Total Area Within Investigation Area (ha)
A	A001	Forestry	7.6	3.2	Moderate	18.3
	A002	Grazing Good	5.4	1.6	Moderate	
	A003	Forestry	1.7	0.0	Not Significant	
	A004	Grazing Moderate	2.7	0.0	Not Significant	
	A005	Grazing Good	0.9	0.0	Not Significant	
B	B001	Grazing Poor	18.9	6.3	Moderate	31.2
	B002	Grazing Good	10.3	0.0	Not Significant	
	B003	Grazing Moderate	2.0	0.0	Not Significant	
C	C001	Grazing Good	1.8	1.8	Severe	1.8
D	D001	Grazing Good	1.8	7.2	Na <sup>2</sup>	10.6
	D002	Grazing Poor	2.5			
	D003	Grazing Moderate	1.6			
	D004	Landfill	35			
	D005	Grazing Good	0.5			
	D006	Grazing Good	1.8			
	D007	Forestry	1.1			
	D008	Grazing Poor <sup>1</sup>	1.3			
E	E001	Grazing Moderate	2.3	9.4	Severe	9.4
	E002	Grazing Poor <sup>1</sup>	7.1			
G	G001	Grazing Good	1.7	1.7	Severe	6.1
	G002	Grazing Moderate	1.0	1.0	Severe	
	G003	Grazing Good	1.9	0.4	Major	
	G004	Grazing Good	0.7	0.0	Not Significant	
	G005	Grazing Moderate	0.8	0.0	Not Significant	
H	H001	Grazing Good	1.1	0.0	Not Significant	12.4
	H002	Grazing Good	2.9	0.0	Not Significant	
	H003	Grazing Good	1.4	1.4	Severe	
	H004	Grazing Moderate	2.5	2.5	Severe	
	H005	Grazing Good	3.7	3.7	Severe	
	H006	Grazing Good	0.8	0.0	Not Significant	
J	J001	Grazing Poor	4.8	0.0	Not Significant	15.5
	J002	Grazing Good	8.1			
	J003	Grazing Moderate	2.6			

Note<sup>1</sup> Grazing in these fields is particularly poor

Note<sup>2</sup> Lands belong to Limerick County Council

## 3.12 ARCHAEOLOGY AND CULTURAL HERITAGE

### 3.12.1 Introduction

This report was compiled by Margaret Gowan & Co Ltd. to assess the likely significant impacts on archaeological, architectural and cultural heritage from the proposed extension to the Gortadroma Landfill.

### 3.12.2 Methodologies

The architectural, archaeological and cultural heritage potential of the study area was assessed through documentary sources – investigations at the existing landfill, cartographic references, stray

finds, recorded archaeological sites, toponomy, archaeological, architectural and historical literary sources as well as observing the local topography, physical environment, cultural landscape and proximity to recorded archaeological sites while in the field.

### 3.12.3 Existing Environment

#### 3.12.3.1 General

Gortadroma is located right at the heart of an area inhabited by a people known as Uí Chonaill Gabra, who were a branch of a dynasty called Uí Fidgeinti, who were in turn a branch of one of the greatest ruling power-blocs in early medieval Ireland, the Eóganachta of Munster.

Two townlands are located within the constraint area of the proposed development, these are Gortadroma and Cahernagh.

Gortadroma is a townland in the parish of Dunmoylan, and barony of Shanid, Co. Limerick.

#### 3.12.3.2 Archaeological Background

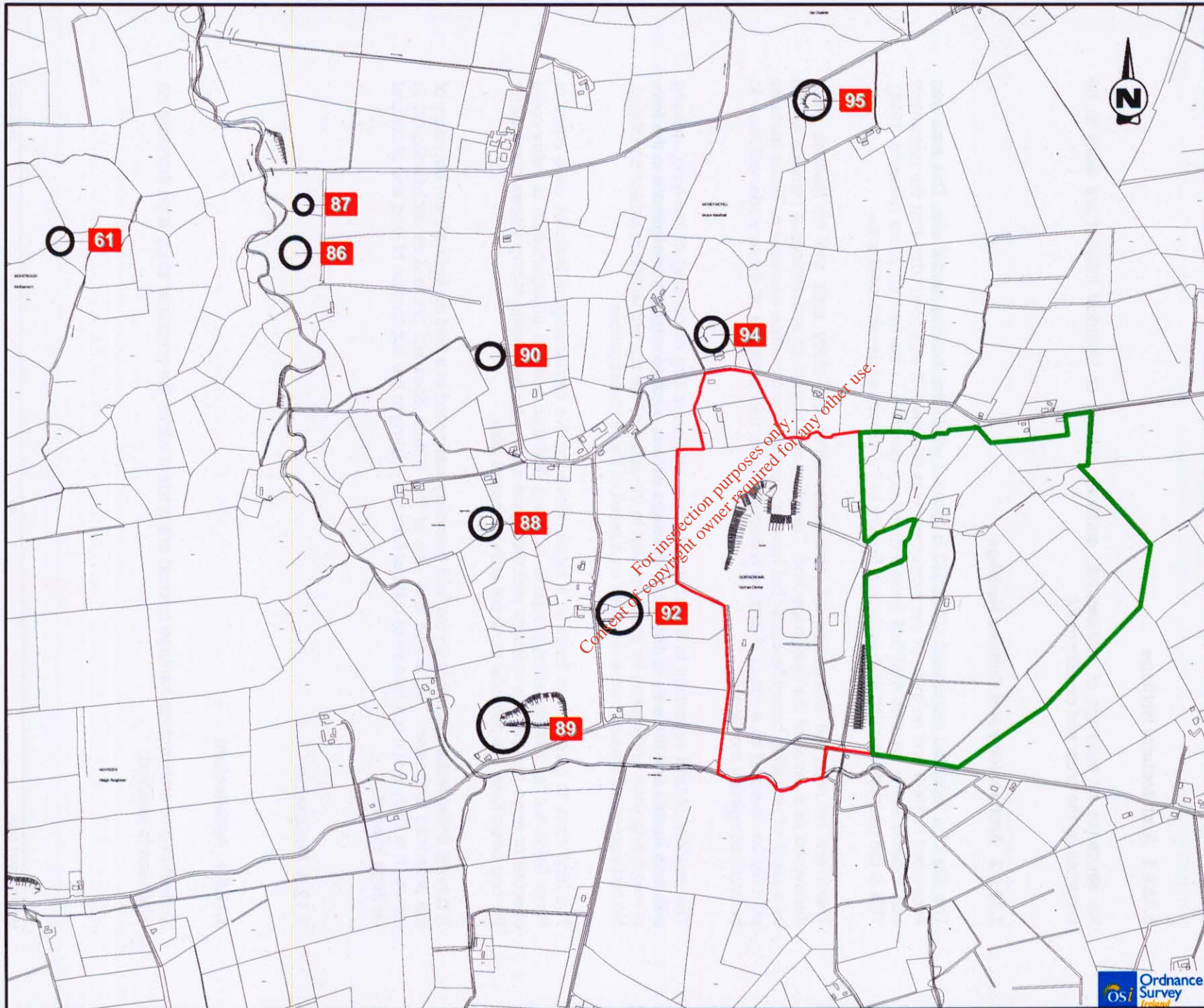
The site at Gortadroma is surrounded to the north and west by a significant number of earthworks and earthen enclosures (RMP Nos. 018:086, 087, 088, 090, 094, 095) (Figure 3.12.1), which attest to extensive habitation in the area at an early date. These are all located at good vantage points, overlooking the White River or at high elevations.

The townland of Gortadroma is one, which bears witness to an early ecclesiastical presence and social function. When the great authority on Irish holy wells, Caoimhín Ó Danachair, visited the site in the 1950s, he was able to see for himself the continuing importance to the local community of a holy well (018:093) marked on the Ordnance Survey maps. He described it as a 'small clear spring, overhung by an old thorn tree. A few people have made the rounds recently, but the devotion has almost died out. Rags were left as offerings, and nails driven in the tree'. There is no visible trace of the well or the tree today (Ó Danachair 1955, 214). Test excavations in 1998 concluded that the monument was located within an area that had been extensively quarried in the last 50 years (Stevens 1998).

Gortadroma is a potentially very important site, which was once the location of a *dominicus* or *domnach*, one of the very earliest centres of Christianity in Ireland. To the west of the proposed landfill lies a disused burial ground (LI: 018:092), surrounded by a bank up to 3 metres high, partly faced in stone. The first Ordnance Surveyors recorded it and, bones were reputedly recovered from it some forty years ago or so. This may possibly be a cemetery linked to the early ecclesiastical site at this spot. This site is located over 600m from the proposed development and will not be affected by the proposal.

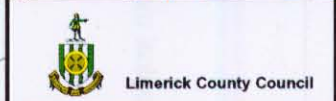
About 400 metres southwest of the burial ground was Gortadroma Castle (018:089) otherwise known as Moyreen Castle, the walls of which were still standing in 1840, and under which vaults were subsequently found; a fragment of the ancient castle, with traces of a side turret, was still visible when Westropp visited the site in the early years of the 20<sup>th</sup> century. Moyreen is mentioned in 1289, but the castle is described as being ruinous in 1583 (Westropp 1906-7, 244-5), from which it may be assumed that it was of early date. It overlooked a ford, with stepping-stones, on the White River, which was notable enough to be recorded by the Ordnance Surveyors, and it again points to an intensive occupation of the area in the Anglo-Norman era.





**Legend**

- Proposed Extension
- RMP Site
- Existing Landfill Boundary



**Project**  
Gortadroma  
Landfill Extension EIS

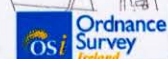
**Title**  
RMP Sites

**Figure** 3.12.1

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There are no recorded archaeological monuments within the proposed development area.

### 3.12.4 Potential Impacts

#### 3.12.4.1 Architectural Heritage

No structures or buildings of architectural, artistic, cultural or historical interest are likely to be impacted by the proposed development.

#### 3.12.4.2 Archaeology and Cultural Heritage

The site of a recorded monument LI018:093 is located within the existing landfill site. This area was excavated in 1998 and no trace of the monument was revealed. It was concluded that the monument was located within an area that had been extensively quarried in the last 50 years (Stevens 1998). This is the nearest recorded archaeological feature to the proposed development area.

There are no recorded archaeological monuments within the study area and no features were discovered as a result of the field inspection. Therefore any impact on archaeological remains will be as a result of revealing buried features that have no above ground surface expression. These features will only be revealed as a result of ground reduction works and therefore all these works will have to be archaeologically monitored.

The majority of land especially to the south of the extension is bog comprising of low-lying, wetland with long rushes and the area is divided by drainage ditches. Archaeological investigations in the form of monitoring were undertaken for the extension to the south of the current landfill in similar conditions. No archaeological features were revealed as a result of these investigations.

The land rises to give way to fields at a higher elevation. No archaeological features were noted in these fields but land reclamation practices including drainage and the amalgamation of fields could obscure or even remove low visibility archaeological sites. The southwest facing slopes overlooking the bog basin have the potential to reveal archaeological sites.

A curving linear feature possibly an old field boundary was noted in a field on the northern boundary of the proposed extension. The shape and size of the feature does not present as archaeological in nature. It is likely that it is a feature of cultural heritage relating to the subdivision of land and of cultural heritage interest.

### 3.12.5 Mitigation

#### 3.12.5.1 Architecture

No features of architectural heritage interest are present within the proposed study area therefore no mitigation is required.



### 3.12.5.2 Archaeology and Cultural Heritage

Archaeological monitoring of the entire topsoil stripping process is recommended for the proposed the proposed extension area and screening/landscape/buffer areas. Removal of the curving linear feature identified in a field on the northern boundary of the proposed landfill area will take place under guidance of a licenced archaeologist.

### 3.12.6 Impacts and Mitigation during the Construction Phase

It will be necessary to monitor soil stripping during the site preparation stage of the proposed development given the relatively undisturbed nature and the topography of the site. This requirement will be done under licence to the National Monuments Section of the Department of the Environment and Local Government (formerly *Dúchas*), the Heritage Service and the developer should note that it could take 3-4 weeks to process such a licence before an archaeologist is allowed on site. It is therefore imperative that all licences are applied for as early as possible to alleviate any delays at a later stage.

#### 3.12.6.1 Residual Impacts

It is not anticipated that any residual impacts will remain if the appropriate mitigation measures and procedures are put in place.

## 3.13 SUMMARY OF ENVIRONMENTAL ASPECTS

### 3.13.1 Social and Community

The proposed development is unlikely to have a significant impact on population trends and structures at a Regional (Mid-Western Region), County or District (Rathkeale Rural District) level. However, there is some potential for a moderate negative impact on population structure and trends at a local level.

Free refuse disposal for dwellings within a 2-kilometre radius of the landfill, a levy on each tonne of waste disposed at Gortadroma that is used for funding local community based projects and the provision of employment for a number of people living in the locality are all positive impacts arising from the Landfill.

All potential impacts on the environment from the proposed development interact with social and community aspects. Therefore, mitigation measures outlined in the other studies completed, as part of the EIA for the proposed extension will reduce the potential impacts on the social and community environment.

### 3.13.2 Human Health

Human health may be impacted by a number of factors emanating from the proposed extension of Gortadroma Landfill. These include gas, odour and dust emissions to the atmosphere, losses of leachate to ground and surface waters, and by associated landfill operations such as increased road traffic. To ensure no potentially significant impacts will occur on human health particular consideration of all Best Available Technologies will be implemented during all stages of development of the proposed extension. Also, licensing of the facility by the EPA will ensure that all emissions are

monitored on a regular basis and recognised limits will be placed on all discharges to ensure there are no potential impacts on human health.

### 3.13.3 Landscape and visual

The proposed extension of the Gortadroma Landfill will potentially impact on both the character of the existing landscape and on the views seen by people living, working and passing through the area. However, the effect of the proposed development on landscape character will be localised. Therefore the proposed extension will have little or no impact upon surrounding character areas.

### 3.13.4 Air quality

There are five principal air pollutants and subsequently five potential impacts emitted from landfills – dust, PM<sub>10</sub>, aerosols, odours and landfill gas.

The dust control measures, such as a wheel-wash, construction of paved internal haul roads and spraying road surfaces with water during dry weather conditions shall effectively control dust emissions from landfill construction and operations at Gortadroma. With these measures implemented, the impact of dust emissions will be slight with no significant impact beyond the landfill boundary.

Daily cover of the deposited waste material will significantly reduce the quantity of malodours, which could potentially be released from the surface of the waste and along with the installation of landfill gas collection/utilisation/flaring, emissions from the landfill will decrease.

Due to the nature of the activity, it is possible odorous emissions from the operational landfill will occasionally be detected in the area, with a slight to moderate short-term impact depending on weather conditions. However, with the continuing improvements being carried out and regular inspections for odours at the boundary as required under the conditions in the Waste Licence, it is predicted that impacts of malodours will continue to decline.

### 3.13.5 Noise

The proposed landfill extension will move the centre of activity to within c.420 metres of the nearest residences both north, locations N1 to N3, and south, locations N6 to N8 (See Figure 3.5.1). The noise levels due to the current operation, when interpolated to the distances from the proposed development, have a potential to equal the criterion limit of 55 dB(A) at the nearest residences. However, the operational noise from the site will be attenuated by the construction of landscaped earth embankments. These will be constructed early in the development stage to minimise the impact of the construction noise. Therefore, the predicted impact of the proposed landfill extension will be slight except during the construction phase when the impact will be significant, albeit temporary.

### 3.13.6 Climate

The proposed landfill extension at Gortadroma is not expected to have any significant impact on the national climate. Regarding control of greenhouse gases the National Climate Change Strategy estimate that a substantial reduction of 50% in methane emissions from landfills can be achieved by flaring (converting the methane to carbon dioxide), or used to produce electricity. With the continued installation of a gas collection network and flaring or burning it in the energy utilisation plant, emissions of methane and other greenhouse gases will decrease dramatically from the Gortadroma waste facility.



### 3.13.7 Traffic

There will be no increased traffic impact due to the proposed extension of the landfill since the landfill is currently operational and the volume of waste 'intake' is to remain the same. Analysis of traffic figures demonstrate that whilst the extension of the Gortadroma Landfill site will continue to generate operational traffic movements on the surrounding road network, it is clear that the network will continue to operate with acceptable capacity limits. The operational traffic will not significantly impact on the surrounding road network and no mitigation measures will be required.

### 3.13.8 Geology/hydrology

There will be a potential impact on the geology of the proposed site from the compaction of soils, which will occur during the construction period. However, the overburden deposits are not of geological significance and the impact is not significant.

The operation of the landfill site will not impact on the yield of boreholes in the vicinity of the site however it has the potential to impact on the water quality. The potential contamination of groundwater also has the knock on effect of potentially impacting on surface water.

The proposed future cells are to be lined and will incorporate a leachate collection and treatment system. The existing environmental monitoring programme will be extended to include the extension area. Stockpiles and excavated material will be located as far as possible from drainage ditches, surface water drains and watercourses.

The introduction of the mitigation measures will prevent any significant impact on either the quality or quantity of the groundwater from the proposed extension.

### 3.13.9 Aquatic environment

The principal potential impact to the aquatic ecology from the proposed extension of Gortadroma Landfill is from the discharge of raw or untreated leachate to surface waters. Contamination of surface waters with sediments and other pollutants during construction are also potential impacts. The leachate is treated at the on-site treatment plant and will only be discharged to the river when flows in the river offer a sufficient dilution and the treated leachate does not exceed licensed limits (treated leachate is continuously monitored). If the dilution factor in the river is not sufficient or the licensed limits are exceeded or there is no storage capacity on site then the leachate is tankered off-site.

Regular monitoring of the quality in streams surrounding the site will be undertaken to identify pollution. However, surface waters should not be affected by leachate from the extended landfill, as all leachate will be contained, collected and treated or tankered off-site. A spill response action plan shall be put in place, and spill response materials kept on site, to ensure that any spills of potentially polluting materials are prevented from entering surface waters and effective sediment traps will be constructed to prevent all export of suspended solids in the outflowing streams.

The impacts of the proposed landfill extension on the flora, fauna and habitats of the White River will be slight or insignificant if the mitigation measures are fully implemented.

### 3.13.10 Terrestrial environment

There will be no impact on a national or regional scale from the proposed development. However, the impact will be significant from a local level due to the total loss of habitat for the medium term. This will reduce to slight on the long-term with the re-establishment of the capped landfill.

### 3.13.11 Material assets – agriculture

The extension of the Gortadroma Landfill will not have a significant impact on agriculture nationally or regionally. The loss of 13.9 hectares of good grazing from an area with a dearth of good grazing will impact on the locality but could only be considered slight. However, there will be a significant impact on a small number of landowners due to a loss of land for the proposed extension.

### 3.13.12 Archaeology/architecture/cultural heritage

There are no recorded archaeological monuments and no structures of architectural heritage interest were discovered within the study area as a result of the field inspection. Any impact on archaeological remains will be as a result of revealing buried features that have no above ground surface expression. These features will only be revealed as a result of ground reduction works and therefore all these works will have to be archaeologically monitored. Because there are no features of architectural heritage interest detectable at this stage within the proposed study area no mitigation is proposed.

## 3.14 POTENTIAL SIGNIFICANT INTERACTION IN THE RECEIVING ENVIRONMENT

All aspects of the environment interact with one another to greater or lesser extent. A potential impact of the development on one aspect of the environment may have a significant knock-on effect on another aspect. For example any potential detrimental impact on water quality due to leachate discharges could potentially impact on the amenity value of the receiving waters in terms of suitability for salmonids or fishing, which in turn may have a detrimental impact on tourist potential. **Table 4.1** shows the potential interactions between each environmental aspect.



**Table 4.1: Inter-Relationship Matrix - Potential Significant Interaction in the Receiving Environment**

	HUMAN BEINGS	AIR	NOISE	LANDSCAPE	FLORA AND FAUNA	AQUATIC	GEOLOGY /HYDROGEOLOGY	CLIMATE	MATERIAL ASSETS AGRICULTURE
HUMAN BEINGS		•	•	•	•	•	•	•	•
AIR					•			•	•
NOISE				•	•				•
LANDSCAPE					•	•	•		•
FLORA AND FAUNA						•	•	•	•
AQUATIC							•		•
GEOLOGY /HYDROGEOLOGY								•	•
CLIMATE									•
MATERIAL ASSETS AGRICULTURE									

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## 4 OVERALL SUMMARY

The Limerick/Clare/Kerry Waste Management Plan was adopted in 2001. This *Plan* required the integration of a number of strategies that would ultimately reduce the quantities of waste going to landfill. As part of the full implementation of this *Plan* it was recognised that there would always be a requirement for landfill in the region. Limerick County Council recognised this requirement for ongoing landfill capacity to deal with the future waste production of both Limerick City and County. Limerick County Council also recognised that this additional capacity would not be available in the other landfills in the region and therefore additional capacity was sought within the county itself. However, national policies documents on waste management state that requirements for additional landfill within a region should be provided by extension of existing facilities rather than the development of 'Greenfield' sites. These policies ensure greater protection of the environment and economic resources. Therefore in cognisance of National Policy and the obligation for a Local Authority to provide for the safe disposal of waste, Limerick County Council propose to extend the existing facility at Gortadroma.

Six possible extension options were identified in the *Strategic Development Plan for Gortadroma Landfill* (May 2001). The suitability of these options was assessed in this report. A final area was selected to the east of the existing site and was brought forward as the proposed area to be assessed for a potential extension of Gortadroma Landfill in this Environmental Impact Statement.

The proposed extension will encompass an area of approximately 41 hectares, which is sub-divided into a buffer/landscape/screening area of 22 hectares and a disposal area of 19 hectares. The disposal area will be developed in discrete lined cells over a number of phases and will include provision for leachate collection and treatment and for gas extraction, collection and utilisation.

As part of the environmental impact assessment eleven different environmental aspects were studied by specialists. These studies examined potential impacts on both the human and natural environments. All of these studies state that there will be no potential impact from the proposed extension on a National or Regional scale. However it was observed in some of the studies that the proposed extension will potentially impact at a local level although mitigation measures will reduce, and in many cases eliminate these potential impacts.

## 5 CONCLUSION

Limerick County Council have commissioned this Environmental Impact Assessment and subsequent Environmental Impact Statement for a proposed extension to Gortadroma landfill, Ballyhahill, Co. Limerick. Limerick County Council have a statutory obligation to provide for the safe disposal of the county's municipal waste and a requirement to play its role with the region as set down in the Limerick/Clare/Kerry Waste Management Plan. As a result there is a requirement for additional landfill space to be provided in the near future in the Limerick area and National Policy states that this additional landfill space be acquired by the extension of existing landfill facilities.

If the proposed mitigation measures outlined in this EIS are implemented then the overall impact of the proposed extension will not have a significant impact on the environment in and around Gortadroma Landfill.