

## 16.0 MATERIAL ASSETS

### ARCHAEOLOGY BASELINE STUDY

#### *Archaeological and Historical Background*

16.1 The following is based on a literature search and desk study. The site of the proposed development is located approximately 2km east of the N15 between Ballyshannon and Ballintra.

#### *Methodology*

16.2 Research was undertaken in two phases. The first phase comprised a desk study of all available archaeological, historical and cartographic sources. The second phase involved a field inspection of the proposed development area.

#### *Prehistoric Period*

16.3 Approximately 9000 years ago the first settlers came to Ireland. They were a hunting and gathering society. In general the only artefacts found relating to these Mesolithic societies are scattered stone tools or middens, which are usually found on seashores or riverbanks. Some flint objects dating from the Mesolithic have been found in Donegal, particularly Bann Flakes from the Later Mesolithic, and the discovery of a collection of narrow blades, which were found in Raw's Bog near Castlefinn may well date to the Early Mesolithic, c. 5500 BC.

16.4 The discovery of so many Mesolithic artefacts near to rivers would suggest that these people were using rivers, such as the Foyle and the Finn, as means of transport. In the late 1800s a possible early Mesolithic axe was found in the vicinity of Dunfanaghy, which would suggest that there have been groups of people inhabiting Donegal from the early Mesolithic to modern times. In the 1960s at Dunaff Bay at the northwest of Inishowen peninsula, near the mouth of Lough Swilly a Mesolithic site was excavated, the only definite site in Donegal.

16.5 A number of flints were recovered from the site and the surrounding area. These flints were mainly debitage although a few rough scrapers were also found. It has been suggested that this flint was not found in the locality and so must have been brought in, possibly from Derry or Antrim. This would seem to indicate trade with neighbouring groups and possibly as far inland as the rivers were navigable. It is thought that the settlers whose tools were found at Dunaff Bay discarded them around the same time that the beach itself was forming c. 3500 BC. Those who excavated the site have interpreted it as the site of flint industry or seasonal camp area though no evidence of any structures were uncovered during the course of excavations.

### **Neolithic Period**

- 16.6 Unlike the Mesolithic period, there are numerous sites that have been dated to the Neolithic, particularly megalithic tombs in Donegal (c. 10% of Ireland's megalithic tombs can be found in Donegal). This would certainly suggest both a vibrant population and economy. It was in the Neolithic that the change from hunting and gathering to farming came about. The similarity of artefacts recovered from these tombs both locally and nationwide would indicate that there was a well established communications network in this period. The position of these tombs would suggest that the surrounding land was fertile and so the peaty soils must not have been laid down as yet.
- 16.7 A survey was carried out by Herity (see Lacy, 1983) in an attempt to discover whether there was a preference of locations for the construction of these monuments, and whether the communities that constructed these monuments lived and worked near by. The surroundings of 21 court tombs, 13 portal tombs, 7 wedge tombs, 3 passage tombs and 6 unclassified tombs were examined. Forty-four of these tombs lay beneath 500ft with eighteen between 100 and 200ft. The majority of the tombs were situated on ridges or in valleys with a preference for south facing slopes. More than 65% were located in good agricultural areas. With just three exceptions all the tombs were situated within 200m of fresh water. The results of this survey indicated that the distribution of these tombs corresponded with settlement locations.
- 16.8 Part of the survey included a programme of pollen analysis, the results of which concluded that the pre-Neolithic landscape of southwest Donegal was dominated by mixed deciduous woodland. These woods were cut away probably by the first farmers in land clearance to increase the potential agricultural areas. Pollen samples taken from beneath the tombs indicated a high presence of grasses, plantain, mugwort, dandelion, thistle and legumes at the time of their construction. This would seem to point to the fact that these monuments were built on open areas near to pasture areas. Pollen of cereals found at the site of two of these tombs would indicate cereal production in the immediate locality. Field systems, which were laid out prior to the formation of the bogs reiterate the evidence of a strong agricultural community in Donegal in prehistoric times.

### **Early Historic to Modern**

- 16.9 Donegal County was occupied from the 5<sup>th</sup> century by the northern Ui Neill dynasties, the Cenel Conaill and the Cenel Eogain, before the latter expanded into mid-Ulster. It is from these dynastic families that the County derives the names of its two main parts, Inis Eogain and Tir Conaill. The County name, Donegal, derives from Dun na nGall, and is probably associated with Scandinavian/Viking activity in the area. The Cenel Conaill retained control after the withdrawal of the Normans.

- 16.10 In the 12<sup>th</sup> century the O'Donnells became princes of Tir Conaill. Under the leadership of the O'Donnells, the Cenel Conaill established their main seat in Donegal Town.
- 16.11 The rivalry between the two Ulster families dominated the history of the region until their eventual defeat and conquest by the Elizabethans, with the Cenel Conaill being dominant in the area of Donegal Town and beyond, maintaining control of the strategically important Barnesmore Gap. The Cenel Conaill retained control after the withdrawal of the Normans. In the 12<sup>th</sup> century the O'Donnells became Princes of Tir Conaill. Under the leadership of the O'Donnells, the Cenel Conaill established their main seat in Donegal Town. The present castle, granted to and adapted by Sir Basil Brook in the 17<sup>th</sup> Century incorporates the square tower of the castle erected by Red Hugh O'Donnell in 1505. During the 16<sup>th</sup> century, English garrisons were gradually established throughout the County, and in 1601, the Gaelic Chieftains were finally defeated by the Elizabethan forces. The subsequent 'Flight of the Earls' left the way open for the Elizabethans to confiscate and subsequently colonise the region. The County was sub-divided into plantations, with vast holdings being taken over by speculators. The settlers were, for the main part, Scots and English.
- 16.12 Traces of Ireland's earliest settlers, the hunters and gatherers of the Mesolithic period have been revealed under bog at Boora in Co. Offaly. To the people of the Neolithic and Bronze Age times, the raised bogs must have been major obstacles to transportation. Trackways or 'toghers' which would have served pedestrian and possibly wheeled traffic are commonly found at various levels in the bogs. Artefacts of all types and all periods have been found during turf cutting and large scale peat removal. These range from stone and bronze axe-heads, bronze cauldrons, bronze weapons, amber and jet beads, to hoards of gold ornaments.

## EXISTING BASELINE DATA

### *The Sites and Monument Record*

- 16.13 The RMP is a database recording all archaeological sites in Ireland known to the National Monuments Service. Established under Section 12 of the 1994 National Monuments (Amendment) Act, it is based on the Sites and Monuments Record of each County. The record comprises Ordnance Survey 6" sheets which indicate the location of each monument or place of archaeological interest and files of further documentary and photographic data or information relating to an archaeological event such as a site visit, survey or excavation (see Figure 16.1). These are housed in the National Monuments Services in Dublin. The record is constantly updated and principally focuses on monuments that pre-date 1700.

16.14 The Sites and Monuments Record was consulted on the 23<sup>rd</sup> of September 2002. Two sites are recorded in the townland of Ballynacarrick (DG 103:019 & DG 103:024) and a third site is located to the south of the development site (DG 103:025). These are described below.

**SMR No:** DG 103:019  
**Nat. Grid Ref:** 192350/368810  
**Townland:** Ballynacarrick  
**Classification:** Cashel  
**Description:** Located approximately 1km north of the development area, this site comprises a subcircular area, surrounded by a low stone wall which survives to a maximum height of 450mm. The site is approximately 27m in diameter internally. A gap in the wall at the north west probably represents the original entranceway.

**SMR No:** DG 103:024  
**Nat. Grid Ref:** 192880/368060  
**Townland:** Ballynacarrick  
**Classification:** Enclosure site  
**Description:** Located roughly 500m to the north west of the development area, there is no visible trace of the enclosure marked on the 2<sup>nd</sup> edition of the OS map. The site is on the gorse-covered eastern flanks of Ballynacarrick Hill.

**SMR No:** DG 103:025  
**Nat. Grid Ref:** 192980/367460  
**Townland:** Garvanagh  
**Classification:** Cashel  
**Description:** Located roughly 300m south of the development area, across the road on the north eastern slope of Garvanagh Hill, this cashel is 9.5m in diameter. It is enclosed by an overgrown stone wall which is truncated by a field boundary/field fence to the west. The wall survives to a height of 500mm.

#### ***The National Museum of Ireland Topographical Files***

16.15 The discovery of artefacts can be an important indicator of past levels of activity in an area and therefore a useful guide to the archaeological potential of a site. The National Museum in Dublin houses a national archive of antiquities cataloguing artefacts that were found and reported between 1928 and 1995. They are catalogued by year and accession number.

16.16 No artefacts are recorded in the townland of Ballynacarrick.

### **Cartographic Evidence**

- 16.17 Two maps were consulted during research; the 1834 OS First Edition and Francis Jobson's Map of Ulster, 1590. No new or additional information was obtained.

### **Previous Archaeological Work Near to the Subject Site**

- 16.18 **2002, Ballynacarrick.**

**02E0199**, Mary Henry

Archaeological monitoring was carried out in the townland of Ballynacarrick, Co. Donegal in March 2002. The development entailed the extension of the existing waste facility at Ballynacarrick. Nothing of archaeological significance was noted

### **Field Inspection**

- 16.19 Field inspection is necessary to determine the extent and nature of archaeological remains, and can also lead to the identification of previously unrecorded sites and portable finds through topographical observation and local information.
- 16.20 The area under assessment is a waste facility extension in the townland of Ballynacarrick, in the Parish of Drumhome, Co. Donegal. The terrain consists of rough, undulating pastureland with areas of deep peat. The site is located roughly 2.5km to the east of the N15 Donegal to Ballyshannon road.
- 16.21 Bogs cover approx one sixth (1.34 million ha) of the total land area in Ireland. There are three different types of peatland in Ireland, classified on the basis of plant composition and water source; these are fens, raised bogs and blanket bogs.
- 16.22 Raised bogs are mainly located throughout the central lowlands of Ireland, and they cover 314,000 ha, almost one quarter of the total peat covered area of Ireland. They vary in depth from 3m to over 12m with an average depth of 7m.
- 16.23 Raised bogs accumulated during most of the post-glacial period, when drainage was obstructed by irregular glacial deposits. High water tables resulted in widespread flooding, particularly in broad shallow basins of the Shannon and Erne systems. As the water table and lake levels fell, reed swamps developed and peat accumulated. Eventually, the peat and its perched water table was elevated above the surrounding land so that no mineral was entering the bog. Vegetation changed to species tolerant of low nutrient conditions, that were only fed by rainwater, in particular the *Sphagnum* mosses. The peat continued to grow upward, taking the water table with it, and the acidic raised bogs were produced. Raised bogs had overgrown the central part of the country approximately 7,000 years ago.

- 16.24 Traces of Irelands earliest settlers, the hunters and gatherers of the Mesolithic period have been revealed under raised bog at Boora in Co.Offaly. To the people of the Neolithic and Bronze Age times, the raised bogs must have been major obstacles to transportation. Trackways or 'toghers' which would have served pedestrian and possibly wheeled traffic are commonly found at various levels in the bogs. Artefacts of all types and all periods have been found during turf cutting and large scale peat removal. These range from stone and bronze axe-heads, bronze cauldrons, bronze weapons, amber and jet beads, to hoards of gold ornaments.
- 16.25 A field inspection was carried out on the subject site on Monday the 9<sup>th</sup> of September 2002. The proposed development area immediately west of the existing landfill was walked over. It was not possible to locate the enclosure to the north of the development area (DG 103:024). The general terrain in the area comprises poor quality, rough pastureland, overlooked by high ground. The area is dominated by raised bog.
- 16.26 Nothing of archaeological significance was noted during the site visit or during the course of previous archaeological monitoring. No sites or artefacts of archaeological significance are recorded within the development area.

#### **PREDICTED IMPACTS**

##### ***Direct Impacts***

- 16.27 Due to the size of the proposed development on the subject site it is envisaged that deep and extensive machine excavation would be required. This would have a negative impact on any archaeological features and deposits which may survive in this area.
- 16.28 The passage of machinery and vehicles would have a negative impact on any previously unrecorded sub-surface remains that may survive within the proposed development.

#### **MITIGATION MEASURES**

##### ***Direct Impacts***

- 16.29 It is recommended that all groundworks be monitored by an archaeologist, under license to Dúchas, The Heritage Service, with provision made for full recording and excavation of any archaeological features or deposits which may be exposed.
- 16.30 The mitigation measures recommended above would also function as a monitoring system to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

## IMPACT ON MARKET VALUE

### *Introduction*

- 16.31 Development of a landfill site can potentially result in a perceived negative impact on commercial investment and property values in the area of the site. An assessment of the impact of the proposed extension on surrounding land prices has been undertaken and is set out below. The proposed development is an extension to an existing landfill which has been operational for approximately 22 years. The existing site will be progressively restored as detailed in Section 8 of this report. The main approach to the site is by way of a minor and narrow county road leading from the N15 Donegal Town to Ballyshannon Road, which is a primary National Route.

### *Character of Site*

- 16.32 The proposed extension is immediately to the west of the existing site and the extension land is poor quality farm land suitable for rough grazing. The immediate surrounding properties are agricultural land of a similar quality. There are some residential properties within 500m of the extension area. The closest is a caravan used as a residence approximately 380m from the area of the extension. The other properties within 500m of the extension are four detached bungalows and a detached house.

### *Site Management*

- 16.33 The site is currently operated under an Environmental Protection Agency (EPA) Waste Licence (Reference 24-1). The development, operation and closure of the proposed extension will also be subject to a Waste Licence.

### *Period of Operation*

- 16.34 The estimated capacity of the proposed site extension is 225,000m<sup>3</sup> and based on the maximum annual waste intake of 24,000 tonnes the lifespan of the site will be 8½ years.

### *Traffic*

- 16.35 Apart from construction traffic, the traffic using the proposed extension will not exceed the traffic using the existing site as set out in Section 18. However it is proposed to carry out remedial works along the access route to the site to reduce the impact for local residents.

**DEFRA UK Study**

- 16.36 Studies in relation to the impact of landfills on property prices are not available for the Republic of Ireland or Northern Ireland. However a study to identify and estimate the disamenity costs of landfill in Great Britain was produced by Cambridge Econometrics. Disamenity costs are the local nuisance impacts caused by landfill activity and experienced by households living close to landfill. The local nuisance impacts include odour, dust, litter, noise, vermin and visual intrusion. The report indicates the property values reductions vary dependent upon distance from the landfill but no evidence of reduction was reported at distances greater than ½ mile from the sites.
- 16.37 It is however considered that the effect on property values may differ between different regions, and is very likely to depend on the monitoring and control of the Landfill Site.

**Conclusions**

- 16.38 There is no doubt that the perception of a landfill site may give concern to property owners in the vicinity. However, it is a matter of whether or not this perception is transferred in reality into any substantial effect on property values.
- 16.39 During the assessment of land prices local auctioneers were contacted and they expressed the view that the existing Ballynacarrick Landfill Site has not and does not depreciate values of properties, including residential, in the area.

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## BIBLIOGRAPHY

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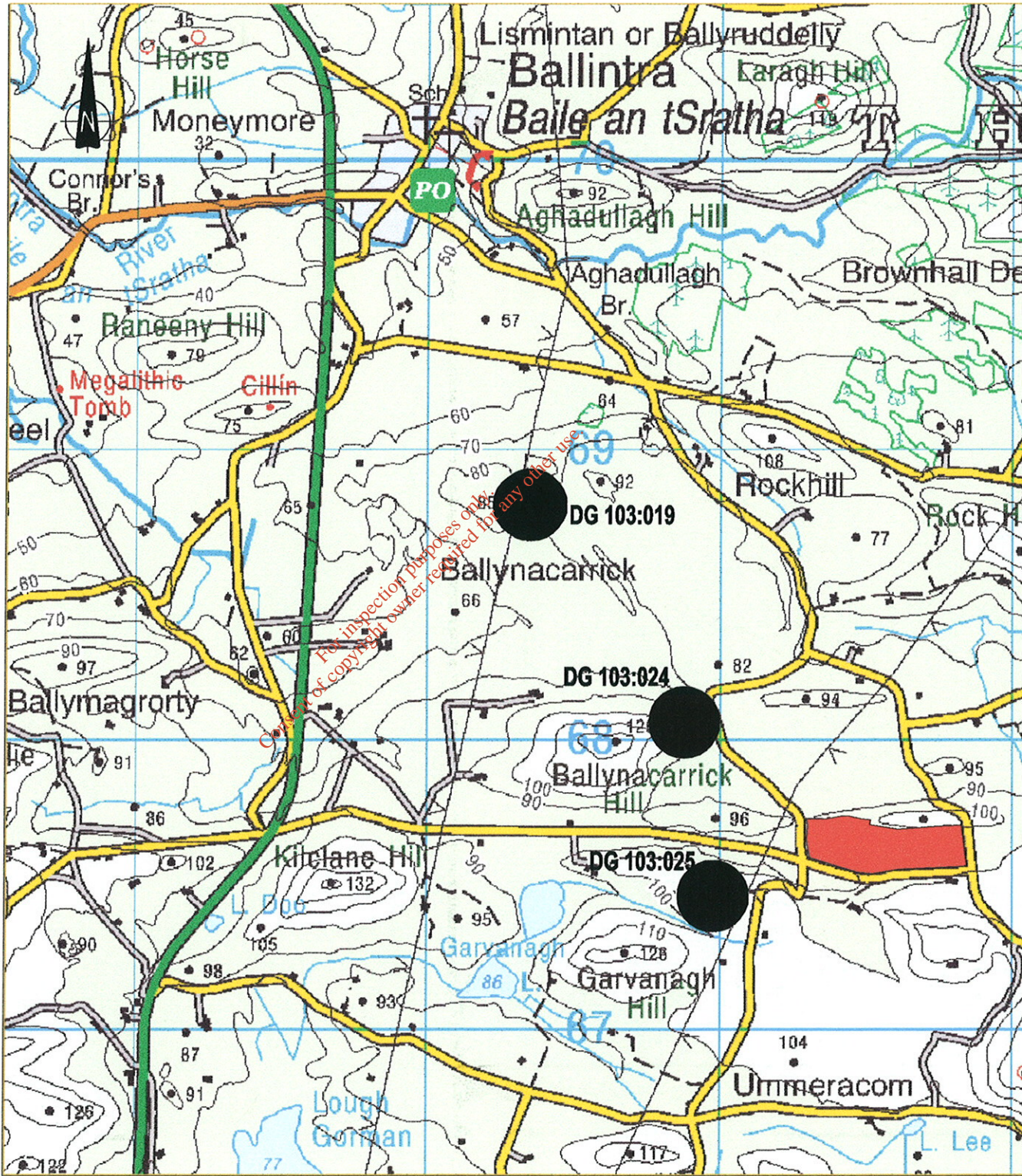
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## FIGURES

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## 17.0 NOISE

### INTRODUCTION

- 17.1 This noise impact assessment relates to a proposed extension of an existing landfill in Ballynacarrick County Donegal. The application is to extend the tip-head of the existing site in a westerly direction, and as a result increase the distance between site activity and noise sensitive receptors. No increase in annual disposal capacity is being applied for; rather this application is to extend the lifetime of the facility beyond that originally envisaged. This report will assess the potential noise impact of continuing activity, on the nearest noise sensitive receptor in the vicinity of the development. The potential impact due to construction and long-term operation of the proposed extension, will be referenced to limits already specified under the existing waste licence, and where deemed necessary mitigation measures will be recommended.
- 17.2 The assessment has been completed based on the requirements for noise impacts assessments as stated in the "Draft Guidelines on Information to be contained in Environmental Impact Statements". June 1997. Additional guidance & information was obtained from the following documents: Guidance Notes for Applicants – Disposal Activities Landfill (EPA, 1996); State of the Environment in Ireland" document (EPA, 1996); Calculation of Road Traffic Noise" (UK DOT, 1990); and "Design Manual for Roads and Bridges and BS5228 (1984 and 1997), "Noise Control in Construction and Open Sites".
- 17.3 Explanations of noise terms used in this assessment are presented in Appendix G.

### EXISTING ENVIRONMENT

- 17.4 The proposed site is situated in a rural setting in County Donegal between Ballyshannon and Ballintra approximately two miles east of the N15. A number of noise sensitive receptors are located close to the existing site with the closest being a caravan to the north; approximately 350 m from nearest edge of the proposed extension. Other receptors are of the order >400 m from site boundaries.
- 17.5 The site is currently in use as a landfill and in receipt of a waste licence from the Environmental Protection Agency.
- 17.6 Existing noise levels were measured on 11<sup>th</sup> and 12<sup>th</sup> September 2002 at four boundary locations. Measurement locations are shown on the site plan of Figure 17.1. During the survey there were suitable weather conditions for measurement with no rainfall and low wind speed.

- 17.7 All measurements were taken using Type 1 instrumentation, appropriately calibrated, and measurement details and results are presented in Appendix G.
- 17.8 The daytime noise environment consisted of H.G.V movement on and off site, occasional public traffic accessing site, spreading and compaction of waste, construction of new cell, and occasional public vehicles on surrounding roads. Nighttime noise environment consisted of occasional local traffic and low background rural noise.

### **SUMMARY OF POTENTIAL IMPACTS FROM NOISE SOURCES**

- 17.9 The potential for noise from the proposed development can be usefully split into a number of sections, which are subject to separate noise impact assessment.

#### ***Landfill Operation***

- 17.10 This assesses the impact of the use and function of the proposed site with regard to the nearest noise sensitive receptor. This level of impact will be assessed with regard to current daytime and night time limits set by Environmental Protection Agency as part of the existing licence.

#### ***Vehicle Noise***

- 17.11 This assesses the impact of traffic movement on roads approaching and within the boundaries of the site including the impact of service vehicles.
- 17.12 This will be assessed using the methodology detailed in the "Calculation of Road Traffic Noise" (UK DOT, 1990) and "Design Manual for Roads and Bridges" documents, and, with regard to the "State of the Environment in Ireland" document (EPA, 1996).

#### ***Construction Noise***

- 17.13 The impact of the short-term works associated with the site preparation and subsequent construction the E.P.A currently recommend assessment of this impact using BS5228 (1984 and 1997), "Noise Control in Construction and Open Sites".

### **LANDFILL OPERATION**

#### ***Evaluation Criteria***

- 17.14 The target noise level for the nearest residential properties are those currently in force as part of the licence issued by the E.P.A. Therefore, the following targets are presented as appropriate for the site.



**Daytime Target Level = 55 dB  $L_{Aeq}$**

**Night-time Target Level = 45 dB  $L_{Aeq}$**

17.15 There are two main sources of noise on the site as shown below:

- The dumping of refuse and its consequent spreading and compaction (Tip-Head Activity)
- The items of fixed plant such as leachate treatment and gas flare systems

#### **Calculation Methodology**

17.16 The calculation of noise impact will incorporate the following:

- Existing maximum noise levels recorded on site
- Minimum distance to nearest noise sensitive receptor to ensure a 'worst-case' scenario
- Attenuation by partial or complete visual screening which will provide 5dB or 10dB respectively
- Attenuation by ground absorption will be incorporated where appropriate

17.17 To ensure that a 'worst case' scenario is assessed, the calculation will assume a tip-head activity level of 83 dB  $L_{Aeq}$ . This figure is the maximum  $L_{Aeq}$  level measured on site, at a distance of 10 m from tip-head operations. The attenuation by distance will be calculated with reference to the minimum distance between the tip-head and the nearest noise sensitive receptor, as measured from the site-plan. However, the location of the tip-head activity varies throughout the day and the attenuation by distance will increase periodically throughout the lifetime of the proposed site as it is developed westward.

17.18 As part of the site preparation works, including removal of overfill, surplus material is currently being used to create earth bunds. These have the dual benefit of acting as visual screening purposes and acoustic barriers and where constructed properly provide between 5dB (A) and 10dB (A) attenuation.

#### **Impact of Tip-Head Activity**

Maximum noise level (As measured)	≤	83 dB $L_{Aeq}$	
Attenuation by distance	=	$20 \log 230/10$	= 27 dB
Attenuation by barriers (Partial Screening)	=	5 dB	
Total available attenuation	=	32 dB	
Potential impact at property facade	=	$83 - 32$	= 51 dB $L_{Aeq}$

17.19 It is predicted that the potential noise impact from activity noise, at the most proximate residential properties, is below daytime target levels.

**Potential Impact of Fixed Plant**

17.20 External plant such as a leachate treatment system, gas flares etc will be required over the lifetime of the proposed facility. Manufacturers and installers can silence these items to meet the required target level. Based on the standard attenuation by distance formula, and neglecting any attenuation by ground absorption, the following are established as the maximum permissible noise levels from any item of plant at 10m from source. The leachate plant is approximately 150 m distant from facade of nearest noise sensitive receptor.

Daytime target rating level	55 dB $L_{Aeq, 1h}$
Night-time target rating level	45 dB $L_{Aeq, 5min}$
Attenuation by minimum distance	$20 \log 150/10 = 24$ dB
Permissible combined plant noise level, at 10m (daytime use only)	$= 55 + 24 = 79$ $L_{Aeq, 1h}$
Permissible combined plant noise level, at 10m (24 hour use)	$= 45 + 24 = 69$ dB $L_{Aeq, 5min}$

17.21 All plant shall be chosen, sited and silenced/enclosed (if necessary) such that the combined noise level does not exceed the above target levels at any residential property – the daytime target being used for plant operating during daytime only, and for emergency plant; and, the night-time target for plant which operates over 24 hours. Additional attenuation may be afforded by locating the plant at greater distance from the nearest residential properties.

17.22 Therefore, higher permissible noise levels incorporating screening or increased distance to the nearest property may be assessed at an individual site prior to installation.

17.23 Otherwise the operator of the site should be provided with, and adhere to, the above criteria to ensure that impact from plant noise is within target levels.

17.24 Typical noise levels from properly maintained and (where necessary) housed or screened units are as follows:

Flare units	65 dB (A) at 10 m
Leachate Treatment System	69 dB (A) at 10 m

17.25 It follows from the above data (and current site conditions) that with the Leachate Treatment System and flare unit operating together the night time limit will not be exceeded. It is recommended, in order to provide a margin of safety, to site the flare and leachate lagoons a greater distance away or at time of installation to provide complete visual screening of the equipment from the nearest noise sensitive receiver.

**Prediction of Current Impact of H.G.V's on Haul Road**

- 17.26 The impact of HGV movement is best assessed using the haul road calculation from BS5228, *Noise and Vibration Control on Construction and Open Sites* using the formula below.

$$\text{Approach Road } L_{Aeq} = \text{Average SWL} - 33 + 10 \log Q - 10 \log V - 10 \log d$$

- 17.27 Traffic consultants for the scheme estimate that there will be a maximum of 26 HGV deliveries to the development during a day. As a 'worst-case', it will be assumed that 10 HGVs may access the site in any hour (Q=20), travelling at a speed of 20 km/h (V).

- 17.28 Therefore:

**Determination of Potential Impact of H.G.V's on Haul Road**

Average sound power level of HGV	98 dB
Calculation correction	- 33
Correction for number of HGV passes in one hour	+ 10 log 20 = + 13
Correction for average speed of HGV (in km/h)	- 10 log 20 = - 13
Attenuation by minimum distance of haul road to property	- 10 log 100 = - 20
Potential future impact at nearest properties (unscreened)	= 45 dB $L_{Aeq, 1h}$

**VEHICLE NOISE**

- 17.29 As stated previously this application is a proposal to extend the area of the landfill site to allow existing operations to continue. We have been advised that Ballynacarrick is currently licensed for 24000 tonnes of waste per year.

- 17.30 As this limit is not to be increased, no traffic movements in and around the site, above that already allowed for in the current licence will occur. Therefore, it is submitted that there will be no additional noise impact from traffic.

**CONSTRUCTION NOISE**

- 17.31 The relevant British Standard for guidance on the prediction, assessment and control of construction noise is BS5228. While this document is not in force in Ireland, it contains a number of guidelines and recommendations, which are considered appropriate, and of good working practice for all construction contracts. These guidelines are detailed in the section on Reductive Measures and should form the basis of control and limiting of potential impact to noise sensitive locations.

17.32 The main source of noise from the site will be: -

- The preparation and restoration of the site, including any phased lining / levelling

17.33 It will ultimately be the responsibility of the nominated contractor to specify the plant used and the most efficient methodology, however the following operations (shown in Table 17.1) are deemed as typical of potential usage.

17.34 BS5228 states typical noise levels (either as sound power level or as  $L_{Aeq}$  at 10m) appropriate for the above works and these are shown in Table 17.1.

**Table 17.1 Noise Levels from Construction Works (ref: BS 5228)**

Activity	Plant	$L_{Aeq}$ at 10m
Site clearance/excavation Removal of waste/rubble	Lorries (drive by)	70 dB
	Dozers	87 dB
	HGV and tippers	84 dB
General construction works	Lorries (drive by)	70 dB
	HGV and tippers	84 dB
	Cement mixers	74 dB
	Compressor	81 dB
	Water pump	to 80 dB
Landscaping / Tipping of material	Surfacing/rolling	76 - 86 dB
	HGV and tippers	84 dB

17.35 For prediction purposes, it is assumed that at any one stage in construction several activities occur together. Therefore, at equal unscreened distances from a receiver, the 'worst case' construction activity level may become:

- Combined maximum activity level (during site preparation) = 90 dB  $L_{Aeq}$  at 10m

17.36 It would be expected that such activity would only be occasional in any given day. Other construction activity is typically 80-84 dB  $L_{Aeq}$ .

17.37 The impact of construction is assessed by considering the 'worst case' combined maximum activity level predicted above, and correcting for the minimum distance from source to receiver. The nearest residential properties to the site are at least 230m from the extents of works, and at circa 300m from the centre of a phase of works. The attenuation provided by ground absorption has been neglected to provide a margin of safety.

'Worst case' noise level at	=	Combined noise level	-	Attenuation by distance
property façades	=	90	-	20 log 230/10
	=	63 dB L <sub>Aeq,1h</sub>		
	=	58 dB L <sub>Aeq 12hr</sub>		
Typical noise level at	=	Combined noise level	-	Attenuation by distance
property façades	=	85	-	20 log 230/10
	=	58 dB L <sub>Aeq</sub>		

17.38 The impact of construction on these properties will typically be 58 dB L<sub>Aeq</sub>, with levels up to 63 dB L<sub>Aeq,1h</sub> for site preparation activity at the extent of works.

17.39 Presently, in Ireland, there are no fixed noise limits for construction noise and the control of such sources is outside the remit of the EPA. In general it is left to the discretion of the local council authority and An Bórd Pléanala determine if fixed limits are appropriate; such restrictions are rare, and there is little precedent. In Fingal Council Area discussions are underway with the Construction Industry Federation to agree time limits of Monday to Friday daytime, and Saturday morning – but with no restriction on noise levels.

## REMEDIAL OR REDUCTIVE MEASURES

### *Remedial Measures for Landfill Operation Noise*

17.40 It has been assessed on the previous pages that all activity falls within target levels. However, as some of the calculated levels (within 230m of a residential property) are close to the target levels it is necessary to ensure that the activity is visually screened from any noise sensitive properties. Currently temporary earth bunds, are constructed with overfill material at the active tip-head in order to screen the working of the equipment from the nearest noise sensitive residence. It is a recommendation that this practice continues.

17.41 It will ultimately be the responsibility of the nominated contractor to specify the plant used and the most efficient methodology, however the following operations are deemed as typical of potential usage.

17.42 Permissible noise levels for fixed plant associated with the development have been calculated in Section 17.20 to 17.25. These are summarised as follows:

At the nearest noise sensitive residence, which is determined to be approx 230m distant there will be a 77 dB (A) limit at 10m unscreened from the plant operating only in the daytime and 67 dB (A) for any plant operating over 24 hours. Current noise levels from typical fixed plant are estimated to be 65dB (A) from flare system and 69 dB (A) from leachate system therefore the leachate system will be above the recommended limit. It is recommended that the leachate system is carefully located with respect to visual screening from the affected property, this will provide an additional 10dB (A) of attenuation and bring the impact well below target level.

#### **Remedial Measure for Construction Noise**

17.43 BS5228 includes a number of guidelines and recommendations, which are considered appropriate of good working practice for all construction contracts. These are summarised below.

#### **General Measures**

17.44 The contractor should take note of control measures for relevant plant listed in BS5228 and apply the appropriate measures where practicable, including temporary screening or enclosure of noisy plant, control of "on times" for noisy plant, and positioning of plant as far as possible from noise sensitive locations and properties. Also:

- Use of well maintained plant and, where possible, plant maintained under recent EC guidelines for manufacturers.
- Substitution of unsuitable plant.
- Maintenance of silencers and moving components.

#### **Screening**

17.45 The contractor should endeavour to sequence operations such that spoil mounds or storage areas are located in positions to screen nearby residential properties from ongoing works. Temporary screening using sandbags, 20mm plywood sheeting or similar dense boarding may be required to reduce impact of extensive works close to noise sensitive locations. Such measures can be best assessed during the contract by monitoring.

#### **Monitoring**

17.46 Monitoring is carried out annually at three locations as part of the existing licence. It is recommended that this be continued.

**Responsible Person**

- 17.47 It is often recommended that the appropriate party should appoint or delegate a responsible person who will be present on site and who will be willing to answer and act upon queries from the local public.

**Night Works**

- 17.48 If there are items of plant (e.g. leachate treatment system, gas flares) in use during night-time hours they should be chosen, sited and enclosed such that levels at the nearest properties do not exceed licence limits of 45 dB  $L_{Aeq}$ . Sound reduction by barrier walls of up to 10 dB (A) is possible and hence any plant could be controlled to within the guidelines indicated.

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Calculation of Road Traffic Noise" (UK DOT, 1990)

Design Manual for Roads and Bridges and BS5228 (1984 and 1997), "Noise Control in Construction and Open Sites".

Guidance Notes for Applicants – Disposal Activities Landfill (EPA, 1996)

State of the Environment in Ireland" document (EPA, 1996)

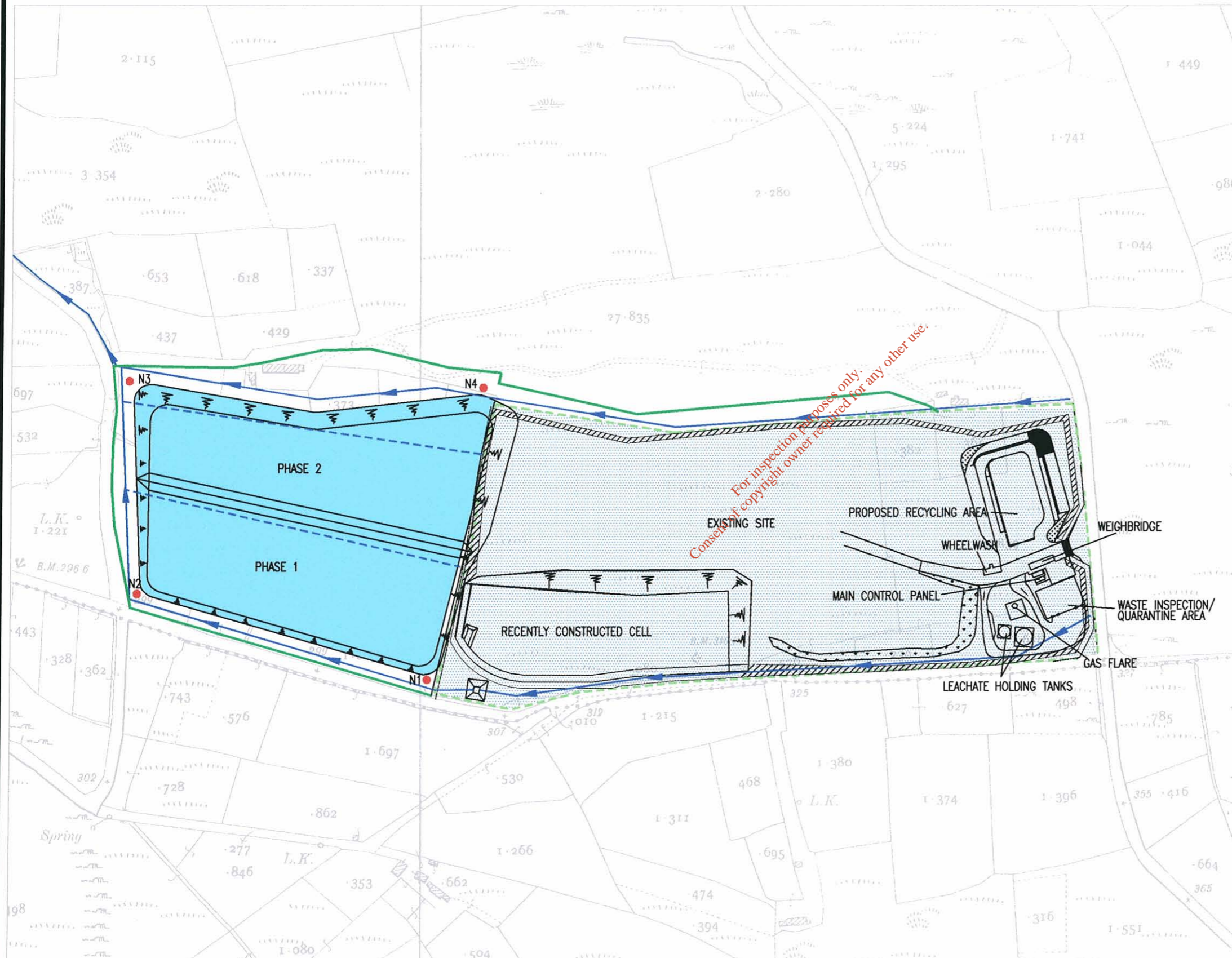
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## FIGURES

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KEY	
	BOUNDARY OF EXISTING LANDFILL
	BOUNDARY OF PROPOSED EXTENSION
	LIMIT OF PROPOSED LANDFILL EXTENSION
	SURFACE WATER DRAINAGE PIPELINE
	GROUNDWATER DRAINAGE PIPELINE
	LIMIT OF EXISTING SITE
	N3 NOISE MONITORING LOCATION AND REFERENCE

SCALE: 1:2500

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PROJECT  
**BALLYNACARRICK LANDFILL PROJECT**

TITLE NOISE MEASUREMENT LOCATIONS	FIGURE 17.1
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## 18.0 TRANSPORTATION

### INTRODUCTION

- 18.1 This traffic impact assessment (TIA) has been completed for an extension to the existing non-hazardous landfill site at Ballynacarrick. The existing access (from south to north) is shown in the plate 18.1. The site is being extended to increase the area of land available for landfill operations; however there will be no notable intensification in use.

**Plate 18.1 Existing Site Access**



- 18.2 This TIA has been prepared on the basis of a proposed extension of 3.54 Ha to an existing site measuring 5.57 Ha, resulting in a new site area of 9.11 Ha. The year of opening of the site is 2005. The site location and preliminary indicative layout are shown in Figure 18.1 and 18.2.
- 18.3 The purpose of the TIA will be to provide a statement addressing the effects of the traffic generated by the proposed development. It will be prepared following the approach set out in the Guidelines published by the Institution of Highway & Transportation. These guidelines represent the most up to date standards for assessing traffic flows for different types of development and are used throughout both Ireland and the UK and are used in relation to traffic and transportation.

- 18.4 Recent 2002 traffic surveys, carried out by Kirk McClure Morton, have been used to assess the existing traffic flows on the surrounding road network. Surveys have been conducted at the site access junction of the site, and the priority junction directly to the south of the site. The road adjacent to the site is the TCR02 road, locally named the "Bog Road". Trip rates for the traffic that may be generated by the proposed development has been determined by assessing the traffic using the existing site to provide an accurate picture of the impact of the proposed development.
- 18.5 Computer analysis has been carried out to determine the effects of traffic from the development on the surrounding road network and the results assessed to determine if the existing road network and proposed site access will cater adequately for the additional traffic generated by the proposed development. Some sensitivity testing has been carried out to determine the effect on capacity of the immediate adjacent junctions.
- 18.6 Presently the existing site accommodates a volume of 10,000 tonnes per annum. The operational capacity for the existing site is 24,000 tonnes per annum. To ensure that an accurate generation for the development is provided a sensitivity test for an additional 14,000 tonnes has been included to ensure that if the site is operating at capacity an accurate model of generated and proposed traffic is provided.
- 18.7 The weighbridge records for the 4 September 2002, the day of the survey, have been used to compare traffic into and out of the site with the actual arriving and departing HGV's depositing waste material at the site. On that day there were only 11 arriving and 11 departing HGV's with waste material. Additional traffic on that day included construction vehicle traffic which we have counted in our survey to use as an additional sensitivity test in relation to traffic volume at the site.

#### EXISTING CONDITIONS

- 18.8 The existing site is currently an operational landfill site and caters for waste arising from mid and south Donegal. Table 18.1 below and Figure 18.1 provide details of the approach routes to the site from the surrounding areas.

**Table 18.1 Approaches to the Site**

Surrounding Area	Approach Routes Relative to Site
Mid	N15 and Ballintra
South	N15 and Ballyshannon

- 18.9 Traffic surveys were carried out on the 4 September 2002. The purpose of the classified count was to assess the existing traffic conditions on the surrounding road network of the existing Ballynacarrick landfill. Surveys are detailed in Appendix H and broadly highlight that the through traffic in relation to the site is minimal, and the majority of traffic using the roads adjacent to the landfill is site traffic. A notable proportion of the existing total traffic is HGV's. In general traffic flow at the access and the priority junction to the south of the site was low throughout the period of assessment. The existing traffic movements at the site include private waste collection vehicles, private cars, delivery vehicles for cover material and aggregate together with occasional leachate collection vehicles.
- 18.10 The classified count was conducted from 08.45 to 16.00. Analysis of the data highlighted a peak period between 10.45 am and 11.45 am. Based on the weighbridge records there was an additional 4 HGV vehicles arriving and 8 HGV departures not related to ordinary site traffic. Some of the "other" traffic would also have been construction traffic and not day to day operational traffic.
- 18.11 Table 18.2 and Figure 18.3 details HGV and other vehicle movement (including cars, vans, and single axle vehicles) to and from the site during the peak period. A high percentage of approaches to the site come from the north with a smaller proportion of traffic approaching the site from the west.

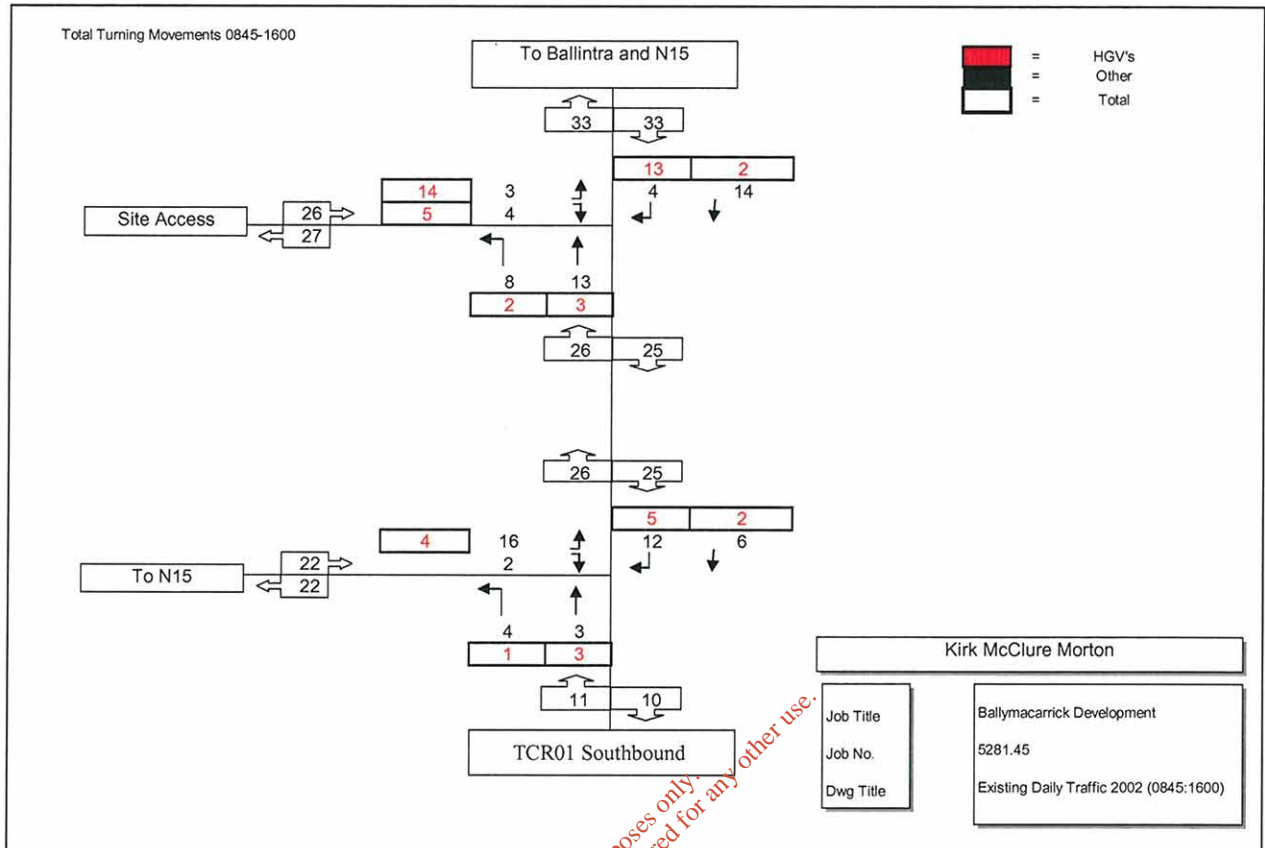
**Table 18.2 Vehicle Movement at Site Approaches**

	ARRIVALS			DEPARTURES		
	HGV	Other	TOTAL	HGV	Other	TOTAL
Site access daily flow	15	12	27	19	7	26
Peak Hour Flow	4	3	7	4	3	7
2way flow N15 @ Laghy	*11%			11%		606
2-way flow N15 @ Ballyshannon	*12%			12%		721

Note: \* Counts extrapolated from 1999 NRTF Traffic Flow Data included in the Appendices

- 18.12 The 2002 existing traffic figures will be increased by 3.4% to give an estimate of the existing traffic for the year 2004, and by 20.6% to give an estimate of the existing traffic for the year 2014, assuming central traffic growth. Appendix H illustrates the extent of the existing traffic information for the area.

**Figure 18.3 Traffic Breakdown During Assessment Period (0845:1600)**



18.13 Given the remote site location and the low flows on the rural road network we have deemed that traffic generation using lower growth figures in relation to other sites in larger populated areas an appropriate and realistic traffic assessment in relation to the area.

**PROPOSED DEVELOPMENT**

18.14 For the purpose of this assessment the proposed development will consist of an additional 3.54 Ha to an existing site area of 5.57 Ha. The waste will, similarly to the existing site, be landfill material. Based on this increase in size, the expansion will be an increase in site area of approximately 63%. However the site is being extended to create more site area and not to intensify operations at the site.

18.15 It is anticipated that the proposed development will provide a maximum of 24,000 tonne per year to landfill. The exact tonnage per year is based on the existing use of the site at capacity. As such there will be no change in operational traffic to the site as a result of the continued use of the extended site. In order to consider the access routes some sensitivity testing has been considered when assessing the traffic capacity of the site access junction, it should be remembered that site traffic will access and depart the site from the N15 Northern approach route. Site traffic is prohibited from travelling directly from or to Ballintra, and site traffic only travels on the site approach road when the road merges with the N15 approach



road. As a result there should be no site traffic travelling through any of the surrounding towns as traffic will travel from the N15 to the site via the approved route only (Figure 18.1).

18.16 Vehicular access to the development will be achievable using the existing access. From the N15 to the site speed limits will continue to be greatly restricted as a result of both the general road alignment and the nature of the material carried (to ensure that spillage does not occur on the public highway).

**TRAFFIC GENERATION AND DISTRIBUTION**

18.17 Traffic generation for the landfill has been assessed using a classified count at the existing site. Using this method has provided a realistic comparison between the existing situation at the landfill including construction traffic, which we have compared with the weighbridge records for that day giving us an accurate picture of actual tonnage per day deposited at the site by HGV vehicles.

18.18 Although the total waste material for 2001 was only 10,823 tonnes and considering that the licence for the site remains at a maximum of 24,000 tonnes per annum, as a sensitivity test we have increased the classified count site traffic to reflect an increase from 10,000 tonnes per annum to 24,000 tonnes per annum to show the impact of the landfill development on the surrounding road network if the site is operating at full capacity. It should be noted that for the existing analysis our survey showed a total of 53 total trips per day (this includes HGV arrivals and departures, other vehicles and construction traffic) and not the actual 22 HGV trips which were recorded in the weighbridge records. A small number of "other" types of vehicles should be added to the weighbridge totals. A breakdown of peak hour flow using the more robust traffic figures is provided in Table 18.3, below.

**Table 18.3 Existing and Proposed TOTAL Traffic for 2004 Peak Hour (10.45-11.45) based on Traffic Survey**

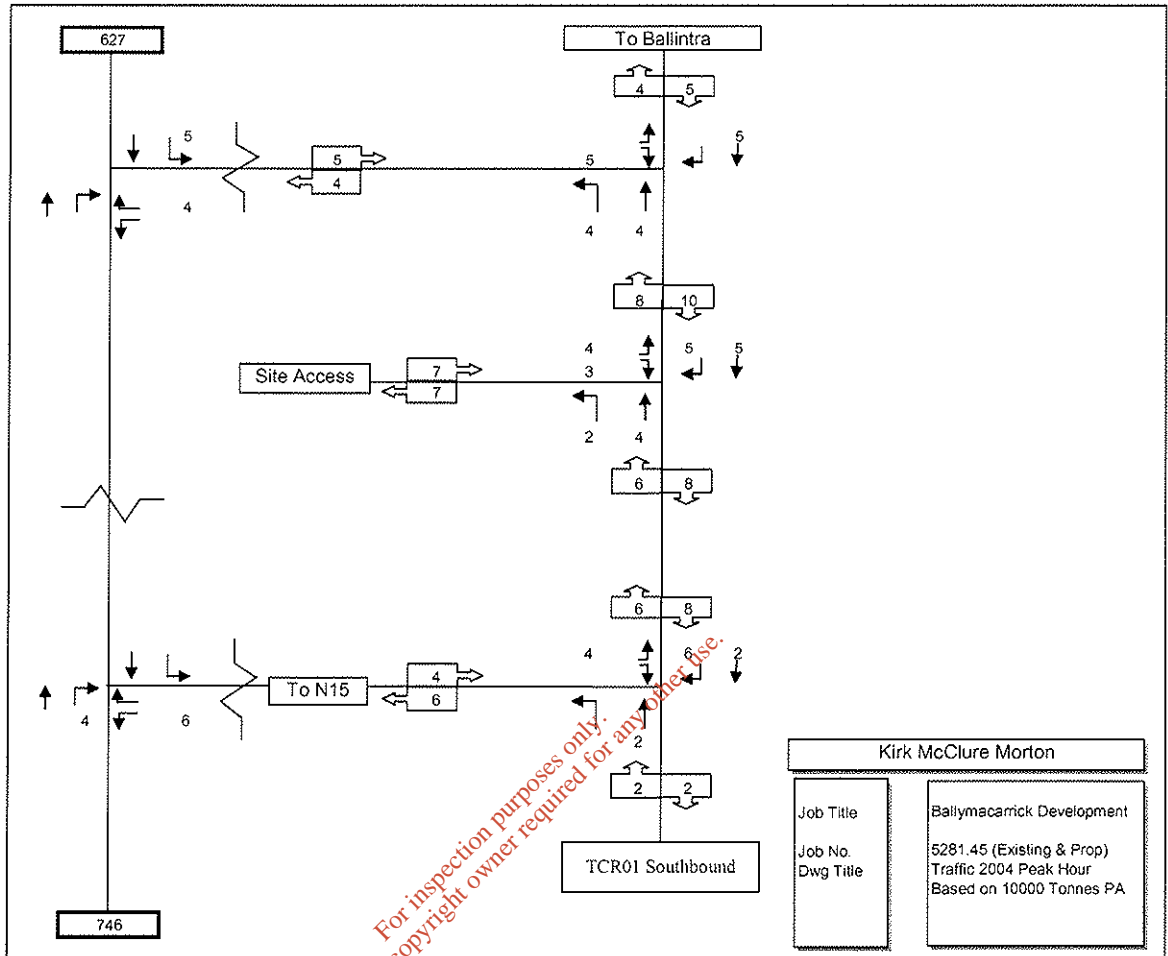
Generation	Peak Arrivals and Departures (1045 : 1145)	
	Arrivals	Departures
Existing Site based on traffic survey	7	7
Generated Traffic	0	0
Proposed Traffic (based on 10,000 tonnes)	7	7
Proposed including sensitivity (based on 24,000 tonnes)	17	17

**Table 18.4 Existing and Proposed Traffic based on Traffic Survey, including sensitivity and Weighbridge Records**

Generation	Peak Hour Arrivals and Departures (1045 : 1145) Daily Flow Arrivals and Departures (0845-1600)	
	Arrivals	Departures
Existing Peak hour count (based on 10000 tonnes See computer models)	7	7
Existing Peak Hour SENSITIVITY count (based on additional 14,000 tonnes)- (as per computer model)	17	17
Generated traffic from new development	0	0
Actual per day traffic as per weighbridge records	11	11
DAILY TRAFFIC (10,000 tonnes) AS PER COUNT	26	26
Proposed DAILY Traffic used for analysis including sensitivity (24,000 tonnes)	36	49

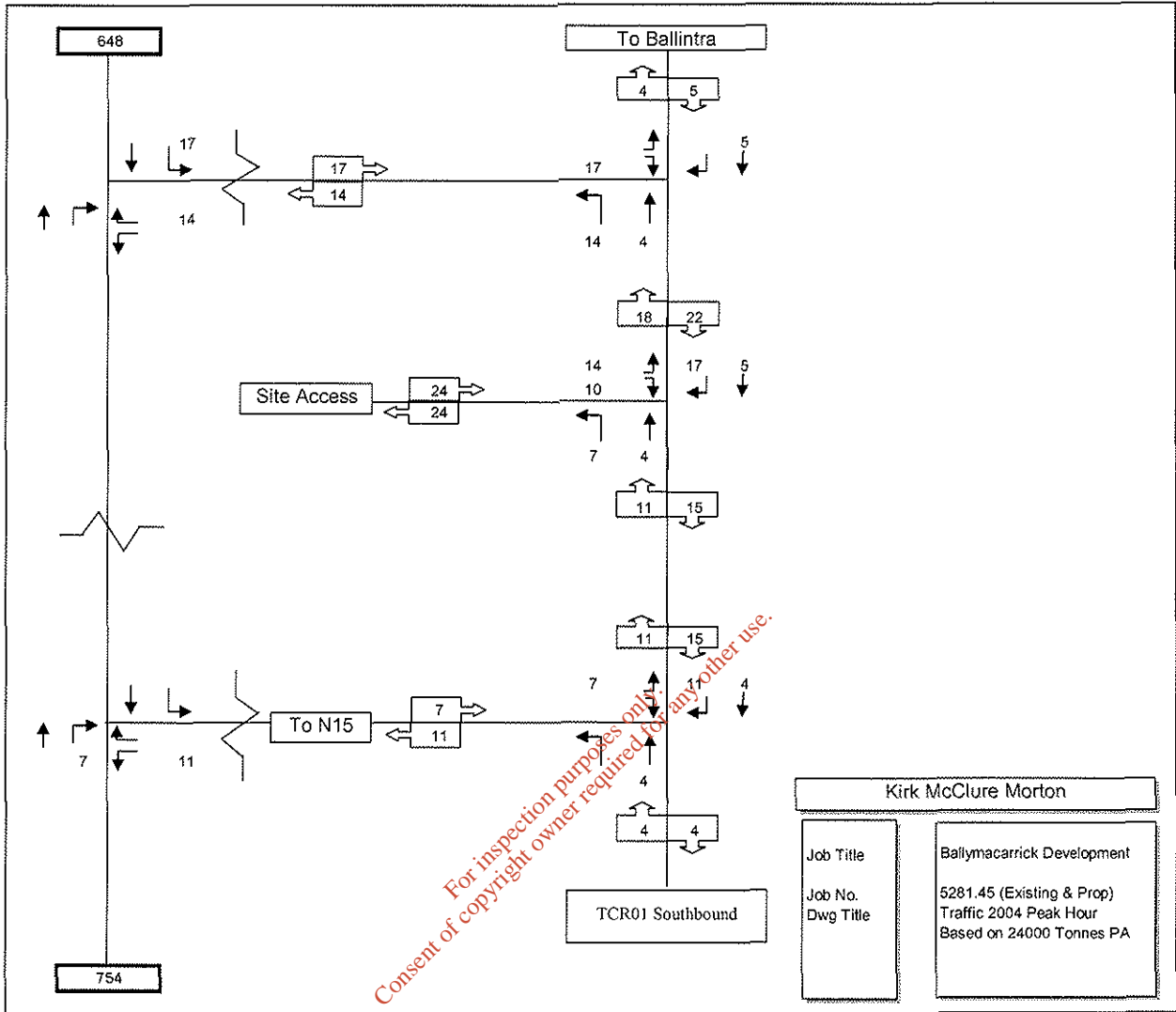
18.19 This data shows peak hour traffic, i.e. HGV, other and construction traffic during the busiest hour of the day at the site in Figure 18.4. Figure 18.5 shows the peak hour traffic on a given day if the site was operating at 24,000 tonnes per annum. We have used the much higher figures based on the traffic count rather than the actual assessment based on the weighbridge records. The figures show that even when the sensitivity analysis figures are used, at the busiest periods there is a low volume of vehicles at the site. In reality even during the traffic count there was a number of one hour periods when no vehicles entered the site. The weighbridge records underline this argument and suggest that even during the daily peak hour there is only a few HGV's entering or leaving the site.

**Figure 18.4 Peak Hour TOTAL Traffic 2004 Including HGV, Other, and Construction Traffic based on 10,000 Tonnes Per Annum**

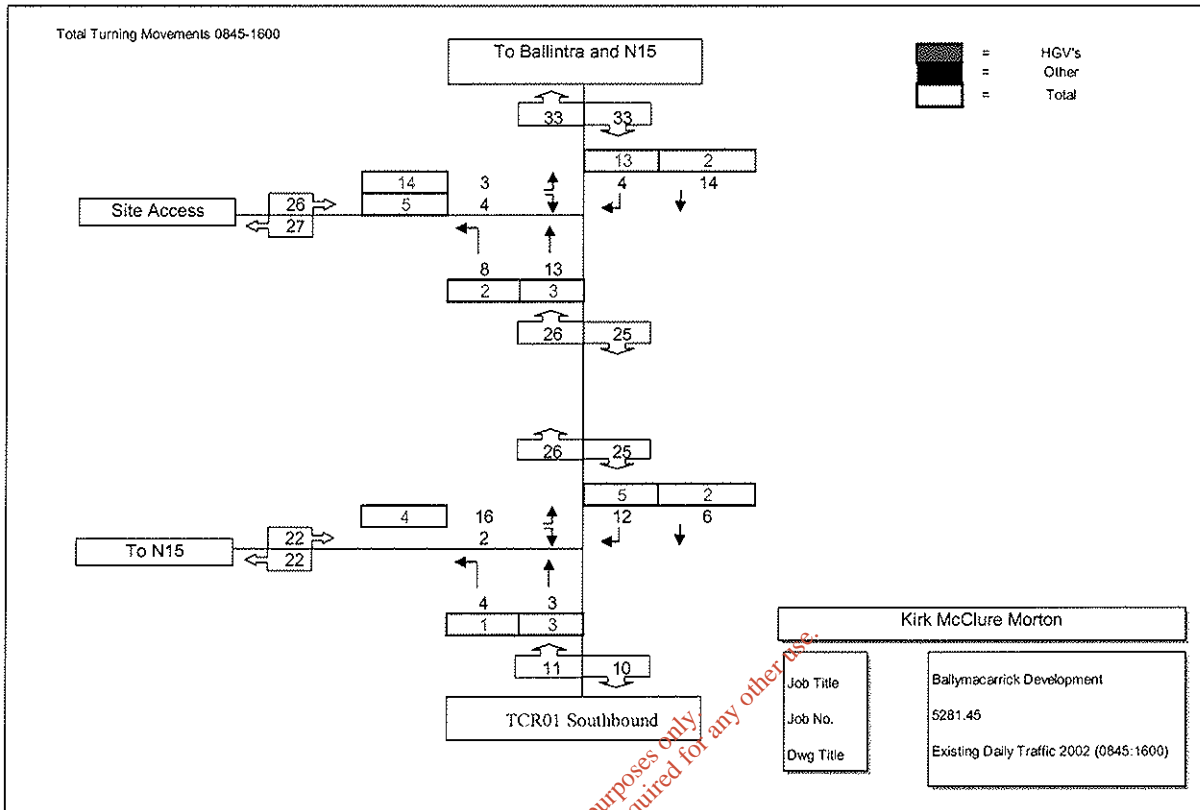


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**Figure 18.5 Sensitivity Analysis Peak Hour TOTAL Traffic 2004 Including HGV, Other, and Construction Traffic based on 24,000 Tonnes Per Annum**



**Figure 18.6 Breakdown of All Day Count Data as per Traffic Existing Traffic Count**



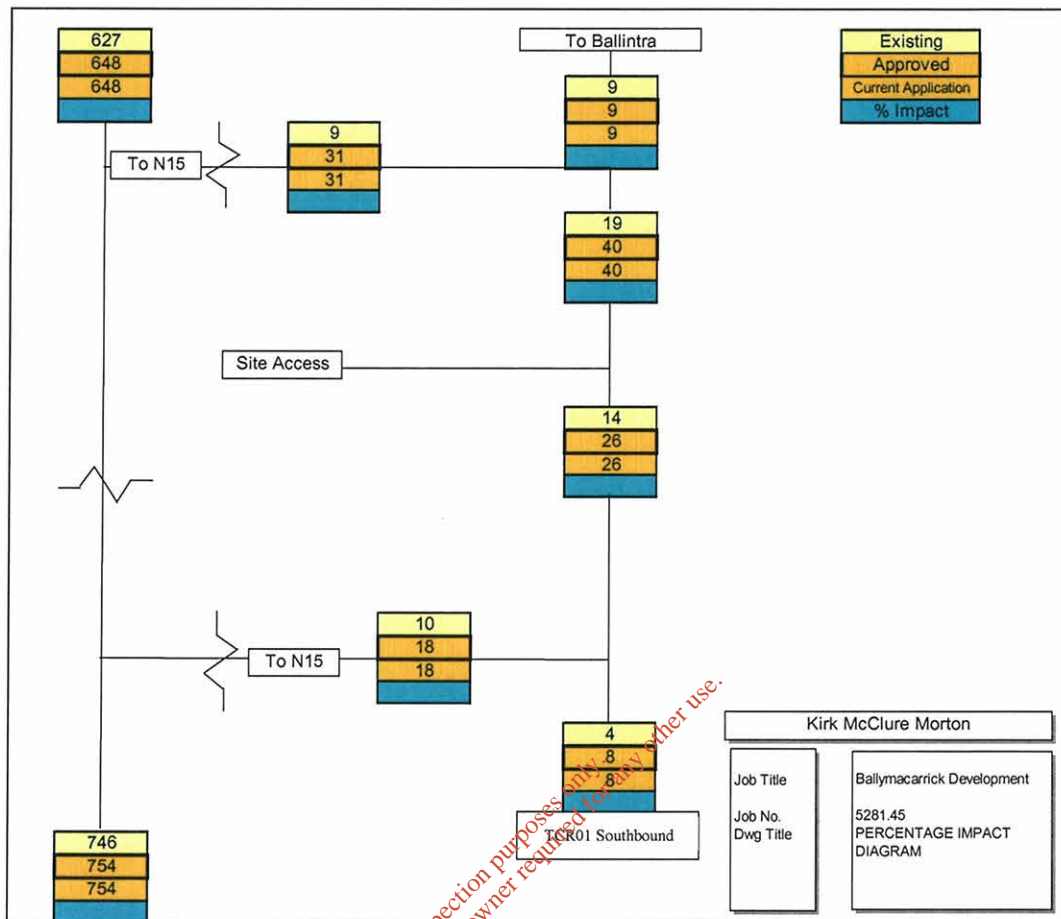
18.20 Figures 18.5 and 18.6 above highlights that based on the robust assessment of existing trips; over the course of a day there will be little change in traffic during the normal working day or peak hour, and that over the period of a day the impact on the surrounding network is low. These figures provide a high sensitivity analysis and include other traffic and construction traffic.

18.21 Peak hour and sensitivity analysis as shown in Figures 18.4 and 18.5 provides a robust assessment of the traffic entering and leaving the site at the peak hour. By comparing Figure 18.4 based on 10,000 tonnes with additional traffic as shown in Figures 18.5 based on 24,000 tonnes and Figure 18.6 the all day count breakdown of total existing traffic throughout the day, a complete assessment has been made and it is clear that even at peak hour, including additional traffic, at full capacity, the amount of generated traffic is small and that over the period of a day, even when additional traffic is included the overall traffic flows throughout the day are low.

18.22 The Institution of Highways and Transportation (IHT) has published Guidelines for carrying out Traffic Impact Assessments. These Guidelines have been used as a basis for the assessment of the additional traffic.

- 18.23 These Guidelines recommend that a traffic assessment should be produced when one or other of the following thresholds are exceeded:
- Traffic to and from the development exceeds 10% of the existing two-way flow on the adjoining highway.
  - Traffic to and from the development exceeds 5% of the existing two-way flow on the adjoining highway, where traffic congestion exists or will exist within the assessment period, or in other sensitive locations.
- 18.24 The impact of this development on the adjoining road network in the year 2005 is no greater than the existing traffic and as such there is no net detriment on the existing road network. The movement of vehicles along the minor road may cause minor conflict, with the potential for two vehicles unable to pass on the narrow sections of an unclassified road. We would recommend the introduction of passing bays along the road to accommodate two-way traffic and ensure that cars and HGV's can safely pass. In 2014, 10 years after year of opening, there is still a low volume of vehicles passing the Ballynacarrick site; consequently we believe the introduction of passing bays instead of significant road widening would be more appropriate at this location and would provide a significant improvement over the existing site. This is discussed later in this report.
- 18.25 Existing junctions that exceed the criterion established by IHT guidelines should be assessed 10 years after the proposed development opens. The assumed year of opening has been taken as 2004, there is no impact as there is no additional traffic, but we have provided models for 2014 to show that the surrounding junctions of the site operate with capacity. It should be noted that the operation of the site will only be 8.5 years however generally developments are assessed on traffic grounds ten years after a development is opened, on this basis an overly robust assessment has been completed in relation to the computer modelling to ensure that the ratio of flow to capacity is below 0.850, or 85<sup>th</sup> percentile of capacity.
- 18.26 The percentage impact, shown in Figure 18.7 below, compares the impact of the traffic count (10000 tonnes per annum) with the sensitivity analysis traffic (24000 tonnes per annum) approved existing yearly tonnage, and shows that there is no impact on the surrounding towns. The numbers of vehicles travelling to or from the site from the N15 is low.

**Figure 18.7 Percentage Impact between Existing and Sensitivity Traffic Data**



18.27 In consideration of the impact of the main junctions, detailed analysis was carried out at the site access and the junction directly to the south of the site. The computer program PICADY has been used to analyse the site access priority junction, and the neighbouring priority junction. The software PICADY predicts capacities, queues and delays at traffic junctions. HGV movement on each arm was calculated on the basis of the classified count.

18.28 The results of the analysis for these junctions are summarised in Tables 18.6 and copies of the input and output data for the computer models of the junction are included in H.

**Table 18.5 Summary of Computer Modelling for the Site Access 2014**

Scenario (ARCADY)	Movement	Delay (min)	Delay (min/veh)	Max RFC	Max Queue
Existing and proposed Traffic 2014 Based on 10000 Tonnes per annum	B-AC	2.1	0.17	0.028	0.0
	C-AB	1.2	0.15	0.016	0.0
Proposed Traffic 2014 with development SENSITIVITY Based on 24000 Tonnes PA	B-AC	6.1	0.18	0.078	0.1
	C-AB	3.8	0.15	0.048	0.1

NOTE: ARM A - ACCESS ROAD (TO SOUTH)  
ARM B - SITE ACCESS  
ARM C - ACCESS ROAD (TO NORTH)

18.29 When the Ratio of Flow to Capacity (RFC) exceeds 1.0 the flow arriving at the junction will be greater than the capacity available for a particular movement, hence queuing will become a problem and delays will be imminent.

18.30 Table 18.6 shows the analysis carried out for the proposed site access for the year 2014. This shows that the junction has adequate capacity to deal with the proposed levels of traffic for the year 2014 with a maximum RFC value of 0.028. Through traffic is not impeded by the turning traffic.

18.31 As a sensitivity measure we have increased the existing site traffic which accounts for approximately 10,000 tonnes per year by a factor of 2.4 to account for a maximum tonnage accepted at the site of 24,000 tonnes per annum. Tables 18.6 and 18.7 show that even with double the traffic the ratio of flow to capacity is still below 0.100, less than 10% of the available capacity used.

18.32 It is our conclusion that the proposed development will not have a significant impact on the surrounding road network.

### SAFETY

18.33 It is felt that the major element of this traffic impact assessment is not the junction capacity but remedial measures to ensure that the impact of the existing and proposed development does not have a detrimental impact on safety in the vicinity of the site. There are adequate sightlines for vehicles entering or leaving the site. This is shown in the photographs included in the Appendix. There have been no reported accidents at the site access to date.



- 18.34 From information gathered on site, there have not been a significant number of accidents on the surrounding road network. From the Garda Síochána records there has only been one minor incident approaching the site in the past few years, and at the junction with the N15 there is not a safety or sightline issue as there have been few reported accidents at this junction this is an important statistic considering the high volume of traffic using the N15. When approaching the site the adjoining roads are narrow, reducing vehicle speeds. These vehicles may be landfill HGV's or timber Lorries (observed passing the site) or other agricultural vehicles. Due to existing use of HGV's on these roads remedial actions have been taken to ensure that the good safety record of HGV's and other traffic within the vicinity of the site is maintained. Photographs shown in Plate 18.2 and Plate 18.3, taken near the site, show the road before and after resurfacing.
- 18.35 The low traffic volume does not warrant a significant road-widening scheme; instead the introduction of passing lanes at various points between the site and the N15 should be introduced to ensure that there continues to be a good safety record in the area and that through traffic can move freely. The location of passing bays will be assessed at a future stage to ensure that the passing bays are located in the correct positions and that the bays can fully compliment the recent road upgrades.
- 18.36 To avoid problems associated with third party land acquisition natural lay-by sites have been identified, these are easily achievable lay-by's that could be introduced including along the frontage of the site.
- 18.37 A remedial safety measure identified during the survey period included upgrading of the poor road quality in various parts of the main route between the site and the N15 via the northern approach (TCR01) as shown in plate 18.1 below. The road surface near the site has now been considerably improved. Resurfacing has taken place along the route from the N15 and includes the bend to the north of the site as shown in plate 18.2, which caused safety concerns before resurfacing took place.
- 18.38 HGV's will be prohibited from using the Bog Road. The designated route (Figure 18.8) will be a condition of the waste permits issued by Donegal County Council. This will include a map showing the Northern Road from the N15 to the site as the designated route.
- 18.39 In addition to the use of the waste permits for designating the access route a number of measures including signage at the weighbridge will be introduced. The driver will also be informed by the weighbridge operative on site that the right turn manoeuvre from the site is not to be taken. The introduction of physical barriers to prohibit access to and from the Bog road will also be considered. The exact remedial measure will be agreed on site. Care will be

taken to ensure that any prohibitive measure will be introduced for all road users with safety in mind.

**Plate 18.2 Road Surface Before Upgrading**



**Plate 18.3 Road Integrity Has Been Improved At This Point**



- 18.40 The palisade fence marking the boundary line to the front of the site is conducive to ensuring that adequate sightline requirements for vehicles entering and leaving the site are maintained. As vehicles approach the site departing vehicles are clearly visible due to the material used for the fence construction.
- 18.41 In addition to passing bays other options proposed include better signage from the N15 to TCR01. This signage should warn vehicles that HGV's operate in the area. Vehicles travel at a lower speed on these roads due to the number of bends and the width of the road, this naturally slowing traffic on the approach roads to the site, reducing the overall potential conflict on the roads surrounding the site.
- 18.42 It is the conclusion of this report that the traffic generation of the proposal will not have a significant impact on safety of existing roads. However, safety can always be improved by implementation of remedial measures such as those described above.

#### **INTERNAL LAYOUT AND CAR PARKING**

- 18.43 The internal layout has been developed as part of the existing facility.
- 18.44 The infrastructure at the site includes a wheel wash to ensure that debris from vehicles is not deposited on the public road network. The internal network is sufficient to allow vehicles to turn internally without the need for vehicles to reverse on to the public road.

#### **OTHER ROAD USERS**

- 18.45 The safety of other road users is of paramount importance when designing the layout of internal roads.
- 18.46 Within the site boundary there is a separation of car parking, office and site to minimise conflict (Figure 18.2).
- 18.47 Presently there are no public transport facilities near the site. The nature of the development and the volume of traffic would suggest that a public transport infrastructure would be neither required nor viable.

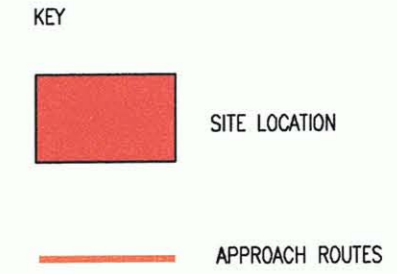
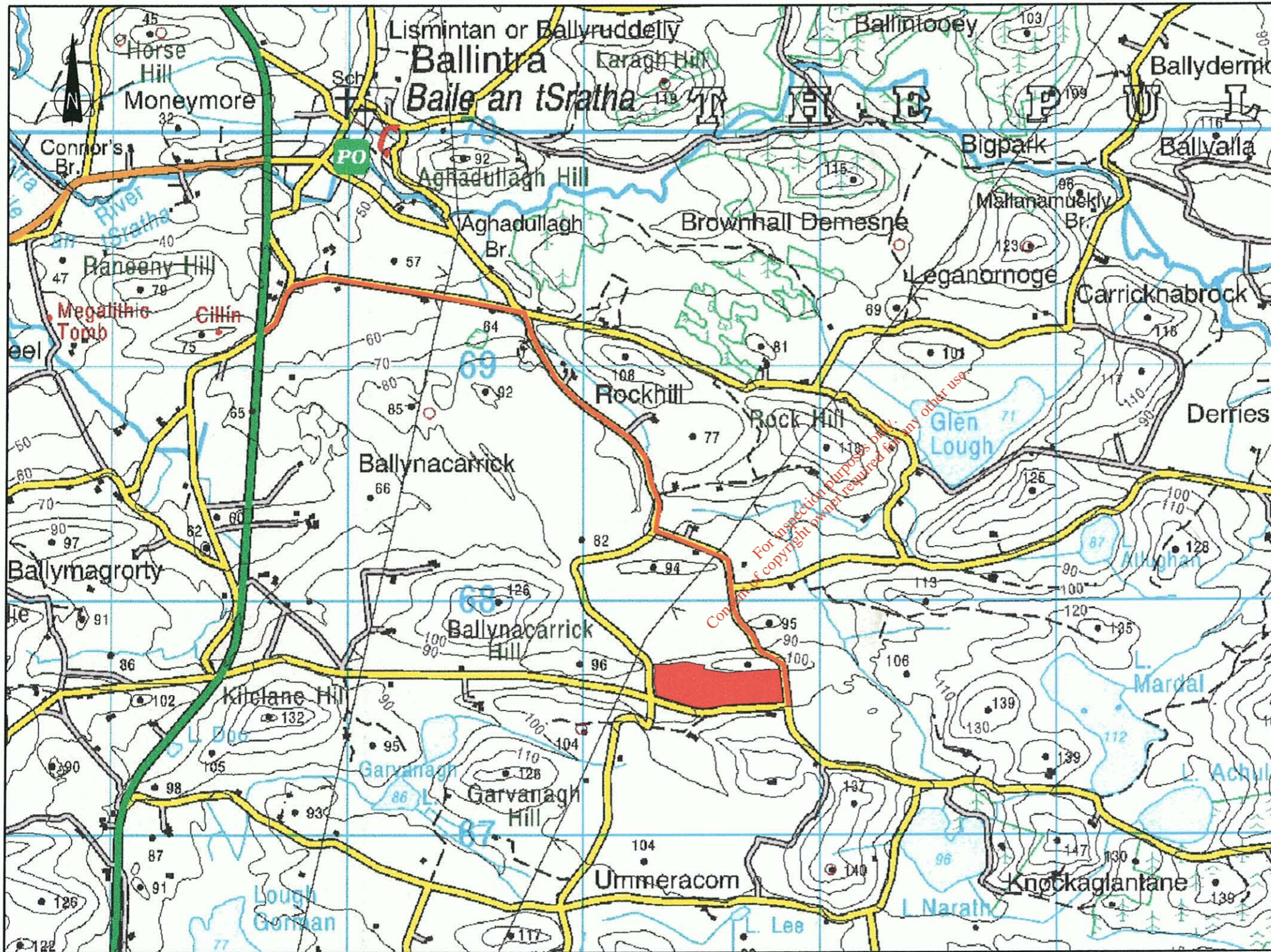
## TRAFFIC SUMMARY

- 18.48 Traffic generations from the proposed redevelopment of Ballynacarrick Landfill have been calculated by counting and analysing the daily flow of existing traffic, including development traffic to the site to predict peak hour traffic flows. This has included a classified traffic count at the existing access and the adjacent priority junction to the south of the site access. Comparisons have been made with these traffic flows and the weighbridge records provided by Donegal County Council. Existing flows have been used to assign the traffic generation onto the existing road network. The existing traffic volume in and around the site is low.
- 18.49 The projected development traffic has been added to the existing traffic on the surrounding road network. The existing traffic has been increased for future traffic growth using NRTF central growth rates.
- 18.50 The increase in traffic on all the links is 0% as the existing site is underutilised at present but has approval for a maximum of 24,000 tonnes per annum, the same tonnage of the proposal, and therefore there will not be an intensification of operations at the site.
- 18.51 The traffic counts included both site traffic and construction traffic, this traffic was factored to provide a robust assessment of 24,000 tonnes of waste per annum and it was shown that there was no impact on the surrounding road network.
- 18.52 Computer software has been used to carry out an assessment of the adjacent junctions. This analysis shows that the existing road network could adequately deal with the proposed traffic flows to and from the development site if the landfill is fully operational.
- 18.53 Safety is the major issue when considering the proposal. Narrow roads and large HGV's make the need to improve road safety a priority. Recently the Northern route from the N15 to the site has been resurfaced and improved. Lay-bys will be agreed and provided along the designated route to ensure there is no conflict between vehicles entering and leaving the site and local traffic. A number of measures will be introduced to prohibit HGV's from turning right out of the site.
- 18.54 Overall we conclude that the impact of the traffic to and from the site will not have a significant impact on the surrounding road network, and with minor improvements, some of which have already been introduced, there will be no net detriment on the surrounding road network as a result of this proposal.

## FIGURES

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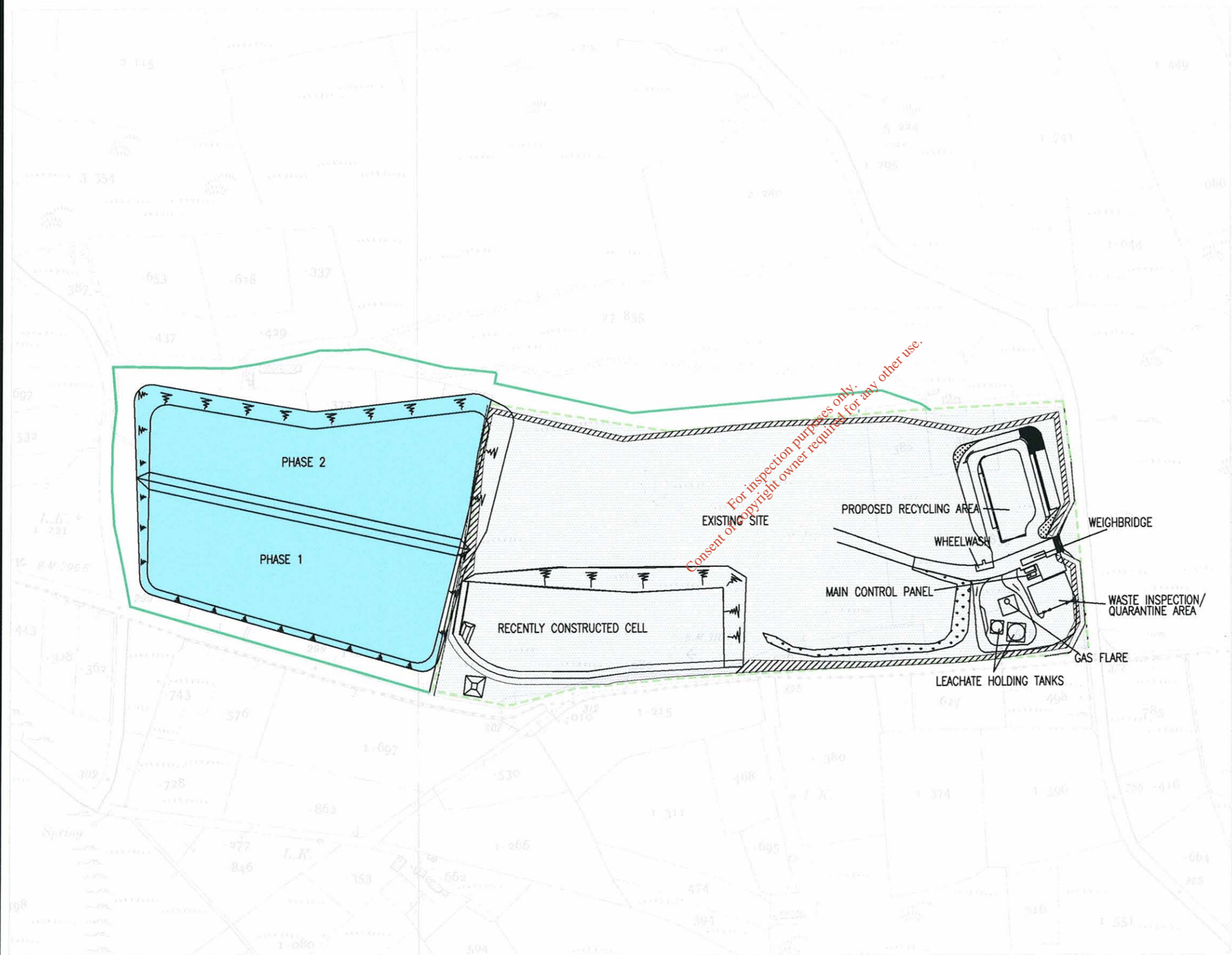
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PROJECT  
BALLYNACARRICK LANDFILL PROJECT

TITLE SITE LOCATION & APPROACH ROUTE	FIGURE 18.1
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- KEY
- BOUNDARY OF EXISTING LANDFILL
  - BOUNDARY OF PROPOSED EXTENSION
  - LIMIT OF PROPOSED LANDFILL EXTENSION
  - LIMIT OF EXISTING SITE

SCALE: 1:2500

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PROJECT  
BALLYNACARRICK LANDFILL PROJECT

TITLE PRELIMINARY INDICATIVE SITE LAYOUT	FIGURE 18.2
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## 19.0 INTERACTIONS

### INTRODUCTION

19.1 This Section encompasses a discussion of the interactions of various environmental issues for the proposed extension to a landfill facility at Ballynacarrick, Ballintra, Co. Donegal. This is in fulfilment of the requirements of the European Communities Environmental Impact Assessment (Amendments) Regulations, 1998. The legislation sets a requirement that an environmental impact assessment must provide a satisfactory description of the impacts of proposed developments and the likely effects on the interaction between:

- Human beings
- Flora
- Fauna
- Soils
- Water
- Air
- Climate
- Landscape
- Material Assets
- Noise

19.2 The location of these interactions in the text has been summarised in Table 19.1 and a description of each interaction provided below. For each of the interactions, it is a necessary requirement that the mitigation, avoidance and remediation measures are documented and their location in the text identified.

**Table 19.1 Potential Interactions between media at Ballynacarrick Landfill Site and their location within the text of the EIS document.**

	Human Beings	Flora	Fauna	Soil	Water	Air	Climate	Landscape	Material Assets	Cultural Heritage	Noise
Human Beings											
Flora	None										
Fauna	10.76/77	10.75									
Soil	None	12.36	None								
Water	12.12	12.36	12.26	12.36							
Air	9.58,9.71 9.76	None	None	None	None						
Climate	None	None	None	None	None	None					
Landscape	15.66-15.91	15.86	10.77	15.63	None	None	None				
Material Assets	14.16-14.34 14.67-14.72 15.66-15.91	None	None	None	None	None	None	15.66-15.91			
Noise	17.9-17.39	None	None	None	None	None	None	None	None	None	

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#### **HUMAN BEINGS AND FAUNA**

- 19.3 An increase in scavenging birds (in particular Hooded Crows, large gulls and small birds such as Chaffinch and Pied Wagtail) may be associated with an extension to the landfill. These may have an impact on human beings in terms of health and nuisance factors. Scavengers such as foxes and brown rats were also recorded close to the site. Measures to mitigate these adverse effects are already in place and include bird scaring devices and a vermin control programme. These measures are highlighted in Section 10.

#### **HUMAN BEINGS AND WATER**

- 19.4 Considering the fact that the landfill is situated in an area where the water has, in the past, been determined to be relatively polluted (as documented in Section 12), the water supply is not used for any potable sources and so the potential impacts are considered to be negligible.

#### **HUMAN BEINGS AND AIR**

- 19.5 There are several properties situated close to the site of the proposed development and these have the greatest potential to be affected by emissions from the increased traffic associated with both the construction phase and the operational phase of the landfill. In addition to this, these properties may be impacted by odours emanating from the site. This will be more prevalent when the wind is blowing from a west to south westerly direction across the tipping face of the landfill. The nearest sensitive receptor likely to suffer the effects of this odour is a property located 300m from the proposed extension. The measures designed to mitigate and remediate these potential impacts have been documented in Section 9.

#### **HUMAN BEINGS AND LANDSCAPE**

- 19.6 The visual amenity of the site will be affected during the site development and operation. It is proposed however that this will take approximately 8.5 years and the site will be returned to its original state following filling. The visual impacts likely to occur during the development and filling phase of the landfill are outlined in Section 15. The mitigation measures, avoidance and remediation measures are also described in Section 15.

#### **HUMAN BEINGS AND MATERIAL ASSETS**

19.7 During the development and operation of the facility, there will be some impact on the material assets. This could be in the form of a potential impact on tourism and agricultural practice although, as documented in Section 14, these are considered to be negligible. The measures designed to mitigate these affects are documented in Section 15. There should also be a positive impact of the development in terms of the socio economic fabric of the area. This impact, in the form of increased employment opportunities in the local community, is outlined in Section 14.

19.8 It is envisaged that there will be a negative impact on archaeological features and deposits that may survive in the vicinity of the proposed development site. In addition to this, it is further envisaged that the passage of vehicles and machinery would have a negative impact on any previously unrecorded subsurface materials that may survive within the development site. The measures described in Section 16 are designed to mitigate any potential impacts from the proposed development.

#### **HUMAN BEINGS AND NOISE**

19.9 Potential noise, in the form of road traffic, site preparation and construction traffic as well as potential noise from fixed plant, may have an impact on human beings in the vicinity of the proposed site. The predicted level of impact from each of these sources has been addressed in Section 17. Remedial or reductive measures for each source have also been addressed within Section 17.

#### **FLORA AND FAUNA**

19.10 The impact of the proposed development, in the form of a phased and gradual loss of habitat, will have an effect on resident bird species in terms of loss of feeding and breeding grounds. This effect should not however cause a significant decline in any species in the surrounding countryside. Mitigation measures, designed to reduce these effects are documented in Section 10.

#### **FLORA, SOIL AND WATER**

19.11 Removal of flora will increase the exposure of the soil on the entire site and may add to increased suspended solids in the surrounding water body. This process will be exacerbated in periods of heavy rainfall and could have a detrimental effect on the water quality in the vicinity of the proposed development. The potential impacts on water quality and the remediation measures proposed are documented in Section 12.

#### FLORA AND LANDSCAPE

- 19.12 A period of temporary visual intrusion is envisaged during the construction phase of the development. This will be in the form of a loss of vegetation and grass cover, as recorded in Section 15. The visual intrusion should however be a short term concern as it is planned that the vegetation will increase as progressive site restoration occurs. The mitigation, avoidance and remediation measures, considered as part of the development are documented in Section 15.

#### FAUNA AND WATER

- 19.13 The proposed impact on the site, and the potential for leakage of leachate from the site into the surrounding water courses, may have a negative effect on the aquatic ecosystem and fishery status in the vicinity of the site. Ballynacarrick Landfill is presently uncapped and it is proposed that the potential of leakage of leachate will be negligible when capping takes place. The potential impacts, along with the proposed mitigation measures, are described in Section 12.

#### FAUNA AND LANDSCAPE

- 19.14 A proposed decrease in agricultural land may decrease the foraging opportunities for the number of Black Headed Gull living in the vicinity of the site. This has further been exacerbated by the gulls being forced inland due to a decrease in fishing stocks in the surrounding coastal region. This will have the effect of a potential increase in scavenging at the landfill site. The measures designed to mitigate these adverse effects are documented in Section 10.

#### SOIL AND LANDSCAPE

- 19.15 The development of the landfill site will inevitably lead to a loss of soil over the 3.5 hectares. Considering that the proposed site is currently a field that blends in with the surrounding agricultural landscape, removal of soil to leave an exposed area will have an impact on the landscape. This impact is considered to be short term as plans are in place to return the area to its natural state, following filling and closure of the landfill. The measures designed to mitigate and remediate this are described in Sections 11 and 15.

#### LANDSCAPE AND MATERIAL ASSETS

- 19.16 A change of land use, from agricultural and grazing land, will have an impact on potential revenue and economic value of the site. This is also expected to be short term however and will be mitigated on filling and closure of the landfill site. These measures are documented in Section 15.

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**20.0 SUMMARY OF IMPACTS AND MITIGATION MEASURES**

Environmental Assessment	Impacts	Mitigation Measures
<p>AIR AND CLIMATE</p>	<ul style="list-style-type: none"> <li>▪ Generation of landfill gas</li> <li>▪ Gas Flare Emissions</li> <li>▪ Traffic Fumes Emissions</li> <li>▪ Dust Deposition</li> <li>▪ Odour</li> </ul>	<ul style="list-style-type: none"> <li>▪ Landfill gas to be collected and vented to atmosphere or flared. Monitoring boreholes to assess efficiency on site gas management. Gas monitoring after closure.</li> <li>▪ Careful consideration to flare location to ensure it is not allowed to pass directly to human habitation under prevailing wind conditions. Consideration to be given to flare stack and combustion process to moderate dispersions.</li> <li>▪ No major impact. Expected to decrease with improvements in engine efficiency and enforcement vehicle emission standards.</li> <li>▪ Limiting generation by careful choice daily cover, damping down materials in dry weather, landfilling within cells, disposal and instant burial dusty wastes and providing well designed access road.</li> <li>▪ Controlled by good working practise - rapid deposition and covering malodorous wastes, effective compaction and covering, installation permanent capping system and flaring landfill gas.</li> </ul>
<p>FLORA AND FAUNA</p>	<ul style="list-style-type: none"> <li>▪ Phased loss of most areas of habitat that currently exist within the site. This will have an adverse effect on breeding territories and feeding sites.</li> <li>▪ Increase in scavenging in the area and from this, increased threat to sensitive species.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Intended to retain some habitat features on site, including wooded copse and scrub woodland. Loss of habitat not considered significant as site area is small and habitats are well represented in surrounding areas. Any habitat loss will be phased and general.</li> <li>▪ Bird-scaring devices in operation when gull numbers are higher or seen to be a nuisance.</li> </ul>

Environmental Assessment	Impacts	Mitigation Measures
GEOLOGY AND SOILS	<ul style="list-style-type: none"> <li>▪ Potential to destroy features geological interest.</li> <li>▪ Volume material requiring off site disposal.</li> <li>▪ Disturbance and loss soils.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bedrock poor in quality and not of special interest.</li> <li>▪ Reuse of all geotechnically suitable materials in construction engineered earthworks, landfill restoration and proposed landscaping operations.</li> <li>▪ Proper storage to prevent excess compaction and reuse as soon as practicable. Materials to be reused directly in engineered earthworks or deposited in stockpiles with graded banks to promote surface runoff.</li> </ul>
HYDROLOGY	<ul style="list-style-type: none"> <li>▪ Potential escape of leachate to local watercourses.</li> <li>▪ Increase in suspended solids as a result of exposure on the site.</li> <li>▪ Contamination of surface water.</li> </ul>	<ul style="list-style-type: none"> <li>▪ A leachate collection system has been installed in the existing site to reduce the volume of leachate that can escape from the existing site. Proposals to cap the site in the near future will reduce the volume of leachate generated. The proposed extension will be developed on a containment basis.</li> <li>▪ It is proposed that temporary settlement lagoons will be utilised during construction works to remove suspended solids from the surface water prior to discharging to watercourses. Topsoil and grass seed applied as cells are capped to allow surface runoff characteristics to return to the present condition.</li> <li>▪ A cut off drain will be excavated around the perimeter of the whole site. Drain will be designed to collect clean surface water running off capping layers and surrounding area.</li> </ul>

Environmental Assessment	Impacts	Mitigation Measures
HYDROGEOLOGY	<ul style="list-style-type: none"> <li>▪ Locally important bedrock aquifers vulnerable as drift cover</li> <li>▪ Environmental pollution with respect to surface and groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Site classified as acceptable for development subject to guidance in EPA Landfill Design Manual. Phased development as fully engineered containment landfill facility with a range of leachate collection and management systems designed to minimise leakage and mitigate further groundwater impacts. No additional impact from extension.</li> <li>▪ On basis above, proposed development satisfies requirements Section 40 (4) b of Waste Management Act, 1996.</li> </ul>
HUMAN BEINGS	<ul style="list-style-type: none"> <li>▪ Increase in employment during the construction phase.</li> <li>▪ Decrease in tourist numbers.</li> <li>▪ Effects of additional vehicle movements on road safety and air quality.</li> <li>▪ Change in character of the area.</li> </ul>	<ul style="list-style-type: none"> <li>▪ To be sourced from the local community where possible.</li> <li>▪ Will be negligible. Effective screening for the operations through a combination of topography and vegetation..</li> <li>▪ Since this is extension to existing facility, current permitted traffic levels will be sustained. Proposed to improve narrow access roads through provision lay-bys. Site to be operated to EU standard - will reduce risk to air quality.</li> <li>▪ Character changes will be limited in time and long term significant effects are not expected.</li> </ul>
LANDSCAPE AND VISUAL	<ul style="list-style-type: none"> <li>▪ Changes in landscape character.</li> <li>▪ Intrusion on views of the area.</li> <li>▪ Visual impact from site construction traffic and infilling works.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Temporary measure until remediation (grassing and planting) takes place. Re-establishment of hedges to link area with surrounding landscape.</li> <li>▪ Will be temporary. Planting works around the site will help ameliorate impact of the development. Screening from adjacent properties and roads to be implemented where possible.</li> <li>▪ Construction to be completed relatively quickly (6 months) with phased infilling programme lasting 8-9 years.</li> </ul>

Environmental Assessment	Impacts	Mitigation Measures
MATERIAL ASSETS	<ul style="list-style-type: none"> <li>▪ Due to the size of the proposed development on the subject site, deep extensive machine excavation is required. This would have negative impact on any archaeological features and deposits that may survive in the area.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Recommended that all groundworks be monitored by an archaeologist under licence to the Heritage Service, with provision made for full recording and excavation of any exposed archaeological features or deposits. Measures will function as monitoring system to allow further assessment of scale of predicted impacts and effectiveness of mitigation.</li> </ul>
NOISE	<ul style="list-style-type: none"> <li>▪ Potential impacts from landfill operation (dumping, spreading and compacting of refuse and fixed plant items such as leachate treatment system and gas flare system).</li> <li>▪ Potential impact from vehicle noise (increased traffic on site).</li> <li>▪ Potential impact from construction noise from preparation and restoration of the site including phased lining/levelling).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Activity assessed as being within target levels. Temporary earth bunds constructed with overfill material at active tip head, already in place to screen working of equipment from nearest noise sensitive residence.</li> <li>▪ No additional noise impact predicted as site currently licensed for 24,000 tonnes per year and this limit will not be increased.</li> <li>▪ Good plant maintenance under EC guidelines to be practised. Monitoring is carried out annually at three locations as part of existing licence.</li> </ul>
TRANSPORTATION	<ul style="list-style-type: none"> <li>▪ Safety in the vicinity of the site.</li> <li>▪ Generation of excess traffic in vicinity of the site.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Main distributor roads will have limited access positions, reducing number of turning movements on major road. Also minimises conflict points between vehicles and pedestrians. Suggestion of lay-bys along designated access route to ensure no conflict between vehicles entering and leaving site and members of the public using the roads.</li> <li>▪ No expected increase in traffic from currently permitted under existing waste licence.</li> </ul>