Waste Licensing

Waste Disposal Activities
(Landfill Sites)

Application by
Fingal County Council
for Waste Licence Application W0231-01
for Fingal Landfill, Co. Dublin

EPA Reg. No.: (Office use only)	**W0231-01**

Fingal County Council
Comhairle Contae Fhine Gall

Replies to Request for further information in accordance with Article 14(2)(b)(ii) of the Waste Management Regulations

December 2006

Fingal Landfill Project

Waste License Application
W0231-01
Article 14 Information

DOCUMENT CONTROL SHEET

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Consulting Engineers

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1 INTRODUCTION

This report has been complied to supply additional information in response to a Notice in accordance with Article 14 (2) (b) (ii) of the Waste Management (Licensing) Regulations from the Environmental Protection Agency dated October 11th 2006.

2 NON TECHNICAL SUMMARY

2.1 REQUEST FOR INFORMATION

As required under Article 12(1)(u) of the Waste Management (Licensing) Regulations, S.I. 395 of 2004 please ensure that all required information is included in the non-technical summary, e.g.:

a) Name, address and contact details of applicant and correspondence details;

b) Planning authority details;

c) Sanitary authority in which receiving sewer is vested;

d) Location details of proposed facility

2.2 RESPONSE TO REQUEST

Attachment A1 – Non Technical Summary

Applicant's Details:

Name*:	Fingal County Council
Address:	PO Box 174
	Fingal County Hall
	Main Street
	Swords
	Co. Dublin
Tel:	01-8905000
Fax:	01-8905809

Correspondence's Details:

Name*:	Mr. Gilbert Power, Director of Services,
Address:	Fingal County Council
	PO Box 174
	Fingal County Hall
	Main Street

	Swords
	Co. Dublin
Tel:	01-8905000
Fax:	01-8905809

Planning Authority Details:

Name*:	Fingal County Council
Address:	PO Box 174
	Fingal County Hall
	Main Street
	Swords
	Co. Dublin
Tel:	01-8905000
Fax:	01-8905809

** = (The planning Application is being processed by An Bord Pleanala)*

Sanitary Authority Details:

Name:	Fingal County Council
Address:	PO Box 174
	Fingal County Hall
	Main Street
	Swords
	Co. Dublin
Tel:	01-8905000
Fax:	01-8905809

Location of the proposed facility:

The landfill will be located within a site of approximately 210 hectares in north County Dublin within the townlands of Rowans Little, Nevitt, Jordanstown, Johnstown and Tooman. The site is located to the west of the M1 motorway between the Courtlough and Ballough junctions. The nearest population centres to the site are the villages of Ballyboghil and the Naul and the towns of Lusk, Rush and Balbriggan. The site is located approximately 20 km from the centre of Dublin City.

Most of the site is sloping gently south-south-east with one steep valley cutting across the site from west to east in the northern section of the site. The site is split north/south by a road running approximately east/west from the Five Roads on the R132 (N1) to the Nags Head on the R108, Ballyboghil to Naul Road.

A new industrial site, the M1 Business Park, is being developed to the north east of the site. A joinery factory is located along the north-west boundary of the site. The east of the site is bounded by the M1 motorway, the west and north of the site is bounded by a rural local road, the south of the site is bounded by a stream. A quarry (which includes a licensed inert landfill facility) is located to the west of the site.

A.1.1 Nature of Facility

The proposed Fingal Landfill has been developed in a coherent and planned manner by the Dublin Local Authorities in-keeping with the planning and waste management policies of the region. Section 18.9 of the Waste Management Plan for the Dublin Region 2005 – 2010 includes the objective:- *"to provide a landfill (of up to 10 million tonne capacity) in accordance with the Dublin Landfill Siting Study 2004*". The proposed Fingal Landfill also conforms to Policy 18.10 of the Waste Management Plan, which seeks to ensure the Dublin Region can manage its own waste in a self-sufficient manner.

The proposed Fingal Landfill development will comprise of a new fully engineered landfill at a greenfield site in north County Dublin. The landfill disposal area will incorporate approximately 57 hectares to be developed in discrete lined cells, over approximately eleven construction phases and to include the provision of leachate collection and treatment and gas collection and utilisation. A remaining area of approximately 153 hectares is to be used as a buffer area for screening/ landscaping of the landfill**.** This area will also incorporate the landfill site infrastructure including: new county road and landfill access road, public recycling centre, administration building & car parking, maintenance facilities, wheel washing facilities, weighbridges, waste inspection and quarantine areas, gas compound, leachate treatment facilities and surface water management facilities.

The landfill will cater for a maximum annual tonnage of approximately 500,000 tonnes of waste in the initial development period. Following the development of the proposed Waste-To-Energy (WTE) facility at Poolbeg this will reduce to approximately 300,000 tonnes. The landfill will have enough capacity to serve the Dublin Region as a non-hazardous landfill for up to 30 years depending on the progress of the implementation of other elements of the Dublin Waste Management Plan.

Geology/Hydrogeology

The bedrock geology of the North Fingal area is varied. Apart from Lower Palaeozoic Rocks which lie to the north of Bog of the Ring, the geological succession is Carboniferous aged.

The bedrock geology of the study area was established by ground investigations which encountered limestones, siltstones and mudstones inferred to be of the Balrickard, Loughshinny, Lucan, Naul and Walshestown Formations. In general, depth to bedrock ranged from approximately 5m to 34m below ground level (mbGL) within the study area.

The overburden within the study area typically consists of glacial till deposits overlying bedrock and in some places sand and gravel deposits. The depth of overburden was found to vary considerably with typical thicknesses range from 15m to 25m, thinning to the east and southeast.

The deepest clay deposits were found within the centre of the study area (where the proposed landfill footprint has been located) with thicknesses up to 27.25m encountered. Sand and gravel deposits vary across the study area with thicknesses ranging from absent to 10m. These areas lie outside of the landfill footprint.

The landfill footprint has been specifically located such that it is in an area where groundwater has a low vulnerability to pollution due to the presence of thick (at least 10m) low permeability (clay) subsoils and where a minimum of 10m of low permeability clay will be retained below the footprint when excavation occurs.

A.1.2 Class or Classes of Activity

The principle class of activity proposed for the Landfill is Class 5 of the Third Schedule of the Waste Management Act (1996 to 2003) namely:

'*Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment'.*

Other activities proposed for the proposed landfill are covered under the following classes of the Third and Forth Schedule:

Third Schedule (Waste Disposal Activities)

Class 4: *Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons*

This activity is limited to the management of leachate and surface water at the facility.

Class 6: *Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule*

This activity is limited to potential future treatment of leachate at the facility.

Class 7: *Physico-chemical treatment not referred to elsewhere in this Schedule (including evaporation, drying and calcination) which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1. to 10. of this Schedule (including evaporation, drying and calcinations).*

This activity involves the treatment of leachate by settlement, filtration or by chemical precipitation or other physio-chemical means at the leachate treatment plant.

Class 11 *Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule*

This activity involves the mixing of sludge with other wastes during the landfilling process to ensure that the waste body is as homogeneous as possible.

Class 13: *Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.*

This activity is limited to the temporary storage of unacceptable wastes in the waste quarantine area prior to dispatch off-site to an alternative facility.

Fourth Schedule (Waste Recovery Activities)

Class 3: Recycling or reclamation of metals and metal compounds

This activity involves the storage of metals and metal compounds, including WEEE at the site.

Class 4: Recycling or reclamation of other inorganic materials

This activity is limited to the use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses and the storage of inorganic materials at the facility prior to reuse or recycling off-site.

Class 9: Use of any waste principally as a fuel or other means to generate energy

This activity is limited to utilisation of landfill gas at the facility.

Class 11 Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule

This activity is limited to the use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses.

Class 13: Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.

This activity involves the temporary storage prior to use of material reclaimed from construction and demolition waste for the purposes of fill, daily cover, road construction and other uses. This activity also includes for the temporary storage of material at the public recycling facility for the purpose of recycling pending collection.

A.1.3 Quantity and Nature of Waste

The types of wastes to be received at the landfill for disposal include:

- Non-Hazardous Municipal Waste
- Industrial Non-Hazardous Waste
- Construction and Demolition Waste
- Biological sludge produced as a waste by-product of the on site leachate treatment system
- Residues from Water and Wastewater Treatment
- Non-hazardous bottom ash from non-hazardous Waste to Energy Plants

Waste for disposal will be accepted only from permitted waste hauliers. No hazardous waste will be accepted for landfill at the facility.

The quantities of waste to be accepted at the proposed landfill site for disposal are given in the table below.

WASTE TYPE	TONNES PER ANNUM (proposed) (Notes1, & 2)
Household	200,000
Commercial	148,000
Sewage Sludge	10,000
Construction and Demolition	50,000 Note 3
Industrial Non-Hazardous Sludges	2,000
Industrial Non-Hazardous Solids	90,000 Note 4

Note 1. While the total quantity of waste proposed to be accepted does not exceed 500,000 tpa, flexibility is sought on the allowable quantities to be accepted of the individual non-sludge waste types shown in the table.

Note 2. The acceptance of 500,000 tpa will be reviewed downwards following the commencement of WTE in the Region.

Note 3: During the baseline assessment, an area within the site where previous disposal of waste took place was discovered in the south-east of the site. Trial pits and boreholes drilled in this area indicate that this material is principally construction and demolition waste. As part of the waste licence application a risk assessment has been prepared and a proposal made to the EPA (Refer to Attachment H.1) that this area be remediated, capped and monitored since there is no evidence at this stage of negative environmental impacts from this site. In the alternative, this material will be removed and landfilled within the proposed engineered landfill. The capacity requirement for this material (in addition to the stated construction and demolition quantities of 50,000 tpa) would only be in Year 1 of operation.

Note 4: It is proposed to accept non-hazardous bottom ash from non-hazardous waste to energy treatment plants. The bottom ash material from these plants is non-hazardous and is normally recycled and used as a road construction material. While recycling of this material is the intention of all plant operators in Ireland at present and they do not intend landfilling this material, provision for the storage of this material at Fingal Landfill will be required. Storage provision will be required for the material for a period of time to allow for CO_2 stabilisation before the recycling activity can commence. If Fingal Landfill is to accept this material in the short or long term, separate cells will be provided for the storage of the material and separate leachate collection systems installed. The leachate concentrations from bottom ash are significantly lower than that from fresh waste landfilled since a minimal organic fraction remains, similarly landfill gas generation from this material is predicted to be minimal. No leachate recirculation systems or sacrificial vertical landfill gas collection systems will be installed within these cells. In drier climatic conditions the spraying of water over the ash may be required in order to mitigate against dust generation.

The proposed waste categories and quantities of waste to be accepted at the public recycling facility are given in the table below.

Material	Approximate quantity per annum
Textiles (tonnes)	15
Glass (tonnes)	65
Aluminium Cans (kg)	4,090
Steel Cans (kg)	6,050
Heavy Cardboard (tonnes)	75
Wood (tonnes)	755
Metal (tonnes)	185
Paper/Magazines (tonnes)	30
Tetra Pak (tonnes)	1
Plastic Bags & Bottles (tonnes)	40
Oil (litres)	12,150
Batteries Lead/Acid (kg)	23,315
Batteries Primary (kg)	510
WEEE (tonnes)	400
White Goods (including Fridges) (tonnes)	100
Gas Cylinders (No.) (tonnes)	365
Paints (tonnes)	0.5
Fluorescent Light Bulbs (tonnes)	0.5
Green Waste (tonnes)	1,500
Household C&D Waste (tonnes)	500
Bagged Household Waste (for final disposal to landfill) (tonnes)	5,000
Estimated Total (Tonnes)	**8,800**

A.1.4 Raw and Ancillary Facilities

The following indicates the typical amounts of materials to be used on site to facilitate the operation of the landfill:

The annual usage of fuel and energy at the site has been estimated from resources used at Balleally Landfill. The table below presents a summary of the quantities of electricity and diesel used on the Balleally site for the 2005 period. Electricity consumed on site was used for the purpose of heating, lighting and for the operation of office equipment.

Resource	Usage (per Annum)
Electricity	115,050 KWh
Diesel	313,320 L

A.1.5 Site Plant, Methods and Operating Procedures

Introduction

The proposed development of the landfill facility covers an area of approximately 210 hectares and comprises two distinct areas:

- Buffer zone consisting of landscape/screening/infrastructure areas; and
- Waste disposal area

The waste disposal area will cater for up to 9,400,000 tonnes of waste over its lifetime. The waste disposal area will consist of approximately 20-25 individual cells each with approximate areas of 2.5 ha or 25,000m^2.

Buffer Zone and Excavated Material

The buffer zone surrounding the proposed waste disposal area serves three main functions. The first is to provide a physical separation between the landfill area and local residents; the second is to provide an area for the disposal of excavated material for screening and landscaping purposes and the third is to provide an area for associated site infrastructure.

Approximately 3,000,000m^3 of soil and rock will be excavated from the site over the lifetime of the development. As the material is removed it will be deposited in the buffer zone and shaped, seeded and planted so that a natural landscape will be created to mitigate against negative views and operational and construction noise from the landfill.

The proposed screening/landscaping areas will have a maximum height of 7m and will cover a total area of approximately 60 ha.

Waste disposal area and phasing of cell construction

The waste disposal area comprises an area of approximately 57 hectares in size and will be developed in a number of construction phases, with construction phases typically occurring every 2-4 years depending on waste intake volumes. Between 20-25 individual cells in total will be constructed

with a number of cells being constructed in each phase. The cells will have areas of up to 2.5 hectares and will on average hold 400,000 tonnes of waste and it is anticipated that it will take between 1 and 1½ years to fill each cell with the initial cells being filled in less than a year. The exact number and size of the cells will be determined by the detailed design of the leachate management system.

The phasing sequence will allow for the progressive use of the landfill area so that construction, operation and restoration can occur simultaneously within the site.

Leachate Collection

Leachate is generated as a result of rainfall on the landfill, which percolates through the solid waste thereby becoming contaminated by various chemical and biological processes within the waste and also includes moisture, which leaches directly from the waste.

Leachate will be collected from each individual cell and either recirculated back into filled cells or pre-treated on site. A leachate management system will be installed which will include monitoring, collection and recirculation infrastructure, removal of leachate from each discrete cell, 7 day storage capacity of raw leachate in a covered fully engineered lined tank, primary treatment system to allow for discharge of treated leachate to sewer for final treatment at a municipal wastewater treatment facility off site. The detailed design, installation and commissioning of the leachate management system will be in accordance with the EPA Landfill Site Design Manual.

Extraction and Utilisation of Landfill Gas

The biodegradation processes in a landfill produces gas, which is primarily composed of methane, carbon dioxide and water vapour. Typically gas will continue to be generated for between 20 and 50 years after placement, (depending on the site conditions), with a peak in production after 2 to 5 years.

A gas management system including gas collection, extraction and flaring will be installed at the site from the outset and extended during progressive capping of the cells. Gas will be utilised as an energy source with the gas being burned in a gas engine to produce electricity.

Closure and Aftercare

Closure and restoration of the landfill will be carried out in accordance with the EPA Manual “Landfill Restoration and Aftercare” (1999) or with any conditions set down by the EPA. The final capping system will be progressively installed and sown/planted after the landfill cells/construction phases reach full capacity.

After the landfill facility has ceased accepting waste, the monitoring and management systems will continue to operate as normal until such time as the EPA determines that the landfill no longer poses an environmental risk and the Waste Licence has been surrendered.

Operational Principles

The site will be operated in accordance with best international practices for similar facilities and having regard to the Waste Management Act, 1996 as amended; Waste Management Licensing Regulations 2002; EPA Landfill *“Operational Practices”* manual (1997); the EU Directive on Landfill of Waste 1999; such Waste Licence as may be issued by the EPA; and any subsequent legislation and licences.

A comprehensive Environmental Management Plan (EMP) will be prepared for the site pursuant to these objectives. The purpose of the EMP is to set out the measures, procedures and guidance *“to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, as well as the resulting risk to human and animal health, from*

landfilling of waste" (from Article 1 of the EU Directive on the Landfill of Waste (99/31/EC)). This Environmental Management Plan will be updated as part of the requirements of any licence that may be issued for the development by the EPA.

The proposed facility is a municipal waste facility and as such is required to accept waste during normal working hours. In order to facilitate the volume of waste traffic expected and to ensure as little queuing of waste trucks occurs as possible permission is being sought for the following opening hours:

Landfill and Associated Activities:

- Waste acceptance at the facility, for disposal to the landfill, between the hours of 8.00am and 4.30pm Monday to Saturday inclusive.

- Landfill operations between the hours of 7.30am to 8.00pm Monday to Friday inclusive, 7.30am - 6:30pm on Saturdays and 8:00am to 4:30pm on Sundays and Bank Holidays (Operations on Sundays and Bank Holidays to be limited to essential maintenance only)

- Construction activities at the facility between the hours of 7:30am to 8:00pm Monday to Friday inclusive, 7:30am to 6:30pm on Saturdays. No construction on Sundays or Bank Holidays

Public Recycling Centre Activities:

- The Public Recycling Centre will accept waste between the hours of 8:00am to 4:30pm Monday to Friday, 8.00am to 4.00pm Saturdays and Sundays.

- The Public Recycling Centre operations will be carried out between the hours of 7.30am to 6.30pm seven days a week and 8:00am to 4:30pm on Bank Holidays.

A.1.5 Determination of Section 40(4) of the Act

To comply with the requirements of the Waste Management Act 1996 as amended, the activity concerned (waste disposal by landfill) must comply with Sections 40(4)(a) to 40(4)(t).

These issues relate to compliance with emission standards, the avoidance of environmental pollution, application of BAT principles, the technical competence and site management by the operator and financial provisions made.

(a) ***Compliance with Emission Standards***

Fingal County Council will ensure compliance with proposed emission standards conditioned under Waste Licence by the EPA.

(b) Avoidance of Environmental Pollution

The Licence Application sets out control/monitoring procedures, which will prevent as far as practicable the specific issues of environmental pollution defined in Section 4 of the Waste Management Act, 1996.

(c) Best Available Techniques (BAT)

The facility will employ BAT principles as appropriate to reduce emissions from the existing facility as far as is practicable which will include operation in accordance with the Waste Licence conditions. The proposed facility will incorporate engineered cells with composite liner systems, leachate and landfill gas collection.

(d) Technical Competence and Site Management

The Fingal objective is to secure a private sector partner with the appropriate landfill design, construction and operations experience to develop and operate the facility.

Fingal as applicant propose to subcontract the operational responsibility for the landfill to the private partner subject to confirmation of compliance with the requisite operational competences. It is not possible therefore at this stage to provide details of designated staff at the facility and Attachment C1 sets out competence requirements for the key staff.

(e) Financial Provisions

Fingal County Council will ensure that funding is available to operate the Landfill Facility in accordance with relevant legislation.

A.1.7 Nature of Emissions at the site

The emissions from a landfill site are: leachate, landfill gas, noise, dust and odours. Each of these individual emissions is considered in this licence application and supporting EIS attachments. The position with regard to each of the above emissions is summarised below:

- ***Leachate*** – To comply with the EU Landfill Directive, the Fingal Landfill will be designed so as to meet the necessary conditions for preventing pollution of the soil, groundwater or surface water and to ensure efficient collection of leachate. The landfill will be fully contained with a composite lining and leachate collection system. Leachate will be collected in a network of slotted pipes laid in a collection blanket in the base of each cell and drain to a leachate collection chamber constructed at the lowest point of each cell from where it will be pumped to the leachate treatment plant.

- ***Landfill Gas*** - A gas management system including gas collection, extraction and flaring system will be installed at the site from the outset and extended during progressive capping of the cells. Gas will be utilised as an energy source with the gas being burned in a gas engine to produce electricity. BAT principles will apply to all future gas extraction and utilisation systems.

- ***Dust*** – There is a potential for dust emissions to have an impact at the site. Dust emissions may arise from vehicles travelling along access roads and activities such as capping. In order to ensure that no dust nuisance occurs during the operation phase of the landfill a series of mitigation measures and good working practices will be implemented as part of a dust minimisation plan. These measures include cleaning of site roads, use of wheel washes, un-surfaced roads restricted to essential site traffic only, water misting or sprays will be used as required if particularly dusty activities, such as capping, are necessary during dry or windy periods. Furthermore, any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions. With these measures in place, the impact of dust emissions will be slight with no significant impact beyond the landfill boundary.

- ***Noise*** –The results of noise modelling at the site indicated that that noise levels from plant during the construction phase of the development will be similar to existing baseline levels. The potential noise impacts from the proposed landfill during its operational phase will primarily be as a result of increased traffic flows along existing routes within and surrounding

the development coupled with the operation of both mobile and stationary site plant and machinery. Screening will be erected between properties along the western and northern boundaries of the site and the proposed county road, which will reduce noise levels from this source. This will be extended as far as the site entrance. It was concluded that the predicted noise levels from site plant and machinery during the operational phase of the landfill will not be significant.

- ***Odours*** –In order to ensure that no odour nuisances occur during the operational phase of the landfill a series of mitigation measures will be implemented which will include, all trucks delivering waste to the facility will be covered, all waste will be incorporated into the active face as soon as possible, the deposited waste material will be covered on a daily basis and a landfill gas collection, utilisation/flaring system will be installed.

- ***Surface Water*** – The only emissions to surface water from the proposed facility will be the discharge from the storm water attenuation pond to the local drainage network.

A.1.8 Assessment of Environmental Impacts

The potential impacts of the proposed landfill operation on the surrounding environment are detailed in Volume 2, Chapter 3 of the EIS. Impacts have been described and assessed under the following headings.

- Human Beings – Public Health
- Human Beings – Community
- Human Beings – Disamenity Effect
- Air Quality
- Climate
- Noise
- Landscape and Visual
- Water – Surface Water
- Water – Aquatic Ecology
- Bird Hazards
- Terrestrial Ecology
- Material Assets – Agriculture
- Material Assets – Non-Agriculture
- Material Assets – Utilities and Services

- Cultural Assets – Architectural Heritage
- Cultural Assets – Archaeology
- Traffic
- Hydrogeology/Geology/Soils

A.1.9 Monitoring and Sampling Arrangements

Dust, ecological, groundwater, landfill gas, leachate, meteorological data, noise, odour and surface water monitoring will be carried out according to frequencies and analysis methods specified in the Waste Licence. Monitoring at these locations will be undertaken in accordance with the guidelines set out in the Environmental Protection Agency, Manual on Landfill Monitoring. A nominated competent person, who sanctions appropriate measures to mitigate any problems identified, will assess all monitoring data.

A.1.10 Waste Recovery

Recyclable household wastes (including glass, newspaper, magazines, cans, oil, cardboard, mixed metals, plastics, batteries and WEEE) will be accepted at the public recycling facility. These wastes will be recycled or recovered at off-site treatment locations. These recyclable wastes will be stored on site in recycling banks/skips in the public recycling facility and collected for recycling/recovery as required.

Off-Site Treatment of Liquid Waste

Leachate will be collected from the landfill cells and either re-circulated back into filled cells or pre-treated on site. A leachate management system will be installed which will include monitoring, collection and recirculation infrastructure, removal of leachate from each discrete cell, 7 day storage capacity of raw leachate in a covered fully engineered lined tank, primary treatment system to allow for discharge of treated leachate to sewer for final treatment at a municipal wastewater treatment facility off site. The detailed design, installation and commissioning of the leachate management system will be in accordance with the EPA Landfill Site Design Manual.

A.1.11 Emergency Procedures

Measures and procedures will be implemented on site for the following situations;

- Fire fighting procedures
- Breakdown situations
- Emergency situations
- Management of accidental emissions

Emergency Response Procedures (ERP's) will be put into action in the event of one of the following incidences occurring or being imminent.

- Fire/Explosion –occurring both within the cells and outside the cells but within the facility.

- Migration of landfill gas- within the site office, elsewhere within the facility or off-site.
- Damage to the integrity of the on site leachate management system which would consist of damage to the leachate storage tank.
- Contamination of stormwater attenuation pond.
- The quantity and/or quality of the local wells being impacted.
- Side slope failure within the landfill.

The appointed safety supervisor for the site or safety representative shall activate the required ERP at the time of the incident.

A Safety Statement for all specified engineering works carried out at the proposed facility will be forwarded to the Agency prior to the commencement of any works.

A.1.12 Closure, Restoration and Aftercare Measures

Closure and restoration of the landfill will be carried out in accordance with the EPA Manual "Landfill Restoration and Aftercare" (1999) or with any conditions set down by the EPA. The final capping system will be progressively installed on a phased basis and sown/planted after the landfill cells/construction phases reach full capacity. The capping system at a minimum will consist of:

- Gas collection layer;
- Compacted mineral layer of minimum 0.6m thickness or equivalent;
- Drainage layer of 0.5m thickness or equivalent;
- Subsoil; and
- Topsoil – such that the subsoil and topsoil have a total thickness of 1m.

After the landfill facility has ceased accepting waste, the monitoring and management systems will continue to operate as normal until such time as the EPA determines that the landfill no longer poses an environmental risk and the Waste Licence has been surrendered.

3 SECTION D.1.B

3.1 REQUEST FOR INFORMATION

Provide outline details of the proposed construction of any unpaved site roads including proposed drainage infrastructure.

3.2 RESPONSE TO REQUEST

The majority of routes within the landfill will be surfaced roads with a suitable surface and sub-surface piped drainage system installed and connected to a petrol /oil interceptor. Landfill access roads are defined as those within the footprint of the landfill, within the waste body. All landfill access roads will remain un-surfaced. The landfill perimeter road will be paved. Surface water run-off from the landfill access roads within the landfill will be diverted into the waste body and surface water from other roads, including the perimeter road will drain to the surface water collection system and is passed through the petrol oil separator and the surface water settlement tanks which will be continually monitored. The pavement layers on the access roads within the waste body will comprise of a suitable capping layer, a sub-base layer and subsequent layers as necessary to cater for the traffic type and volume and to ensure stability and durability over the waste. These roads will be excavated, removed and re-instated as necessary. The perimeter road will be of similar construction and is likely to require a bituminous layer.

4 SECTION D.1.J

4.1 REQUEST FOR INFORMATION

Provide an estimate of the number of waste transport vehicles which can be accommodated within the site without the requirement for queuing on public roadways. Compare this to the expected number of deliveries per hour at peak times.

4.2 RESPONSE TO REQUEST

The proposed landfill is estimated to generate approximately 700 two-way HGV movements a day based on 500,000 tonnes of waste deliveries a year, for the first two years only. The site access is approximately 900 metres long and fronts onto the Nevitt Road by means of a roundabout junction.

Table 1 below summarises the HGV activity to and from the landfill and estimates the number of two way traffic movements during the AM peak hour 08:00 - 09:00. The AM peak hour was used as this is considered to be the worst time period for HGV traffic given that the waste delivery vehicles do not operate during the PM peak period of 17:00 - 18:00.

Table 1: Summary of HGV activity at the proposed Fingal Landfill

Purpose	Vehicle Type	Hours of Operation Mon-Fri	Number of Two Way Vehicles per day (Mon-Fri)	AM Peak Hour 08:00 - 09:00 (Two Way Flows)
Waste Delivery	HGV	08:00 – 16:30 8.5 hours per day	400	32
Cell Construction	HGV	07:30 – 20:00 12.5 hours per day	300	30
Total			700	62

The proposed landfill is likely to use a variety of HGVs. These HGVs could include the following vehicle types such as 4 axle Tipper, 4 axle Container, 4 axle Bin Lorry, 3 axle Bin Lorry, 4 axle Compactor Container, Medium Skip and an Articulated Ejector.

It has been assumed that the majority of these trucks would be approximately 10m long with the exception of the Articulated Ejector which is approximately 15m long. It should be noted that the length of these lorries has been overestimated in order to assess a worst case scenario.

It is predicted that 85% of the HGVs entering the proposed landfill would be of the Articulated Ejector type and the remaining 15% would be the other HGV types described above.

Double lane dedicated queuing facilities will be provided within the site for a minimum of 25 HGV's. In addition the access into the site is approximately 900m long and can sufficiently cater for the following number of HGVs during the AM peak hour as summarised in **Table 2.**

Table 2: Number of HGVs that can be catered for on the Landfill Access Road

Vehicle Type	Estimated Percentage of Vehicle Type expected	Number of HGVs predicted during AM Peak	Average Length of Vehicles (in metres)	Length of Vehicles during AM Peak Hour (in metres)
Articulated Ejector	85%	53	15	795
All other HGV types	15%	9	10	90
Total	100%	62	-	885

The time chosen for the modelling is between 8.00 am and 9.00 am, it represents a situation were there is no access to the landfill facility and the vehicles must queue to gain access to the cell construction area or to the weighbridge. It can be seen that the number of HGV vehicles predicted within the peak hour in the worst case can be accommodated along the site access road. The site access road can accommodate for 53 articulated ejector HGVs and 9 remaining HGV types before queuing would be expected on the neighbouring public roads. This is in addition to the capacity provided in the double lane dedicated queuing facilities for a minimum of an additional 25 HGV's which are within the site.

In addition, to the HGV traffic estimated, the proposed landfill includes a public recycling facility. It is predicted that approximately 530 two-way car based trips per day would be associated with this facility. However, it is considered that the majority of these trips would occur at weekends rather than weekdays and as such no peak hour flow could be determined. It is estimated that an average of approximately 62 vehicles would be expected on an hourly basis. **Table 3** below shows that approximately 217m would be required to accommodate the 62 vehicles predicted.

Table 3: Number of Cars that can be catered for to the Landfill Access Road.

Purpose	Vehicle Type	Hours of Operation Mon-Fri	Number of Vehicles Two-way per day (Mon-Fri)	Average No. of Vehicles (two way) per hour	Length of Vehicle (in metres)	Total Length of Vehicles (in metres)
Public Recycling Facility	Car	08:00 – 16:30 8.5hours	530	62	3.5	217

Conclusion

The information above shows that both HGVs and Cars associated with the proposed Fingal Landfill can be accommodated along the site access road proposed as a worst case scenario but that in addition dedicated queuing for 25 HGV's will be provided within the landfill. Further information regarding traffic can be obtained from Volume 4B Technical Appendix G of the Fingal Landfill Project EIS.

5 SECTION D.1.K

5.1 REQUEST FOR INFORMATION

Provide a schematic of the proposed surface water collection and management system including details of abatement such as oil interceptors and hydro-breaks.

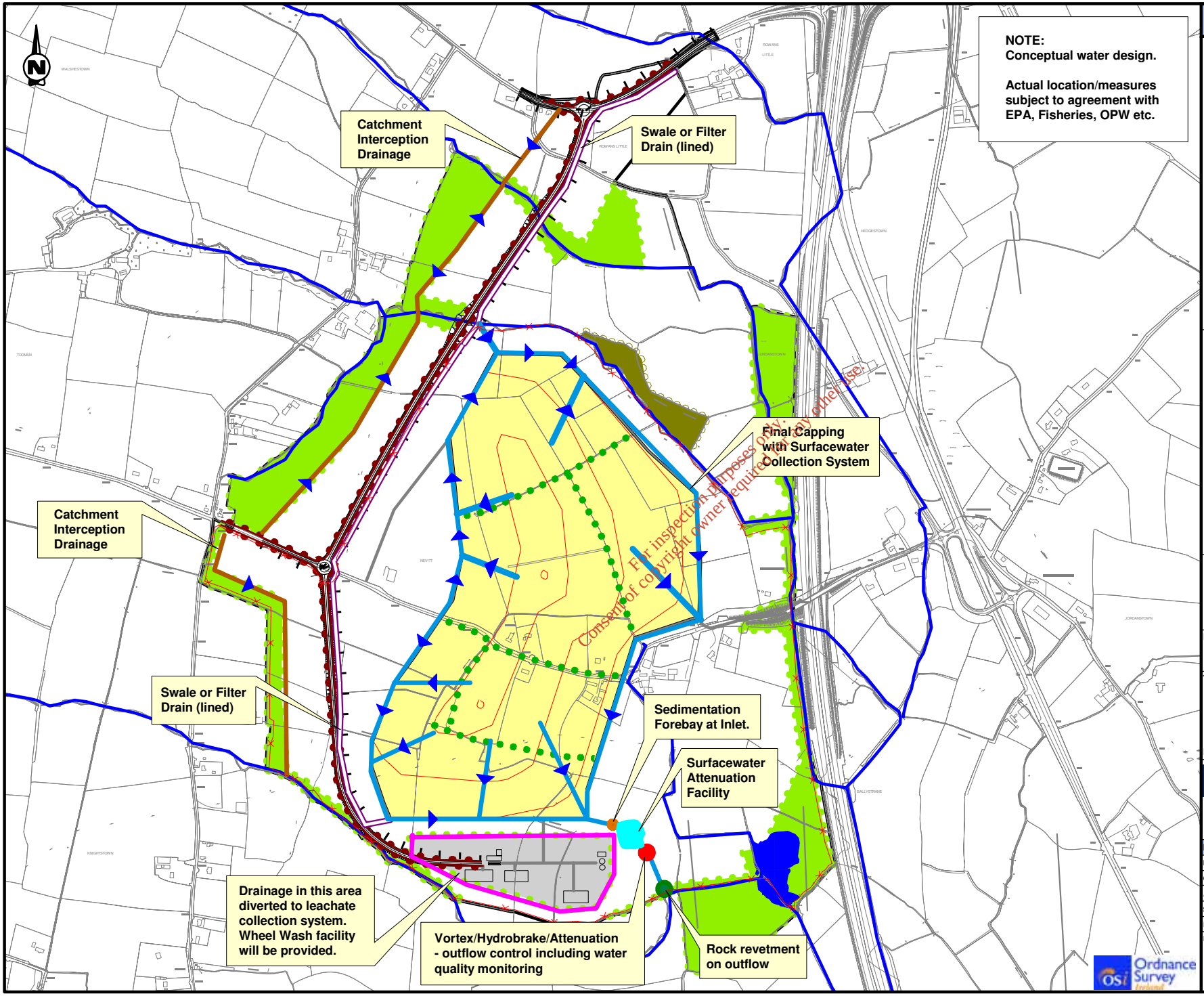
5.2 RESPONSE TO REQUEST

A schematic of the SuDS layout is provided in **Figure 5.1** and specimen drawings of possible surface water collection and management systems are shown in **Figures 5.2** to **5.4**. The catchment interception drainage shall be designed to intercept and convey Greenfield runoff and discharge to the local streams. Road runoff drainage shall be conveyed using lined filter drains or swales and convey road runoff to the attenuation facility prior to discharge. The attenuation facility shall utilise a vortex type flow control as well as rock revetment at the outlet for additional velocity /erosion control. In addition, a sedimentation forebay is to be provided for sediment control with access for maintenance. A bypass mechanism and consideration of overland flow routes will be provided to facilitate the safe passage of water in excess of the 100-year event.

The design will make an allowance for climate change impacts by the application of a 10% increase in design rainfall volume. Additionally, for water quality purposes, a permanent water level will be maintained in the ponds and the ponds will be lined with a low-permeability layer/liner to the minimum water level.

The outlet from the flow attenuation feature will be facilitated by an automated control system that makes use of an online water quality monitor as well as manual control. Under normal conditions, surface water runoff will be discharged at a controlled rate to the receiving water course, when the monitor detects flows with exceeding pollutant levels the runoff will be conveyed to the leachate collection system. The unit includes programmable concentration alarms which would allow for high levels of contamination (in this case levels equal to or greater than the specified objective level) to be detected quickly and reliably. These would be linked to diversion devices to redirect flow to the leachate collection system, and prompt for an appropriate response and action to duty personnel. There are a number of Water Quality online monitors available, which provide accurate results with minimal maintenance needed and dependant on the expected pollutants the appropriate system is to be investigated at detailed design stage.

Recognition has been made of the minor health and safety hazard that ponds offer. The maximum gradient for the first 2 metres in from the perimeter of the permanent pool is to be 1 in 3. Additionally, the pond(s) will be either be fenced and/or have a sufficiently thick planting regime around the perimeter to reduce the possibility from entering the pond area. A sign will be provided in a visible location near the perimeter of the pond(s) warning of safety issues.



Legend

- Exisitng Woodland
- Proposed Woodland
- Existing Floodplain
- Proposed Landfill Footprint
- Infrastructure
- Proposed Hedgerow
- Fenceline
- Water Channels

Fingal County Council

Project
Fingal Landfill

Title
Schematic of Sustainable Drainage Layout

Figure 5.1

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Issue Details			
Drawn:	S. Khan	Project No.	MDR0303
Checked:	W. Schluter	File Ref.	MDR0303MI0236A01
Approved:	C. Wilson		
Scale:	1:12,500 @ A4	Drawing No.	Rev.
Date:	11/12/2006	MI0236	A01

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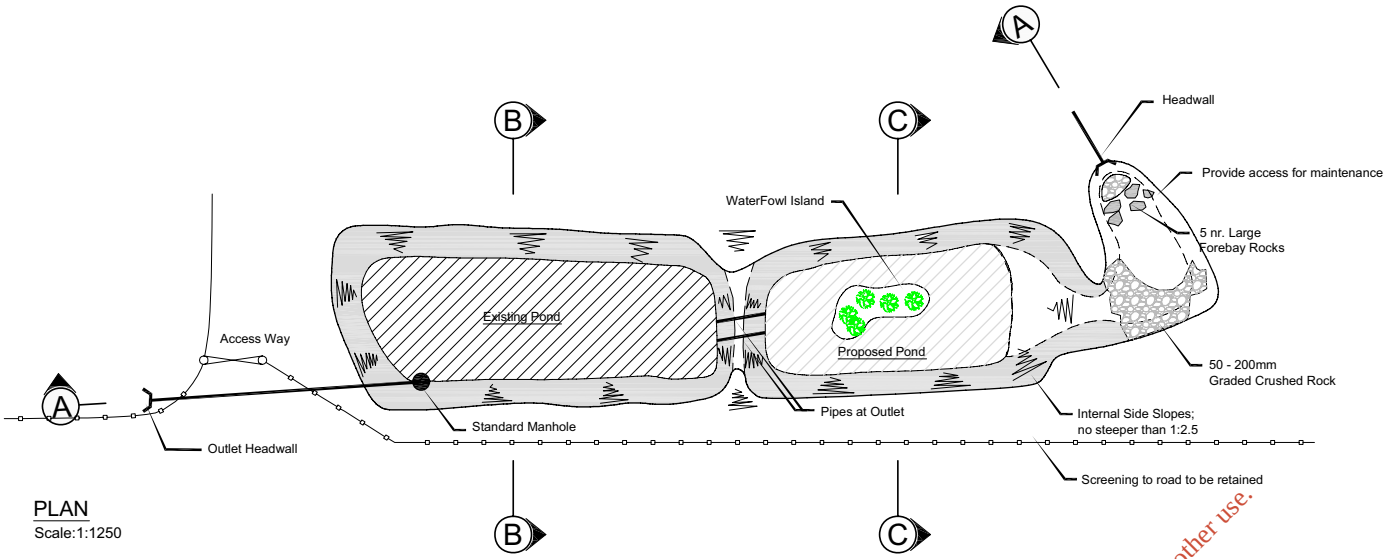

PLAN
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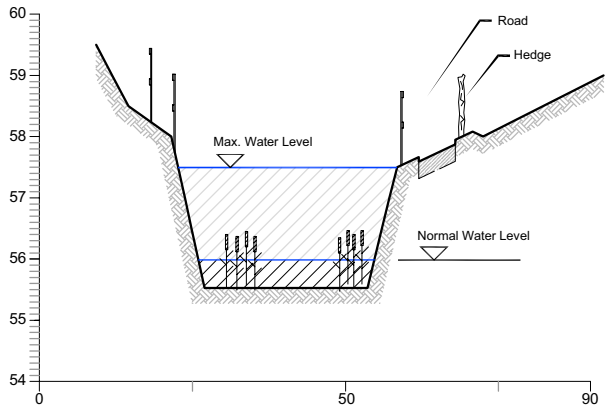

SECTION B-B
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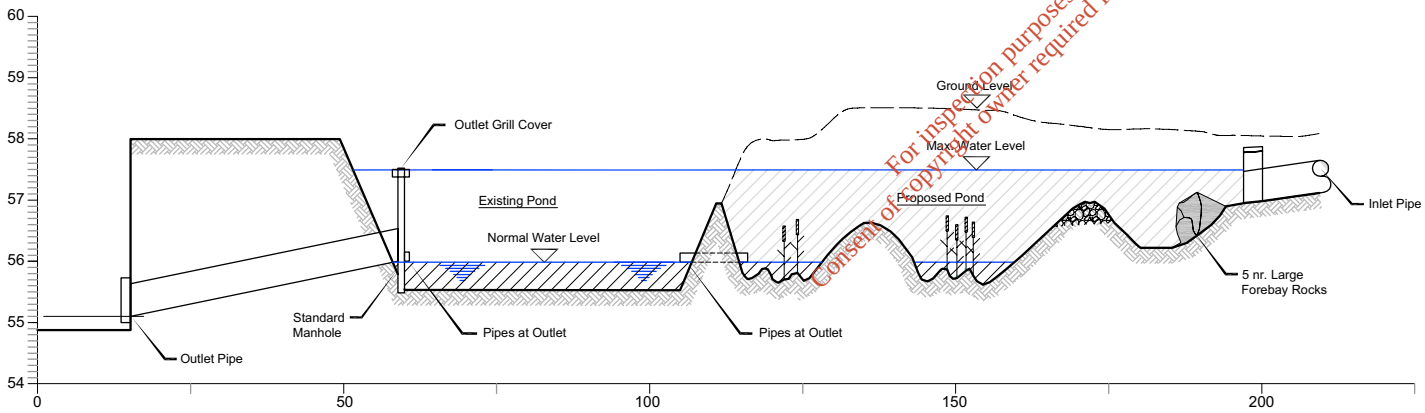
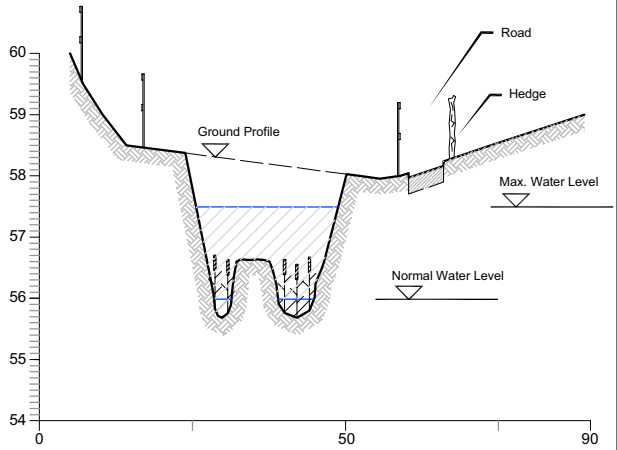


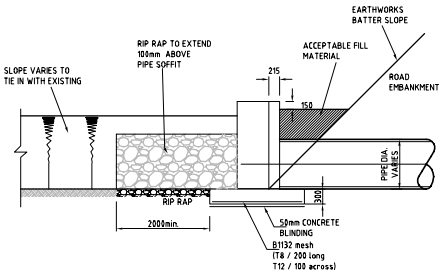
SECTION A-A
Scales: 1:1250 horiz. & 1:125 vert.



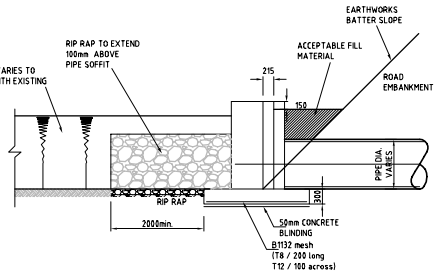
SECTION C-C
Scales: 1:1250 horiz. & 1:125 vert.

SURFACE WATER ATTENTUATION POND

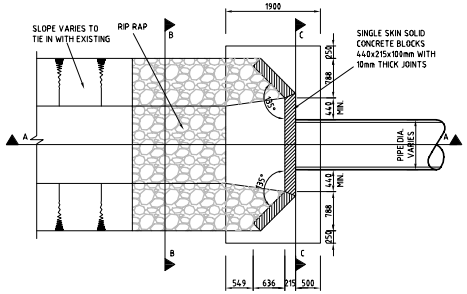
Client:	FINGAL COUNTY COUNCIL Comhairle Chontae Fhine Gall County Hall, Swords, Co. Dublin Phone: 01 890 5000 Fax: 01 890 5809	RPS Consulting Engineers RPS Consulting Engineers, Carnegie House, Library Road, Dun Laoghaire, Co. Dublin, Ireland. T: +353 1 202 0870 - F: +353 1 202 0707 E: ireland@rpsgroup.com W: www.rpsgroup.com/ireland	NOTES 1. This drawing is the property of RPS Consulting Engineers, it is a confidential document and must not be copied, used, or its content divulged without prior written consent. 2. All Levels refer to Ordnance Survey Datum, Malin Head. 3. DO NOT SCALE, use figured dimensions only, if in doubt ask.
A01 Dec'06 — Issue for Approval — CW			
No. Date Dr. Amendment / Issue App.			
Project: FINGAL LANDFILL PROJECT	Title: Specimen drawing of Attenuation Pond	Drawn by: HF; Checked by: WS; Approved by: CW; Scale: As shown @ A4; Date: Dec. '06	Job No: MDR0303; File No: MDR0303FG005.2A01; Drg. No: Fig. 5.2; Rev: A01



SECTION A-A

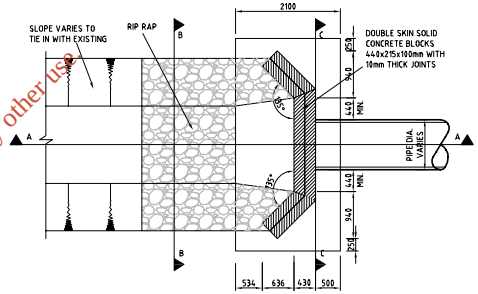


SECTION A-A



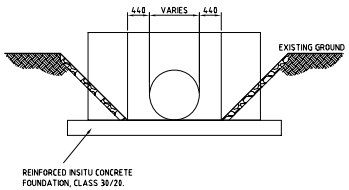
PLAN

DETAIL A: SINGLE-LEAF BLOCKWORK HEADWALL

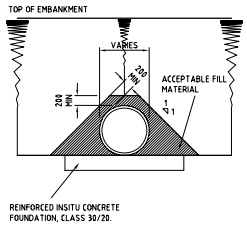


PLAN

DETAIL B: DOUBLE-LEAF BLOCKWORK HEADWALL



FRONT ELEVATION B-B
(SINGLE AND DOUBLE LEAF)



TYPICAL SECTION C-C
(SINGLE AND DOUBLE LEAF)

NOTES

1. ALL EXPOSED CONCRETE SURFACES FROM 100mm BELOW GROUND LEVEL TO BE CLASS F3 FINISH ALL OTHER CONCRETE SURFACES TO BE F1 FINISH UNLESS OTHERWISE SPECIFIED
2. CONCRETE STRUCTURES SHALL BE WATERPROOFED BELOW GROUND USING TWO COATS OF MC-DUR1680 OR EQUIVALENT APPROVED.
3. ALL EXPOSED EDGES MUST HAVE A 25mm X 25mm CHAMFER
4. MORTAR SHALL BE MORTAR DESIGNATION (iii) AS PER TABLE 24/1 IN CLAUSE 2404 OF THE SPECIFICATION FOR ROAD / HIGHWAY WORKS
5. FOR WORKS IN THE REPUBLIC OF IRELAND BLOCKS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5N/mm2 AND SHALL COMPLY WITH CLAUSE 2407 OF THE SPECIFICATION FOR ROAD WORKS
6. FOR WORKS IN NORTHERN IRELAND BLOCKS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 7N/mm2 AND SHALL COMPLY WITH CLAUSE 2407 OF THE SPECIFICATION FOR HIGHWAY WORKS
7. BLOCKWORK HEADWALLS IN THE REPUBLIC OF IRELAND TO BE RENDERED WITH 20mm THICK SMOOTH PLASTER FINISH. RENDERED FINISHES TO BE IN ACCORDANCE WITH BS 5262
8. 40mm MINIMUM COVER TO ALL STEEL
9. ALL DIMENSIONS ARE IN MILLIMETRES

Client:

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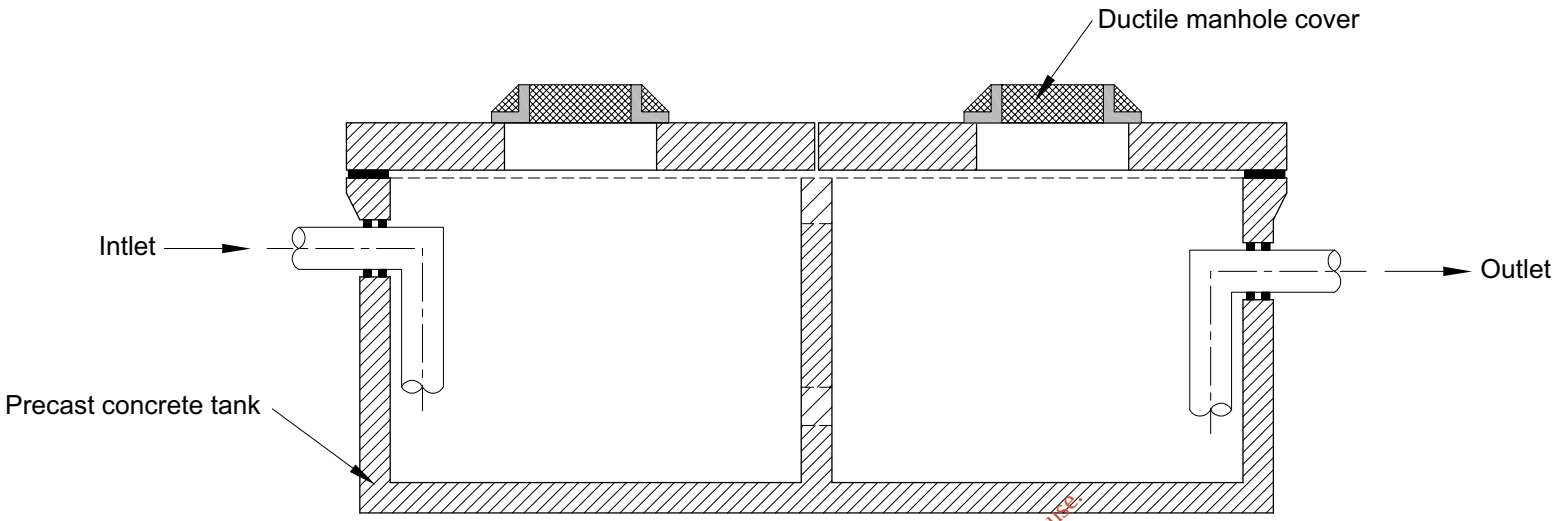
No.	Date	Amendment / Issue	App.
A01	Dec'06	Issue for Approval	CW

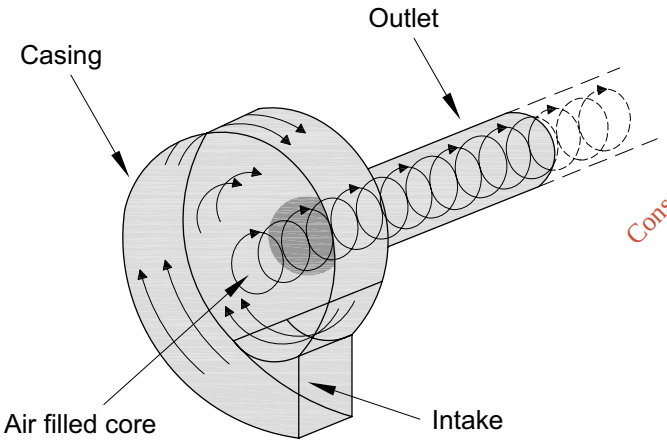
Project: FINGAL LANDFILL PROJECT

Title: Specimen drawing of Headwall Details

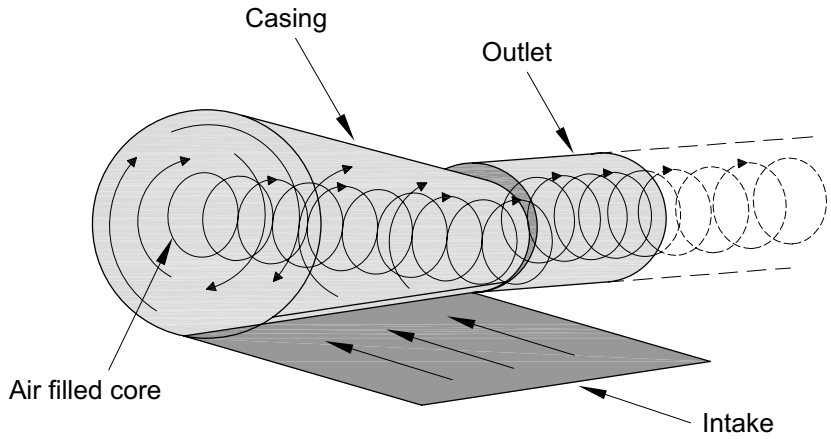
Drawn by:	HF	Job No:	MDR0303
Checked by:	WS	File No:	MDR0303FG005.3A01
Approved by:	CW	Drg. No:	Fig. 5.3
Scale:	NTS	Rev:	A01
Date:	Dec. '06		



Oil Interceptor
Scale 1:20



Type SH Vortex Flow Pattern
(Not to Scale)



Type C Vortex Flow Pattern
(Not to Scale)

Client:

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No.	Date	Dr.	Amendment / Issue	App.
A01	Dec'06		Issue for Approval	CW

Project:
FINGAL LANDFILL PROJECT

Title:
Specimen Details of Oil Interceptor & Hydro Brake

Drawn by:	HF	Job No:	MDR0303
Checked by:	WS	File No:	MDR0303FG005.4A01
Approved by:	CW	Drg. No:	Fig. 5.4
Scale:	As shown @A4	Rev:	A01
Date:	Dec. '06		

6 SECTION D.1.P

6.1 REQUEST FOR INFORMATION

Detail the measures which will be put in place to prevent accidental release of materials collected at the civic amenity facility (e.g. garden chemicals, paints, insecticides, oils, battery acid) to the surface water collection system.

6.2 RESPONSE TO REQUEST

All materials that will be accepted at the civic amenity will be assigned a EWC code in compliance with EU Commission Decision 2001/118/EC. In particular a separate area of the civic amenity will be assigned to household hazardous waste. The proposed waste streams will consist of the following:

Waste Type	EWC code	Approximate Quantity per annum
Paints / Thinners	20 01 27; 20 01 28	0.5 tonnes
Fluorescent tube light bulbs	20 01 21	0.5 tonnes
Household batteries	20 01 33; 20 01 34	510 kg
Car batteries	20 01 33; 20 01 34	23,315 kg
Waste oils	20 01 25; 20 01 26	12,150 kg

This household hazardous waste area will be clearly identifiable with each type of waste having signage and relevant instructions clearly highlighted for the public's information. The detailed design of the civic amenity will allow for adequate safe room to allow movement around the various disposal areas and the household hazardous waste area particularly will be well managed and kept free of disordered waste.

All materials will be stored safely in drums in an upright position. All of the drums will be correctly labelled in UN approved containers. The packaging material of the drums will be compatible with the material being stored.

In the civic amenity facility this household hazardous waste area will be specially bunded and surface water will be drained to a collection sump. This sump will be emptied separately as necessary by separate tanker. If accidental spillages occur within this area the area will be hosed down and waste liquids directed into the sump where they will be tankered off site by a special hazardous waste management company.

The materials will either be disposed or recovered in Ireland, under SI 147 1998 or exported under EU 259/93, SI 149 1998. Controlled movement C1 paperwork will be completed for transport within Ireland and TFS paperwork will be completed for export out of the country.

7 SECTION D.1.S

7.1 REQUEST FOR INFORMATION

Confirm that no processing of construction & demolition waste is proposed to be carried out at the site.

7.2 RESPONSE TO REQUEST

At this stage no application is being made to allow for the on-going processing of construction and demolition waste at the site.

8 SECTION D.3.F

8.1 REQUEST FOR INFORMATION

With regard to the basal gradients of the landfill footprint, demonstrate that the commitment to leave at least 10 metres of clay in-situ will still allow an appropriate basal slope of a minimum 1:50 to ensure effective collection of leachate.

8.2 RESPONSE TO REQUEST

Figure 8.1 (in sleeve at back of report) provides cross sections and plans of the site illustrating that even when allowing for the appropriate minimum 1:50 slope for the cell floors 10m of low permeability clay cover can still be easily maintained. The detailed design of the floor layout of the cells will be forwarded to the EPA under the Specified Engineering Works Procedure which will demonstrate that 10m of clay cover will be remaining in-situ following the development of the cells to formation level and appropriate slopes.

8.3 REQUEST FOR INFORMATION

Provides thickness contours (plan view) of the clay overburden for the current site conditions and following development to formation level.

8.4 RESPONSE TO REQUEST

A drawing of clay thicknesses is provided as **Figure 21.6** at a later stage within this report. A commitment is given within the EIS, section 2.2.6, to maintain 10m depth of low permeability clay beneath the footprint of the landfill. This is to ensure that the site maintains the lowest risk response of 'R1' in the DoEHLG / EPA / GSI Response Matrix for landfills. This will be achieved and once the detailed design is complete, the floor layout of the cells will be forwarded to the EPA under the Specified Engineering Works Procedure which will demonstrate that 10m of clay cover remaining in-situ following the development of the cells to formation level.

9 SECTION D.4.C

9.1 REQUEST FOR INFORMATION

Provide a numerical estimate of the total quantity of leachate generated.

9.2 RESPONSE TO REQUEST

From the period January 2009 till December 2039 (a period of thirty years) the total quantity of leachate generated is estimated at 1,683,785m^3. This is based on the method and graph provided in Section 2.5.6 of Volume 2 of the EIS. The landfill will continue to generate leachate after this period but on a declining scale of both volume and concentration.

10 SECTION D.4.F

10.1 REQUEST FOR INFORMATION

Provide information on the general construction of the leachate storage tank and details of any proposed secondary containment.

10.2 RESPONSE TO REQUEST

It is likely that a Sequence Batch Reactor Plant will be installed at Fingal Landfill for preliminary treatment on site, followed by discharge of treated effluent for final treatment at an off site municipal wastewater treatment facility owned and operated by Fingal County Council.

The Plant on site will include the following elements of infrastructure:

- A reinforced concrete or similar enclosed 7 day capacity raw leachate attenuation tank (min capacity = 1225m^3 at 175m^3 per day for seven days, circular tank)
- Minimum of one reinforced concrete or similar enclosed treatment tank (SBR) (capable of treating 175m^3 of leachate per day, circular tank).
- A reinforced concrete or similar enclosed 7-day capacity treated leachate storage tank. (min capacity = 1225m^3 at 175m^3 per day for seven days, circular tank)
- A sludge concentration circular reinforced concrete tank

Reinforced concrete is generally the preferred material for tank-based SBR systems, having a long life expectancy and better structural integrity. Subject to detailed design, it is anticipated that leachate storage tanks will be covered, constructed of reinforced concrete and designed in accordance with BS 8007: 1987 ' Code of practice for design or concrete structures for retaining aqueous liquids'. The tanks will be installed above ground in a reinforced concrete tank farm, which will also be designed in accordance with BS 8007.

11 SECTION D.4.I

11.1 REQUEST FOR INFORMATION

Identify the method of leachate pre-treatment and outline potential environmental impacts (e.g. odour). Include flow diagrams where necessary.

11.2 RESPONSE TO REQUEST

Subject to detailed design, the method of leachate pre-treatment to be employed at Fingal Landfill is likely to be the Sequencing Batch Reactor (SBR) treatment process. This technology has been developed as a readily-automated, extended aeration system, that is particularly well suited to the higher organic strength and concentrations of ammoniacal-N in landfill leachates. The large volume of the main SBR tank makes for efficient aeration, high rates of dilution of incoming leachates, and high resistance to shock loading. The great majority of well-engineered aerobic biological leachate treatment systems successfully installed in the UK, make use of SBR technologies. *(Environment Agency, Technical Guidance for the Treatment of Landfill Leachate, IPPC S5.03)*

Process Overview
An SBR is a cyclically operated, suspended growth, activated sludge process. The only conceptual difference between the SBR and a conventional activated sludge system is that each SBR tank carries out functions such as aerobic biological treatment, equalisation, settlement of solids, effluent clarification and decanting, over a time sequence rather than in spatially separate tanks. The ability to vary the time sequence, (compared to the inflexibility of specific volumes of separate tanks) enables a very robust and flexible treatment system to be provided. SBR systems that have been designed for particular loading rates, of ammoniacal-N or of organic contaminants, will have considerable flexibility to receive this as either small volumes of strong leachate, or as larger volumes of weaker leachate. This can be important as leachate character changes over time to ensure that optimum treatment performance is maintained.

The operating cycle of a typical SBR system comprises four main phases, nominally: FILL, REACT, SETTLE, DECANT

Although in treatment of domestic and other relatively dilute wastewaters, the fill stage (when wastewater feed is pumped into the SBR) may be a relatively rapid stage, for leachate treatment feeding of leachate generally takes place throughout the REACT stage, in order to balance oxygen demand and oxygen supply, to avoid shock loadings to micro-organisms and to avoid toxic inhibition from contaminants such as ammoniacal-N.

In leachate treatment, the process is readily automated, and generally operated within a 24-hour cycle, in a tank which provides a typical mean hydraulic retention time (HRT) of ten days or longer when treating strong leachates. In general terms, for such leachates, selection of a shorter HRT does not reduce operational costs at all, and may only result in marginal reduction in capital costs. A significant benefit of a 24-hour cycle, is a standard time of day (or night) when a discharge of clarified effluent is made from the SBR.

A typical cycle of operation for SBR treatment of landfill leachate is therefore:

(1) FILL AND REACT: During a period of from 18-20 hours, leachate is gradually fed into the SBR, during which time the reactor is aerated, and pH-value is controlled;

(2) SETTLE: Aeration is stopped for between one and two hours, during which period sludge flocculates and settles, and supernatant liquor is clarified;

(3) DECANT: Effluent is decanted from the surface of the SBR, by means of one of a number of options (bell mouth overflow, floating decant – either gravity or pumped, etc), typically during a period of one or two hours depending on volume involved. Decanting stops and the treatment cycle then recommences.

In the case of Fingal, where the relatively high flow rate from the SBR will not be fed directly to the sewer, an effluent balance tank will be used to balance flows, and allow discharges to be made evenly at lower rates, over a 24 hour period.

A Supervisory Control and Data Acquisition (SCADA) system will be installed to control the SBR process which will ensure the system is reliable and simple to install and operate, and provide such a high level of protection and safety, as well as the maintenance of detailed operating records, that as all new systems they must be considered to comprise BAT. *(Source of data - Environment Agency, Technical Guidance for the Treatment of Landfill Leachate, IPPC S5.03)*

Environmental Issues and Concerns for tank-based SBRs

The SBR tank based system that may be employed at Fingal Landfill, in combination with well-designed and engineered process designs, will allow a high level of automation to be adopted, and will incorporate safety measures such as fail-safe procedures, interlocks, alarms, telemetry, and emergency dial-out systems.

Odours should not be an issue, in well-operated and designed SBR. There may be minor noise as air is entrained within delivery pipes at surface level that requires attenuation and also from the aeration system installed.

Levels of ammoniacal-N in effluents will rarely exceed 5 mg/l in a well designed and well operated system. The treated leachate will then be stored in a buffer tank for transfer. It will be pumped to the Fingal County Council sewer network for final treatment at the wastewater treatment facility at Portrane following completion of its design capacity upgrade to 60,000 PE. The biological load to undergo final treatment at the water works represents a small fraction of the design capacity of the plant and will be easily accommodated within the operational capacity of the upgraded works.

In the event that either the upgrade to Portrane WWTW or the sewer connection are not available at the time of the landfill opening then treated leachate will be accepted, by tankering, at either Swords WWTW or Malahide WWTW. Both of these plants are existing wastewater treatment plants owned and operated by Fingal County Council and have sufficient capacity to provide final treatment of the treated effluent from the Fingal landfill.

11.3 REQUEST FOR INFORMATION

Outline emergency procedures in the event of non-operation of any leachate control systems, including measure to establish the cause and extent of any significant environmental pollution.

11.4 RESPONSE TO REQUEST

A SCADA system will be installed to control and record the operation of the SBR treatment plant. The SCADA will include:

- high-level liquid alarms,
- pump failures,
- emergency shut-off valves in case of emergency

and the following for day to day operation of the plant:

- Level switches
- Dissolved oxygen probes
- PH probes
- Temperature probes
- Flow meters

There will also be secure manual override valves on the plant which can be accessed by site supervisory staff. Daily plant inspections will be carried out to ensure the plant and SCADA systems are fully operational and liquid levels will be checked.

In the event of overflow, or discharge of quantities of liquid from the plant, the entire plant is contained in a separately bunded section of the infrastructure area. The drainage from this area will be contained in a separate controlled sump. This sump can be completely separated from all other surface water drainage systems and foul water drainage systems and can be emptied separately by tanker as required in emergency. The leachate will then be removed off site to one of Fingal's local Waste Water Treatment Plants at Portrane, Malahide or Swords.

12 SECTION D.6

12.1 REQUEST FOR INFORMATION

Provide information on methods which will be used to ensure low permeability layers do not develop within the landfill with particular regard to daily and intermediate cover management.

12.2 RESPONSE TO REQUEST

The types of material which will be selected for the purpose of daily cover at the Fingal landfill can range from subsoils excavated as part of the cell construction, to hessian material, C&D waste or even automobile shredder residue, all with the prior agreement of the EPA. While subsoil is not the ideal choice for daily cover it does prevent windspread of litter and controls odours better than the majority of other materials, yet it is accepted that soil-based cover materials do lead to perched leachate horizons in the waste and that it utilises valuable void space as it is difficult to remove on the next day of filling.

The Fingal landfill will excavate a large volume of subsoil which would be available for daily cover but this material will only be utilised when no other non-traditional permeable cover material is available such as hessian or a suitable source of C&D waste or ASR etc. It is not the intention of the Fingal Landfill to import natural materials for this purpose. The materials proposed may vary depending on the operational and environmental issues occurring on site, e.g. if odour is causing an issue then low permeability clay would be utilised to assist in the reduction of odour at night and at the weekends.

For intermediate cover the low permeability excavated subsoil will be utilised.

13 SECTION E.1.B

13.1 REQUEST FOR INFORMATION

Provide an impact assessment in relation to dust emissions from the storage of ash from waste to energy facilities at the site, with particular attention to the risk (if any) posed by any dioxin levels expected in the ash.

Dispersion modelling of dust generated from the storage area should be investigated.

Identify methods for minimisation of dust emission during unloading and loading operations.

13.2 RESPONSE TO REQUEST

Paragraph 2.5.2.5 of Volume 2 of the EIS states that as part of the licence application, permission has been sought to allow inert bottom ash from non-hazardous waste to energy treatment plants to be stored at the landfill. It is not proposed in the EIS for the Waste to Energy Plant that such materials are brought to the Fingal landfill, the intention is that this material is shipped to mainland Europe for recycling. Permission is being sought on the basis of an emergency situation or that temporary storage is required. The temporary storage of this bottom ash would be in a specially designated cell with a separate leachate collection system. The location of this cell is planned to be at the southern face of the landfill at the greatest distances from the local residents. No fly ash from waste to energy plants will be accepted by the landfill.

In May 2002 the UK Environment Agency published a report titled "Solid Residues from Municipal Waste Incinerators in England and Wales". This report highlights the findings of an investigation into all the solid residues produced between 1996 and 2000 by municipal waste incinerators in England and Wales. In relation to a risk assessment, one of the reports main conclusions was that "*bottom ash, whether at the incinerators themselves or at sites where the ash is either stored, recovered or disposed of, does not contribute significantly to the public's exposure to dioxins*". In addition, the report states that: "*dioxins are present in incinerator bottom ash at levels similar to urban soils and to other commonly used secondary aggregates. According to best available specialist advice, in the circumstances examined, ash does not constitute a significant additional risk to human health*".

Based on these findings, the levels of dioxins expected in the bottom ash would be low and of the range of 0.64 to 23ng ITEQ/kg as determined by the Environment Agency. This is compared to a concentration of 1 billion ng ITEQ/kg that would be required to classify the bottom ash as hazardous. As such, the storage of bottom ash at the proposed landfill would not pose a significant dioxin risk to human health over and above the storage of other aggregate material such as clays and gravels.

Dispersion modelling of dust generated from the storage area should be investigated.

Emissions of dusts from the proposed storage area may be modelled using a suitably approved air dispersion model based on steady-state Gaussian dispersion. However, while air dispersion modelling of dust generated from the storage area is possible, it is open to a larger degree of uncertainty that the other modelling exercises undertaken in this project. A site-specific emission factor is unavailable, hence a USEPA generic emission factor must be employed, and details of the exact location of the source, operations at the source, etc. are not yet defined. As such, a dust modelling exercise was not undertaken as part of the EIS. A dust modelling exercise has been undertaken as part of the Article 14 request and the methodology, assumptions and results are summarised below.

A generic emission factor from the storage area has been calculated based on the procedures outlined in the US EPA document "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources". The emission factor has been calculated from the procedures outlined in section 13.2.4 "Aggregate Handling and Storage Piles" in the AP-42 document. The calculation requires input of particle fraction, wind speed and moisture content to determine the emission factor. A worst case particle fraction of <30μm was used as a scaling factor. In addition, a worst-case annual wind speed of 6.7 m/s (13 knots) was used in calculation when the 30-year average for the nearest met station (Dublin Airport) is 5.0 m/s (9.9 knots). Finally, the worst-case moisture content (0.25% moisture) was used in calculating the emission factor when in reality it is proposed to user water spraying to maintain a high moisture content to prevent dust emissions. Each of these factors was incorporated to ensure the calculation of a worst-case emission factor for dust from the storage area. As such, the predicted concentrations from the model may be considered worst-case and real concentrations would be considered lower than those determined in this modelling survey.

The model assessment has been carried out with the following assumptions:

- The storage area will be 2.5 hectares as per cell area
- That the volume of the storage area will be 400,000 tonnes and this will take 1 year to reach full capacity (this is considerably the worst case since it is predicted that the Waste to Energy Plant will process 600,000 tonnes per year and bottom ash will account for 20% of this or 120,000 tonnes per year, therefore the model is based on 3.5 times the intake predicted)
- The waste will be deposited at a constant rate between 08:00-16:30 hours for 6 days of each week, 52 weeks of the year
- The storage area will be located at the southern face of the landfill adjacent to the infrastructure area

Using the emission factor as above and these assumptions, an air dispersion model (ISC ST3) has been employed to assess the maximum annual ground level concentration of dust at the site boundary. The model indicates that the maximum ground level concentration at the site boundary will be 48 $\mu g/m^3$ at the southern site boundary. All other boundary locations and receptors beyond the site boundary will have a lower concentration than this maximum.

In the absence of statutory limits for Total Suspended Particles in Irish Legislation reference has been made to other suitable guidelines such as the TA Luft (German Government "Technical Instructions on Air Quality"). The TA Luft Guideline is from 1986, Section 2.5.2 Health Related Emission Standards and the guideline refers to "Suspended Particles (without considering the components of the suspended particles)". This guideline is 150 $\mu g/m^3$ as an annual average for suspended particles.

This modelling assessment indicates that the maximum ground level concentrations of dust from the storage area at the site boundary (48 $\mu g/m^3$) will be significantly lower (less than one third) than the relevant guideline as an annual average for the protection against health hazards (150 $\mu g/m^3$). However, it should be borne in mind that there are a number of assumptions incorporated into this model as well as a generic emission factor from the US. As such, while a worst-case approach has been adopted and the predicted concentrations may be subject to change when more definitive details of the storage area are available.

Identify methods for minimisation of dust emission during unloading and loading operations.

In terms of mitigation, paragraph 2.5.2.5 of Volume 2 of the EIS states that specifically for the storage of bottom ash, "*in drier climatic conditions the spraying of water over the ash my be required in order to mitigate against dust generation*". This is supplemented by a wider list of dust mitigation measures in Section 3.4.5.1 of Volume 2 of the EIS. These measures are taken from the UK industry standard

"Control of Dust from Construction and Demolition Activities" published by the Building Research Establishment in 2003. In relation to loading and unloading, the document highlights the dust control measures to consist of the following:

- Use material handling methods that minimise the generation of airborne dust.
- Drop heights must be kept to a minimum
- Use static sprinklers, bowsers, hand held hoses and other watering methods, as necessary.

These are the specific mitigation measures required additional to those previously listed for the control of dust during loading and unloading.

14 SECTION E.1.C

14.1 REQUEST FOR INFORMATION

Emissions modelling of the flare does not take account of background concentrations. Provide tabular results with background concentrations taken into account.

14.2 RESPONSE TO REQUEST

Presented below is Table 3.4.14 of Volume 2 of the EIS depicting the predicted ground level concentrations of pollutants from the operation of the proposed flare unit. 2 additional columns have been added to include the background concentrations and the overall impact, i.e. the background concentrations in addition to the predicted increase from the flare. The background concentrations used in this model survey are data taken from the EPA monitoring report "Ambient Air Monitoring In Mountrath" from 22nd September 2004 to the 14th June 2005. This is also a Zone D (rural) designated site but is located close to a national primary route (N7) but in a 45km/hr vehicle speed zone. Existing backgrounds at the site of the proposed landfill are expected to be similar or lower than these determined at Mountrath.

Parameter	Limit/Guideline Type	Worst Case Boundary Prediction	Background	Impact (Boundary + Background)	Assessment Criteria
Nitrogen Dioxide	EU Maximum 1-hour Average	28 $\mu g/m^3$	62.6 $\mu g/m^3$	90.6 $\mu g/m^3$	200 $\mu g/m^3$
	EU Annual Average	1 $\mu g/m^3$	12.5 $\mu g/m^3$	13.5 $\mu g/m^3$	40 $\mu g/m^3$
Carbon Monoxide	WHO 1-hour Average	0.009 mg/m^3	0.3 mg/m^3	0.309 mg/m^3	30 mg/m^3
	EU Maximum 8-hour Average	0.007 mg/m^3	1.6 mg/m^3	1.607 mg/m^3	10 mg/m^3
Particulates	Danish C-Value	9 $\mu g/m^3$	22.5 $\mu g/m^{3(a)}$	31.5 $\mu g/m^3$	80 $\mu g/m^3$
Total Organic Carbon	Danish C-Value	2 $\mu g/m^3$	2.3 $\mu g/m^{3(b)}$	4.3 $\mu g/m^3$	10 $\mu g/m^3$
Hydrogen Chloride	Danish C-Value	9 $\mu g/m^3$	0.41 $\mu g/m^{3(c)}$	9.41 $\mu g/m^3$	50 $\mu g/m^3$
Hydrogen Fluoride	Danish C-Value	0.9 $\mu g/m^3$	0 $\mu g/m^{3(d)}$	0.9 $\mu g/m^3$	2 $\mu g/m^3$

Table 3.4.14: Results of Flare Emission Modelling at the proposed landfill using the US EPA Industrial Source Complex Model

Notes:

a. Background level of PM_{10} (as an annual average employed). This is worst case scenario as particulates are not a major emission from flares and TA luft emission limit value has been employed to generate boundary concentration.

b. Only benzene and toluene were analysed in Mountrath to a combined concentration of 2.3 mg/m^3.

c. The major source of HCl in ambient air is from large combustion plants such as coal fired power plants with a minor source from the displacement reactions of acidic gases with sea salt particles. In 2002 DEFRA measured annual average concentrations of HCl ranged from 0.12 to 0.41 $\mu g/m^3$ (source: "Guidelines for Halogen and Hydrogen Halides in Ambient Air for Protecting Human Health against Acute Irritancy Effects" DEFRA 2005, draft for consultation). In order to use a worst case scenario the higher value of 0.41$\mu g/m^3$ is employed as background.

d. The major sources of hydrogen fluoride in the atmosphere are coal-fired power stations aluminium smelters. DEFRA have no ongoing measurement of HF so no long term baseline data is available. However, given the site location a background level of 0$\mu g/m^3$ may be assumed with some confidence.

14.3 REQUEST FOR INFORMATION

Detail the source and applicability of the odour emission rates included in Table 3.4.16 of Volume 2 of the EIS.

14.4 RESPONSE TO REQUEST

Presented below is Table 3.4.16 from Volume 2 of the EIS relating to the Odour Emission Rates employed in the dispersion modelling. The applicability and source of the rates is noted at the foot of the table.

Odour source	Odour emission flux ($Ou_E\ m^{-2}\ s^{-1}$)	Odour emission rate ($Ou_E\ s^{-1}$)	Odour descriptor/ character[(g)]
Active face[(a)]	9.61	-	Sweet/ bananas/ Sour/ dustbin/ rotten food
Tipping of waste[(a)]	48.05	-	Dustbin/ sweet/ sour/ rotten food
Active cell[(b)]	1.69	-	Domestic waste/ rotten eggs/ burnt rubber/ sour
Temporary capped cell[(c)]	0.67	-	Musty/ dank/ mature waste
Permanent capped cell[(d)]	0.10	-	Musty clay odour
Leachate storage tank[(e)]	724 $Ou_E\ m^{-3}$ (headspace samples)	905 $Ou_E\ s^{-1}$	Musty/ turnips/ dank
Landfill flare/ gas utilisation engines[(f)]	808 $Ou_E\ m^{-3}$ (gas utilisation engines)	5656 $Ou_E\ s^{-1}$	Flue gas/ burnt

Table 3.4.16: Odour emission rate for each individual process within landfill operation.

Notes:

a. Active face will be covered with impermeable cover at night and at weekends/ bank holidays. A conservative multiplication factor of 5 was used to estimate tipping of accepted waste.

b. Operational area/ active cell will be covered using with daily cover of 250mm of soil/ stabilised compost/ wood chip etc. material depending on stage. Horizontal sacrificial abstraction will be applied

to each 5-metre lift within the active cell.

c. 500mm to 1000mm of soil will be used as temporary cover material. All flanks will be covered with 500mm to 1000mm of soil cover. Soil binding agent should be applied to the flanks/ side embankments in order to minimise etching during storm weather conditions.

d. Permanent capping will be performed at a minimum in accordance with EPA Landfill design manual. LFG abstraction will be performed upon the leachate well risers.

e. Leachate treatment plant will be covered with impermeable covers. The influent balancing tank will be maintained under negative extraction. This headspace odourous air will be introduced into the leachate treatment plant as aeration air (small fraction). The aerated biological liquor will act as a bioscrubber to remove odourous compounds.

f. LFG management system will be in-situ before operation of landfill. All landfill gas generated will be abated in the landfill flaring system/gas utilisation system. All active gas vents will be immediately connected to the LFG management system.

g. Odour emission flux, emission rates and odour characters were taken from library data generated on Irish landfills and from published international studies. The references for these studies have been presented below:

Callan, B.T., (1993). Noses Knows Best. In malodour measurement and control. Proceedings of the International Tydnall School, September. 134-145.

CEN, (2003). prEN13725-Air-quality-Determination of odour concentration by dynamic olfactometry. Brussels, Belgium.

DOE, (1993). Report by the Inspector on a Public Inquiry into the Appeal by Northumbrian Water Limited for Additional Sewage treatment facilities on land adjacent to Spitial Burns, Newbriggin-by-the-Sea, Northumberland in March 1993. DoE ref APP/F2930/A/92/206240.

Dravniek, A., (1986). Atlas of odor character profiles. ASTM Committee on sensory evaluation of materials and products, ASTM data series, Baltimore, MD, USA.

El-Fadel, M., Findikakis, A.N., Leckie, J.O. Environmental impacts of solid waste landfilling. Journal of Environmental Management, 1997, 50, 1-25

EPA, (2002). Odour impacts and odour emission control measures for intensive agriculture. Commissioned by the Environmental Protection Agency (Ireland). OdourNet UK Ltd.

Hobbs, P.J., Pain, B.F., (1986). Reduction of odorous compounds in fresh pig slurry by dietary control of crude protein. Journal of Agricultural Engineering Research, 71. 508-514.

Longhurst, P., (1998). Odour impact assessment of an extension to the Brogborough landfill site. IREC, Cranfield University, England.

McIntyre, A., (2000). Application of dispersion modelling to odour assessment; a practical tool or a complex trap. Water Science and Technology, 41 (6). 81-88.

Sheridan, B., (2002). Biofiltration and atmospheric dispersion modelling of odours from intensive agriculture facilities. PhD thesis, Department of Agricultural and Food Engineering, UCD, Dublin 2.

Sheridan, B.A., (2001). Controlling atmospheric emissions-BAT Note Development, UCD Environmental Engineering Group, Department of Agricultural and Food Engineering, UCD, Dublin 2.

Sheridan, B.A., Curran, T.P., Dodd, V.A., (2002). Biofiltration of air: current operational and technological advances. Unpublished. Department of Agricultural and Food Engineering, University College Dublin. Dublin, Ireland.

Sheridan, B.A., Hayes, E.T., Curran, T.P., Dodd, V.A., (2003). A dispersion modelling approach to determining the odour impact of intensive pig production units in Ireland. Bioresource Technology. Published.

Smith, John. (2003). Personal Communication, Landfill manager, Arthurstown Landfill, Kill, Co. Kildare.

Environment Agency, (2002). Guidance document for the landfill sector. EA, Bristol, UK.

Stretch, D., Laister, G., Strachan, L., and Saner, M.,(2003). Odour trials from landfill sites. School of Civil Engineering, University of Natal, Durban, SA.

Reinhart, D.R., and Townsend, T., (2003). Control of odors from construction and demolition debris landfills. Florida Centre for Solid and Hazardous Waste Management.

Feddes, J., and Edeogu, I., (2001). Technologies for Odour Management. Advances in Pork Production. Vol. 12. pg. 109.

14.5 REQUEST FOR INFORMATION

With regard to odour emissions from the headspace vapour of the leachate storage tank, assess the potential for extraction of this vapour and combustion in the landfill gas flare.

14.6 RESPONSE TO REQUEST

The leachate tanks will be covered with impermeable covers. Negative pressure will be applied to the influent balancing tank, where the headspace air may be significantly odourous. This headspace air will be held under negative pressure and ducted to the aeration tank to act as a scrubber. The headspace air from the aeration tank is considerably less odourous (<1000 Ou/m3) than the balancing tank so this may be vented to atmosphere through a scheduled emission point. At such low odour concentrations the aeration tank headspace air will not have an odour impact on the nearest receptors. It is not feasible to route this headspace air through the landfill gas flare due to the high oxygen, low carbon content of the air, which would not support combustion.

15 SECTION E.2

15.1 REQUEST FOR INFORMATION

Detail any measures proposed to protect the bed of the receiving water body from erosion in the area of the proposed surface water discharge point.

15.2 RESPONSE TO REQUEST

Protection of the river from erosion in the area of the proposed surface water discharge point will be achieved by limiting flow from the attenuation ponds by using an undersized pipe, orifice or vortex control device. A bypass mechanism and consideration of overland flow routes will be provided to facilitate the safe passage of water in excess of the 100-year event. Specimen details of possible attenuation pond design and hydro brakes are shown in **Figures 5.2 to 5.4.**

16 SECTION E.3

16.1 REQUEST FOR INFORMATION

Investigate and comment on the following:

- *Likely effect of the leachate emissions on sewer or sewage treatment maintenance operations:*
- *Likely effect of the leachate emissions on sewer integrity;*
- *Possible reaction of the leachate emissions with other effluent likely to be in the sewerage system.*

16.2 RESPONSE TO REQUEST

Before the leachate is discharged to the sewer it will have already been treated. Therefore there should be minimal risk of the leachate causing maintenance problems to either the sewer or the sewerage treatment works. Floating material by virtue of the nature of leachate should be absent compared to typical raw sewage where floating material does have an impact on maintenance activities.

The integrity of the sewer is a function of the material flowing through it. Typically the majority of the current flow in the sewer is municipal sewage and the treated leachate will represent fraction of the current municipal sewage. Extremes of pH can cause damage to the integrity of the sewer, however as the leachate will be pre-treated using biological activated sludge this will invariably result in a pH in the 6.0 to 10.0 range. This condition is unlikely to have a negative impact on the integrity of the sewer.

Currently the sewer usage is primarily municipal sewage with minor industrial or commercial discharges. Fingal County Council have an existing sewer control programme that monitors emissions from non- domestic sources. Therefore the likelihood of reaction between the treated leachate with other effluent in the sewer is unlikely. A complete characterisation of the raw leachate has been completed and no unusual parameters have been observed.

16.3 REQUEST FOR INFORMATION

Outline any proposed treatment for leachate from the existing waste landfilled at the site. Information in the licence application indicates that in the event of the existing waste body remaining in-situ there will be a leachate discharge point from this area. Clarify whether it is proposed to treat this leachate in the on-site treatment facility.

16.4 RESPONSE TO REQUEST

A risk assessment was undertaken of existing waste that is landfilled at the proposed Fingal Landfill site. This risk assessment was submitted as Attachment H.1 Risk Assessment of the Waste License Application Form.

The following was stated in the conclusion/recommendation section of this risk assessment; "*the material encountered primarily consists of construction and demolition waste, which is determined to be inert and will not produce any eluate or gaseous vapour*".

The conclusion/recommendation section also stated that; "*Given the nature of the waste encountered within the site, the qualitative risk assessment, and the lack of evidence at this stage of environmental impacts, it is recommended that the site be capped and monitored to assess ongoing environmental conditions within the vicinity of the site. The capping will comprise topsoil and sub soil to a minimum thickness of 0.5m and will meet the full requirements of the EPA Landfill Manual, its construction incorporated into the Waste Licence conditions, and meet the tone of the Minister's circular.*

The main objective of the capping system will be to minimise infiltration of water into the waste thus limiting the potential for leachate generation within the waste body"

Monitoring to date would indicate that no leachate is currently generated at this site. To ensure that no leachate is generated at a later stage the conclusion/recommendation section recommends the following; "*It is also proposed to install two groundwater monitoring boreholes (one upstream and one downstream) to assess potential impacts to groundwater quality in the vicinity of the site. Should the groundwater quality be impacted directly by the site, further investigative works will be conducted to establish the source of the contaminants and additional recommendations will be proposed."*

If, in the unlikely event that leachate is generated post capping, the volumes are likely to be small and treatment of this small volume will be accommodated in the on-site treatment facility and discharged to the sewer network off site.

16.5 REQUEST FOR INFORMATION

Characterise the leachate from the proposed ash storage area and assess the impact of the leachate on the on-site and off-site treatment facilities, with particular regard to metals and dioxin composition.

16.6 RESPONSE TO REQUEST

A comparison has been carried out between the composition of weak leachate from Danish MSW landfills with leachate from bottom and fly ash from Danish incineration plants (see table below).

Apart from K, Na and Cl- the measured components in "incineration"-leachate is within the same order of magnitude as expected for typical weak landfill leachate. I.e. heavy metals will not influence negatively the on-site and off-site treatment facilities.

"Incineration"-leachate may although, be alkaline (pH up to 11). Because of this and the expected high Cl^- content the leachate could be corrosive. The EIS for the Dublin Waste to Energy Plant sets out that the bottom ash will be directed to the port for shipping to mainland Europe for recycling. In the case where bottom ash is to be stored on site a comprehensive study will be carried out on the capability of the leachate treatment system and sewers to contain and treat the leachate effectively.

Constituent	Unit	MSW Weak leachate	Incineration Bottom/fly ash leachate
COD	mg/l	320-5000	100-600
BOD5	mg/l	130-4000	5-200
Cl-	mg/l	350-1000	**3000-20000**
SO4-S	mg S/l	10-50	30-140
NH4-N	mg N/l	90-200	6-50
Total-N	mg N/l	100-500	8-50
Fe	mg/l	40-200	0.02-0.3
Mn	mg/l	3-10	0-0.05
K	mg/l	100	**1300-6000**
Na	mg/l	200-500	**3000-7000**
Ca	mg/l	80-500	250-1000
Mg	mg/l	60-100	0.05-40
Cd	µg/l	7	0.02-0.2
Ni	µg/l	130	5
Cu	µg/l	70	0-5
Cr	µg/l	75	0-80
Pb	µg/l	70	0.5-10
Co	µg/l	7	-
B	µg/l	-	-
As	µg/l	15	8-20
Zn	µg/l	700	10-200

Extracted from:
"Sanitary Landfill Liners", Danish Standard Information, DS/INF 466, 1999-08-16, Table D 1.1 and D 1.3.

In surveys conducted in Denmark, the concentration of dioxin in leachate from landfill (with bottom ash disposal) is found to be in the interval of 0.01-0.11 pg I-TEQ/l (pico gram International Toxicity EQuivalents per litre). The similar concentration in rainwater is 0.7-3.0 pg I-TEQ/l. In Denmark it has been concluded that dioxin in leachate is not an issue as regards pollution of ground water and watercourses. The impact from dioxins from bottom ash is predicted to be negligible on in-site and off-site treatment facilities.

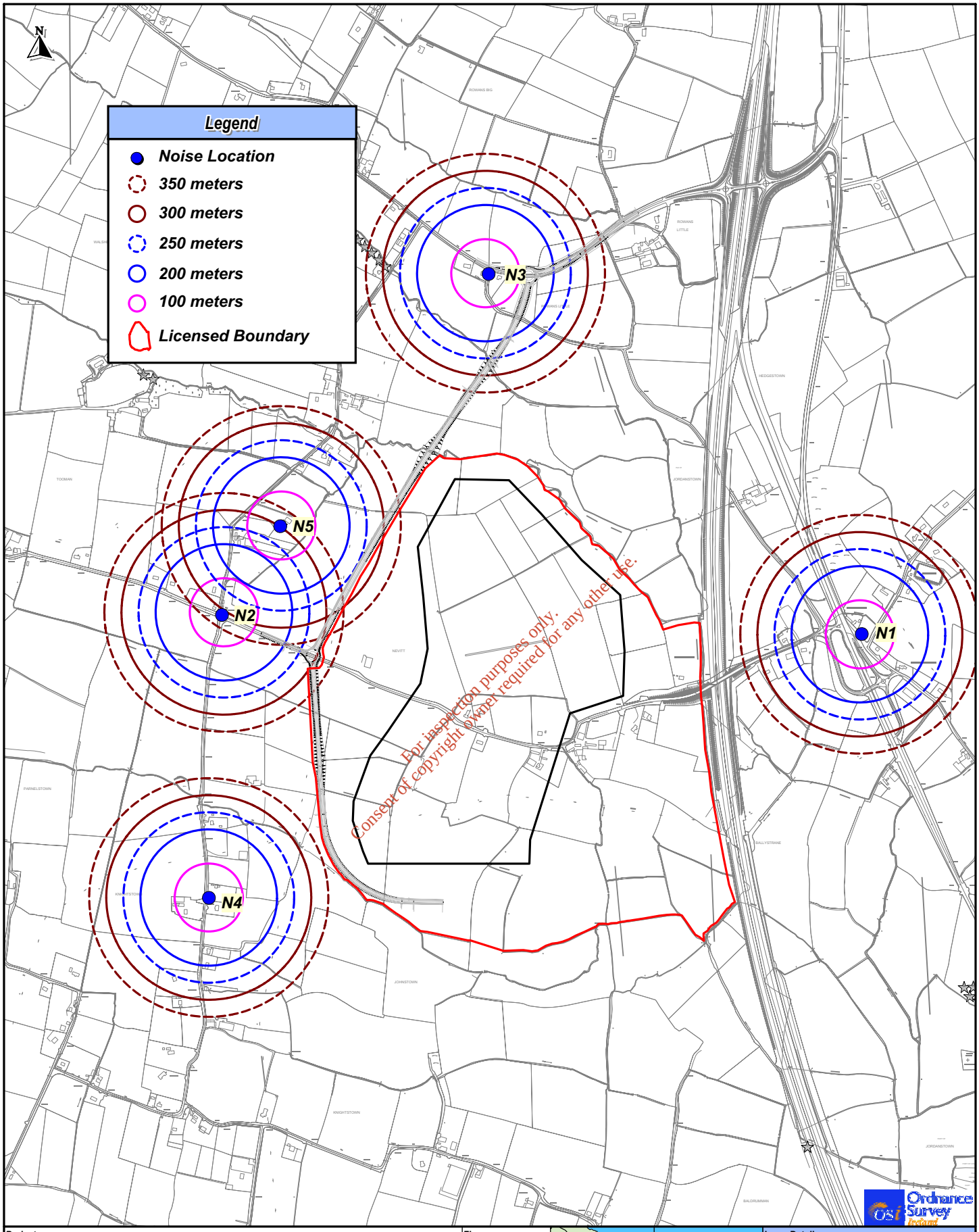
17 SECTION F.6

17.1 REQUEST FOR INFORMATION

With regard to the proposed noise monitoring locations, provide a copy of Figure 3.6.1 which includes the proposed licence boundary as well as the landfill footprint.

17.2 RESPONSE TO REQUEST

Revised copy of Figure 3.6.1 from Volume 2 of the EIS.



Project	*Fingal Landfill Project*	Figure	3.6.1
Title	**Noise Locations**		

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Issue Details

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Date:	06/12/06	Mi0046	F04

Notes

1. This drawing is the property of RPS Consulting Engineers. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent.
2. All levels are referred to Ordnance Datum, Malin Head.
3. Ordnance Survey Ireland Licence No. EN 0005005 Copyright Government of Ireland.

18 SECTION H.1

18.1 REQUEST FOR INFORMATION

Provide EWC codes for all waste types accepted, treated, recovered or disposed of at the site.

18.2 RESPONSE TO REQUEST

Please find below the tables provided in Section H.1 of the Waste licence Application form updated with all relevant EWC codes.

TABLE H.1 (C) WASTE TYPES AND QUANTITIES

(Refer to Volume 2, Section 2.5.2 of the EIS for additional information regarding waste types)

WASTE TYPE	TONNES PER ANNUM (existing)	TONNES PER ANNUM (proposed)	TOTAL (over life of site) tonnes	EWC code
Household	Not Applicable	200,000	6,000,000 (Note 3)	20 03 01
Commercial	Not Applicable	148,000	4,440,000 (Note 3)	20 03 01
Sewage Sludge	Not Applicable	10,000	300,000 (Note 3)	20 03 06
Construction and Demolition	Not Applicable	50,000 (Note 1)	1,500,000 (Note 3)	All wastes covered by code 17 (note 1)
Industrial Non-Hazardous Sludges	Not Applicable	2,000	60,000 (Note 3)	19 08 12; 19 08 14
Industrial Non-Hazardous Solids	Not Applicable	90,000 (Note 2)	2,700,000 (Note 3)	20 01 99; 20 03 99
Hazardous ***(Specify detail in Table H 1.2)**	Not Applicable	Hazardous waste will not be accepted at the landfill. Household hazardous waste will be accepted at the Public Recycling Facility (detailed in Table H1.2 below)	Not Applicable	See table below
Inert Waste imported for restoration purposes	Not Applicable	50,000	1,500,000	Not Applicable

TABLE H.1.2 HAZARDOUS WASTE TYPES AND QUANTITIES (TO BE ACCEPTED AT PUBLIC RECYCLING FACILITY ONLY)

HAZARDOUS WASTE	DETAILED DESCRIPTION * REFERENCE SHOULD BE MADE TO THE RELEVANT EUROPEAN WASTE CATALOGUE CODES AS PRESENTED BY COMMISSION DECISION 2000/532/EC	Tonnes Per Annum (Existing)	(Tonnes Per Annum Proposed)
Waste Oil	20 01 26	Not Applicable	10
Oil filters	Not Applicable	Not Applicable	Not Applicable
Asbestos	Not Applicable	Not Applicable	Not Applicable
Paint and Ink	20 01 27 (and 20 01 28)	Not Applicable	0.5
Batteries	20 01 33 (and 20 01 34)	Not Applicable	28
Fluorescent Light Bulbs	20 01 21	Not Applicable	0.5
Contaminated Soils	Not Applicable	Not Applicable	Not Applicable
WEEE	20 01 35 (and 20 01 36)	Not Applicable	400
White Goods (Fridges)	20 01 23	Not Applicable	40

Estimated types and quantities to be accepted at the Public Recycling Centre

Material	Approximate quantity per annum	EWC Codes
Textiles (tonnes)	15	20 01 11
Glass (tonnes)	65	20 01 02
Aluminium Cans (kg)	4,090	20 01 40 15 01 04
Steel Cans (kg)	6,050	20 01 40 15 01 04
Heavy Cardboard (tonnes)	75	20 01 01
Wood (tonnes)	755	20 01 38
Metal (tonnes)	185	20 01 40
Paper/Magazines (tonnes)	30	20 01 01
Tetra Pak (tonnes)	1	20 01 01
Plastic Bags & Bottles (tonnes)	40	20 01 39

Oil (litres)	12,150	20 01 26
Batteries Lead/Acid (kg)	23,315	20 01 33; 20 01 34
Batteries Primary (kg)	510	20 01 33; 20 01 34
WEEE (tonnes)	400	20 01 35; 20 01 36
White Goods (including Fridges) (tonnes)	100	20 01 35; 20 01 36
Gas Cylinders (No.)	365	16 05 04
Paints (tonnes)	0.5	20 01 27; 20 01 28
Fluorescent Light Bulbs (tonnes)	0.5	20 01 21
Green Waste (tonnes)	1,500	20 02
Household C&D Waste (tonnes)	500	All wastes covered by code 17
Bagged Household Waste (for final disposal to landfill) (tonnes)	5,000	20 03 01
Estimated Total (Tonnes)	8,800	

19 SECTION H.4

19.1 REQUEST FOR INFORMATION

Evaluate the impact of excavation of the historical waste area, recovery of recyclable materials and disposal of residual waste to a new landfill cell.

19.2 RESPONSE TO REQUEST

The likely significant impacts from the excavation, recovery or disposal of this waste are the following;

- Surface water – A surface water channel lies approximately 15 meters from the waste. As the excavation of the historical waste area will require movement of soil and waste there is a risk that the surface water may be impacted, principally from suspended solids. Mitigation measures outlined in Section 3.9.5.2 of Volume 2 of the EIS would be implemented to ensure that this surface water channel is not impacted during excavations,

- Groundwater – The excavation of the historical waste area should not impact on groundwater. However there is a risk from accidental spillage of polluting materials (e.g. oils and diesels) used on site to carry out the excavation. Therefore, fuels, lubricants and hydraulic fluids for equipment used on the site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to codes of practice. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil properly disposed of.

- Archaeology – An archaeological site, Site A was identified during the EIA investigations just south of the historical waste area and an exclusion zone around Site A has been proposed as part of the archaeological mitigation. This exclusion zone does not contain the historical waste area. It was not possible, during the EIA investigations to determine if Site A extended under the historical waste area. If the historical waste has to be excavated a submission should be made to the DoEHLG detailing how the excavation will take place and the excavation may have to be monitored by a licensed archaeologist.

- Air emissions – In order to ensure that no dust emissions occur during the excavation of the historical waste site a series of mitigation measures and good working practices would be implemented as part of a dust minimisation plan. The measures are detailed in Section 3.4.5.1 of the EIS, Main Report, Volume 2.

- Noise – The historical waste site is within approximately 50 meters of the M1 motorway and the noise from traffic associated with the motorway will be the dominant noise in the area. To ensure that the noise associated with excavation is minimised the mitigation measures outlined in Section 3.6.4 of the EIS, Main report, Volume 2 would be adhered to.

The excavated waste from the historical waste area will be tested and characterised as per the EPA Waste Classification tool. All investigations undertaken in the EIA indicate that the material in the historical waste area primarily consists of construction and demolition waste, which was determined to be inert and not likely to produce any elute or gaseous vapour. If it is acceptable to the EPA the construction and demolition material may be recovered from the historical waste area and utilised on site as sub-base for the construction of internal roads. If any residual waste is obtained from the historical waste area then it will be deposited in one of the new engineered landfill cells.

20 SECTION I.2

20.1 REQUEST FOR INFORMATION

Table 2.4 of the main EIS report indicates that a sediment assessment has been completed, however no information on sediment quality is presented in Section 3.8 of the main EIS report. Provide details of any further proposed pre-operational baseline monitoring of surface water quality in line with the requirements of the most recent EPA Landfill Monitoring Manual (Appendix C).

20.2 RESPONSE TO REQUEST

Sediment assessment is a site-specific requirement of the *EPA Landfill Monitoring Manual (Appendix C).* A quantitative assessment of the sediments was undertaken in the streams in the environs of the proposed landfill at seven locations as part of the baseline assessment. This information is provided in Table 3.8.2 of volume 2 of the EIS. Section 4.5 of the *Manual* states that *'occasionally there may be a requirement to take samples of bottom sediment deposits, e.g. at a landfill located beside on estuary.'* It was not felt that the proposed location of this landfill required qualitative assessment of sediments at this stage.

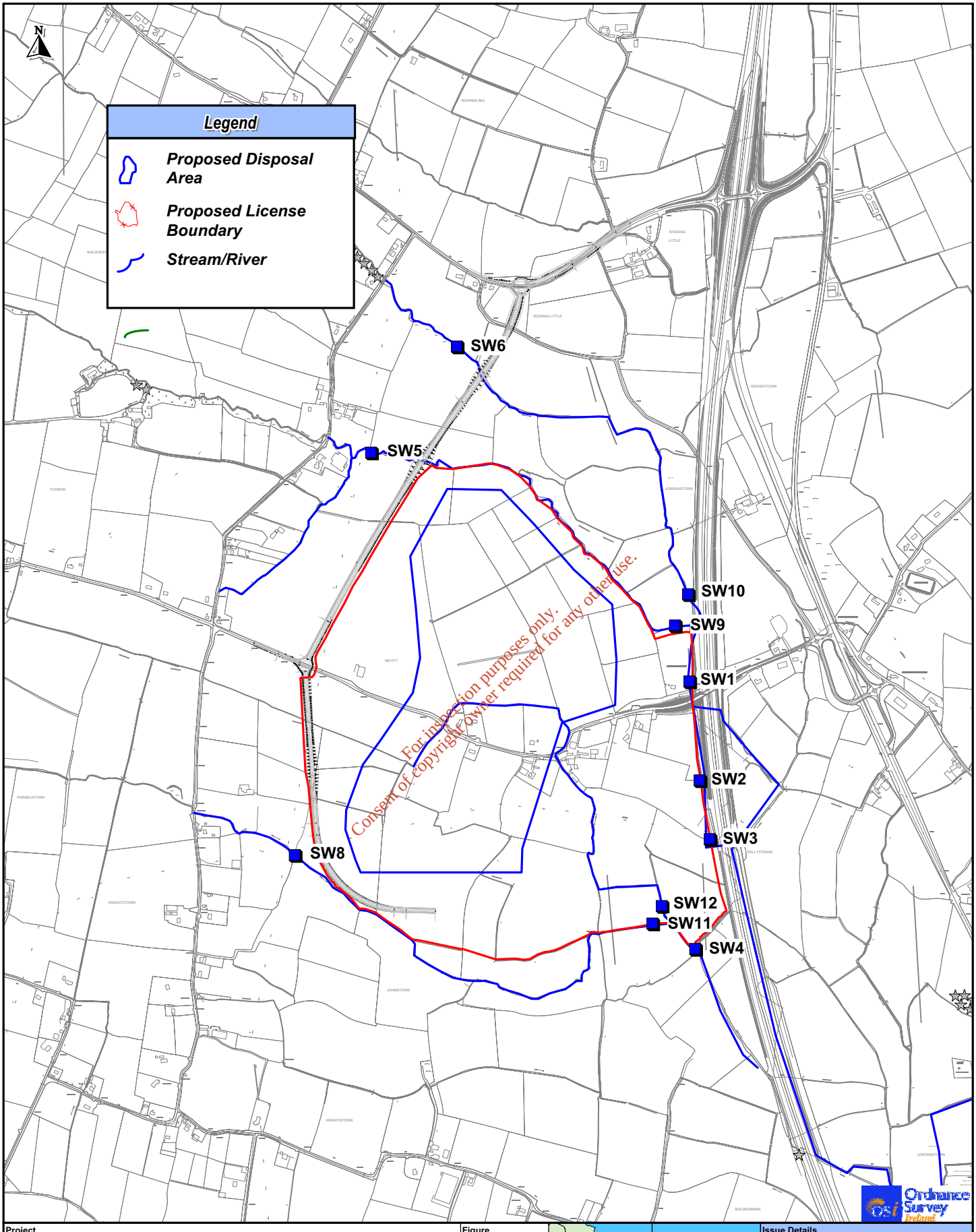
Pre-operational baseline monitoring of surface water quality will be undertaken at the eleven locations shown in **Figure 20.1** on a quarterly basis for one year prior to construction as per the requirements of the *EPA Landfill Monitoring Manual (Appendix C).* The range of parameters to be assessed will be in accordance with Table C.2 of *EPA Landfill Monitoring Manual.* Seven of these locations are the same water quality sites used for the EIS with the same reference numbers.

20.3 REQUEST FOR INFORMATION

The proposed location of the surface water attenuation pond (see Figure B.2.1 of the licence application) is within the area indicated as being subject to flooding in Volume 3 of the EIS. Flooding of the attenuation system will prevent the system from operating effectively. Please provide an assessment detailing the most appropriate location for the attenuation pond.

20.4 RESPONSE TO REQUEST

The location of the pond should be positioned to allow the conveyance of surface water flow by gravity and should be integrated, where possible with the landscape. An indicative location is provided in **Figure 5.1**.



Project	*Fingal Landfill Project*	Figure	20.1
Title	**Proposed Water Quality Sites**		

Fingal County Council
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Issue Details			
Drawn:	SK	Project No.	MDR0303
Checked:	EB	File Ref.	
Approved:	CW		MDR0303Mi0101
Scale:	1:15,000 at A4	Drawing No.	Rev.
Date:	12/12/06	Mi0101	D01

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21 SECTION I.4

21.1 REQUEST FOR INFORMATION

In relation to the geological and hydrogeological information reference in the application, please respond to the following;

1. *The groundwater contour maps presented in Appendix A5 do not appear to take into account recorded data from at least two monitoring wells, BGB1 and BGB3. Reassess the groundwater contour maps taking information from all monitoring wells into account.*

2. *Section 5.2.4 of Technical Appendices H & I reports that there are no groundwater users down gradient of the proposed landfill. With reference to the location of identified groundwater users to the south of the landfill (see P1, P8, P10 abstraction wells in Appendix A8 of Technical Appendices H & I) provide a more rigorous assessment of the groundwater flows in the area of these abstraction wells. Confirm the abstraction rate for well P1.*

3. *Section 6.18 of the EIS Non-Technical Summary reports that sand/gravel deposits 'lie outside of the landfill footprint'. Table 4.2 of Appendix I (and also review of borehole logs) indicates the occurrence of gravel deposits in 14 of the boreholes within the landfill footprint. Clarify the statement made in Section 6.18 of the EIS NTS and detail the potential impact of these gravel deposits on the potential environmental impacts associated with the proposed operation of the landfill. Provide, in plan view, contour plots of the extent and thickness of sub-clay gravels. Provide an assessment of the importance of the gravel as an aquifer.*

4. *Section 3.5.3.2 of EIS Technical Appendix H reports the following:*

   - *An outlier in the analysis was identified during the PW1 pumping test at BGB2 monitoring well at 311m distance. A transmissivity of 180- 232m^2 / day and a storativity of 0.005 were obtained. This monitoring well is installed in the Naul Formation whereas the other monitoring wells are installed in the Loughshinny Formation. The difference in transmissivity and storativity values obtained may reflect a higher degree of fracturing. No gravel was found in BGB2. This area is outside the landfill footprint.*

   Cross referencing of Figure 8 (borehole locations) and Figure 4 (Bedrock Geology) indicates that BGB2 is in the Loughshinny Formation and not the Naul Formation. Please clarify and resubmit this part of the assessment.

21.2 RESPONSE TO REQUEST

1) Only boreholes that were installed in the bedrock were used for deriving groundwater contour maps as the bedrock is the main pathway for groundwater flow in the area. BGB1 and BGB3 therefore were not included as these were not installed in bedrock. BGB1 is a nested borehole with one standpipe installed in clay and the other installed in gravel. BGB3 is a nested borehole with one standpipe installed in the upper clay layer and the other installed in the lower clay layer.

2) RPS understand from conversations with Mr. Kerrigan (**P1**) and from testing the flow rate from the well, that it can sustain a maximum yield of 612m^3/day based on the existing pump and

well infrastructure. However, it has been detailed by Mr. Kerrigan to RPS that this yield of 612m^3/day is only used for a maximum of four months of the year for irrigation in the summer. For the remainder of the year, Mr. Kerrigan uses approximately 5.7m^3/day for vegetable washing.

P8 This well was used prior to mains water becoming available but is not in use now.

P10 The current residents are on mains supply and have stated that they have no intention of using the well.

Both P8 and P10 wells have been sealed off and are therefore currently not accessible for monitoring.

A contour map for December 2006 (**Figure 21.1** – to be provided) will be available once the survey of Kerrigans well has been completed. It is expected that this will be available early in the New Year.

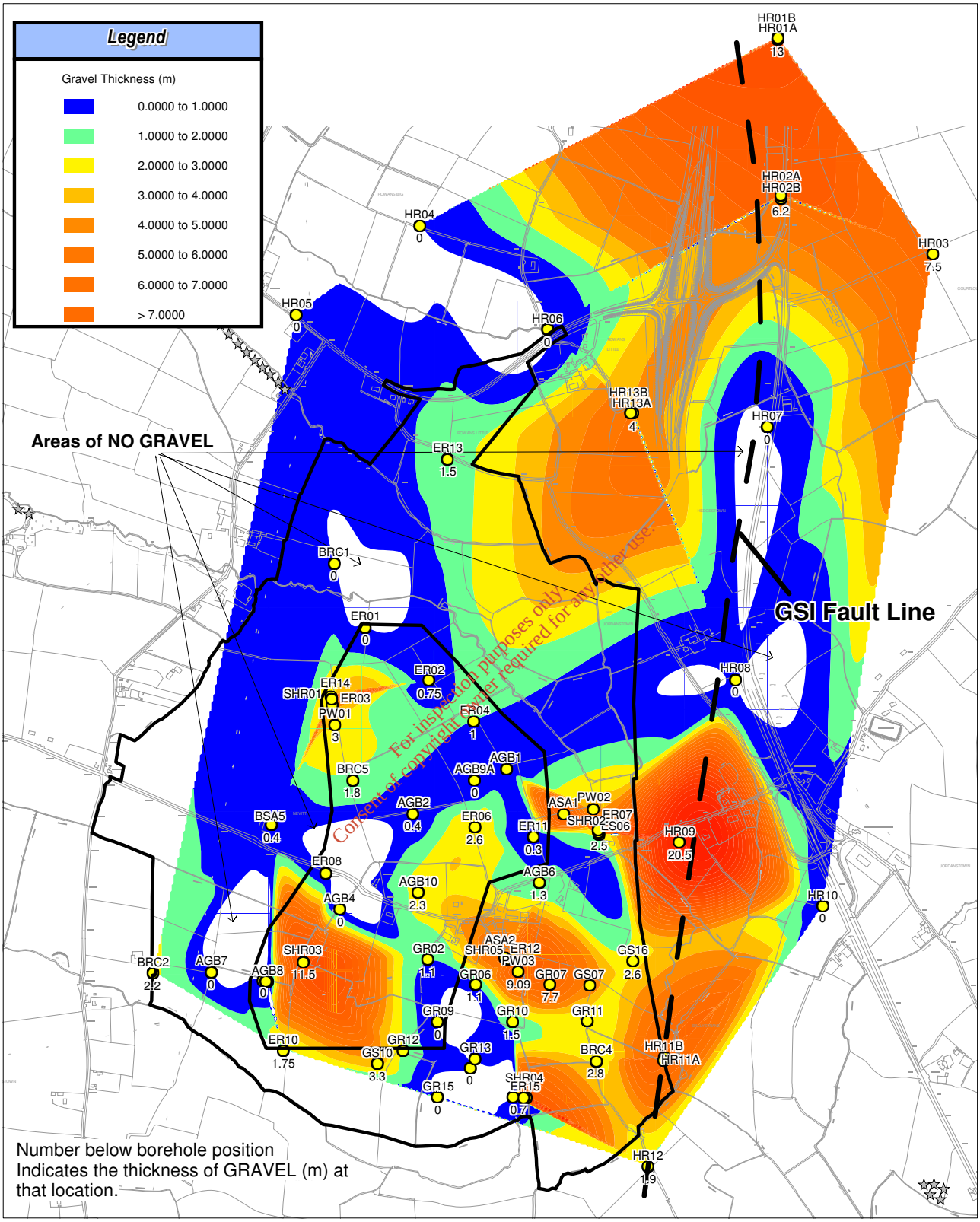
3) There are no sand/gravel deposits *directly underlying* the landfill footprint. Any sand and gravel deposits encountered beneath the landfill footprint underlie a substantial thickness (at least 10m) of low permeability clay deposits. The significance of these deposits is that they result in a low vulnerability to pollution of groundwater in the underlying sand and gravel deposits and the bedrock aquifer beneath that.

A contour map showing the extent and thickness of gravel deposits *which underlie a minimum 10m thickness of low permeability clay*[1] is given on **Figure 21.2**. The plot indicates that the thickness of deposits varies from being absent to over 17m within the study area. Beneath the landfill footprint itself, the maximum gravel thickness encountered is 11.5m. The contour plot also illustrates the discontinuous nature of the gravel deposits, i.e. there are areas where the gravels do not occur. The GSI have criteria for the classification of gravel deposits as aquifers. For a gravel deposit to be classified as an aquifer it must have a high permeability and be a minimum 10m thickness over an area of at least 1km^2. This would classify it as being of local importance. To be classified as a Regionally Important aquifer, the deposit must fulfil these criteria but have an aerial extent of >10km^2. The contour map illustrates that significant thicknesses of gravel >10m over an areal extent of at least 1km^2 do not occur beneath the landfill footprint. Therefore the sand and gravel deposits underlying the thick clays beneath the landfill footprint cannot be classified as an aquifer in their own right.

The hydrogeological significance of the gravel deposits is that, where they occur, they are in hydraulic connectivity with the underlying bedrock and thus provide additional storage to the bedrock aquifer. However, the predominant hydrogeological pathway is within the bedrock aquifer itself.

4) Cross referencing Figure 8 and Figure 4 indicates that BGB2 is within the *Naul* Formation not the Loughshinny. To clarify, a map (**Figure 21.3**) is attached depicting underlying bedrock geology with bedrock borehole locations superimposed. The Naul and the Loughshinny bedrock formations have been grouped together by the GSI along with the Lucan Formation as the same Locally Important aquifer which is generally moderately productive (Lm).

[1] There are two locations (ASA3 and GR01) where a clay thickness of ≥10m after cutting was not conclusively proven. Additional investigations will be carried out at these locations and if not found then the landfill contours will be adjusted in these areas to ensure a minimum underlying clay thickness of 10m. A further area at the southern boundary of the landfill, north of GS10 may possibly be investigated for similar reasons.



Ordnance Survey Ireland

Project	Fingal Landfill Project	Figure	21.2
Title	Extent of Gravel Deposits Underlying Low-Permeability Superficial Deposits		

Fingal County Council
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Issue Details			
Drawn:	DF	Project No.	MDR0303
Checked:	WO	File Ref.	
Approved:	FC	MDR0303MI0003A01	
Scale:	1:15,000 @ A4	Drawing No.	Rev.
Date:	13.12.2006	MI0003	A01

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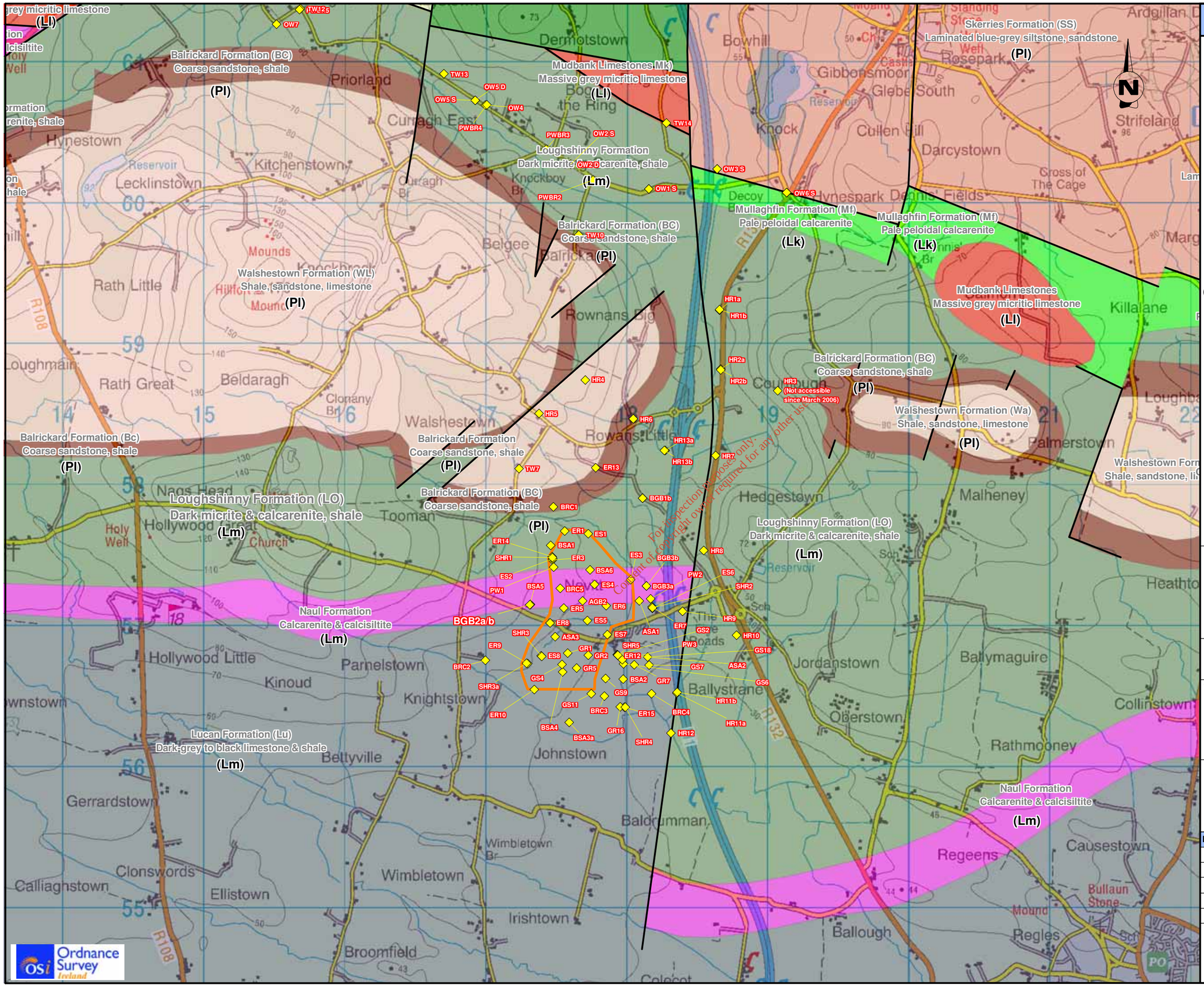

Legend

- Bedrock Geology
- Footprint of the Proposed Landfill
- Monitoring Well
- A' Cross Section

Bedrock Aquifer Classification

- (Lk) Locally Important, Karst
- (Ll) Locally Important, Moderately productive only in local zones
- (Lm) Locally Important, generally moderately productive
- (Pl) Poor, generally unproductive except for local zones
- (U) Unclassified/Unknown

Fingal County Council
Comhairle Contae Fhine Gall

Project
Fingal Landfill

Title
Bedrock Geology with Monitoring Wells

Figure 21.3

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Issue Details

Drawn:	HS/SK/CR/AA	Project No.	MDR0303
Checked:	FC/YC	File Ref.	MDR0303MI0207A09
Approved:	SH		
Scale:	1:25000 at A3	Drawing No.	MI0207
Date:	13/12/2006	Rev.	A09

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21.3 REQUEST FOR INFORMATION

EIS volume 5 Factual Ground Investigation Report (No 9716) indicates the locations of BGB2 and BGB3 are switched when compared to Figure 8 referred to above. Given these inconsistencies please clarify the borehole locations and provide an assessment of the impact of any misinterpretations due to this inconsistency (e.g. impact on groundwater contours, aquifer productivity assessment and other assessments in which the data were employed).

21.4 RESPONSE TO REQUEST

BGB2 and BGB3 were incorrectly located within EIS Volume 5 Factual Ground Investigation Report (No 9716). Similarly BSA2 and BSA4 were mis-located in this report. However, in all other locations within the EIS document, including ground water contour maps, these boreholes have been correctly located. Therefore there are no misinterpretations due to the error in EIS Volume 5 Factual Ground Investigation Report (No 9716).

An A3 size drawing of the site area (**Figure 21.4**), landfill footprint; licensed area boundary and confirmed locations of all boreholes is attached.

21.5 REQUEST FOR INFORMATION

Provide an A3 size drawing of the site area, including the following:

- *Landfill footprint*
- *Licensed area boundary*
- *Confirmed locations of all boreholes*

21.6 RESPONSE TO REQUEST

Landfill footprint, licensed area boundary and confirmed locations of all boreholes are shown in **Figure 21.4.**

21.7 REQUEST FOR INFORMATION

5) *Provide information on any historical quarrying known to have been carried on at the site or in the vicinity of the site (based on existing knowledge or a historical map search). Identify any potential impact associated with these operations. In relation to the existing landfill identified at the site, provide information on the age of the landfill and the period over which landfilling took place.*

21.8 RESPONSE TO REQUEST

A search of the 6-inch to a mile OSI sheets was conducted in the Geological Survey of Ireland (GSI) and in the Map Library of Trinity College Dublin. Sheets 4, 5, 7 and 8 of the North Dublin area were viewed in both cases. Historical maps from the years 1843, 1869, 1906 and 1937 were viewed in the Map Library.

No quarries were found within the proposed Landfill Site. Two quarries were noted in the townland of Hollywood Great, west of Tooman, approximately half a mile to west of the Landfill site. A quarry was located almost a mile to the north of the Landfill site in the townland of Balrickard. A quarry was also located in the townland of Parnellstown to the west of the outer edge of the Landfill Site. These quarries were noted only on the 1843 set of maps. Although later maps may have recorded a feature at these locations, the feature was not recorded as a quarry. There is some anecdotal evidence that sand or gravel for local use was taken from the historical waste area to the east of the proposed disposal footprint.

No impact on these quarries is identified as a result of the proposed development.

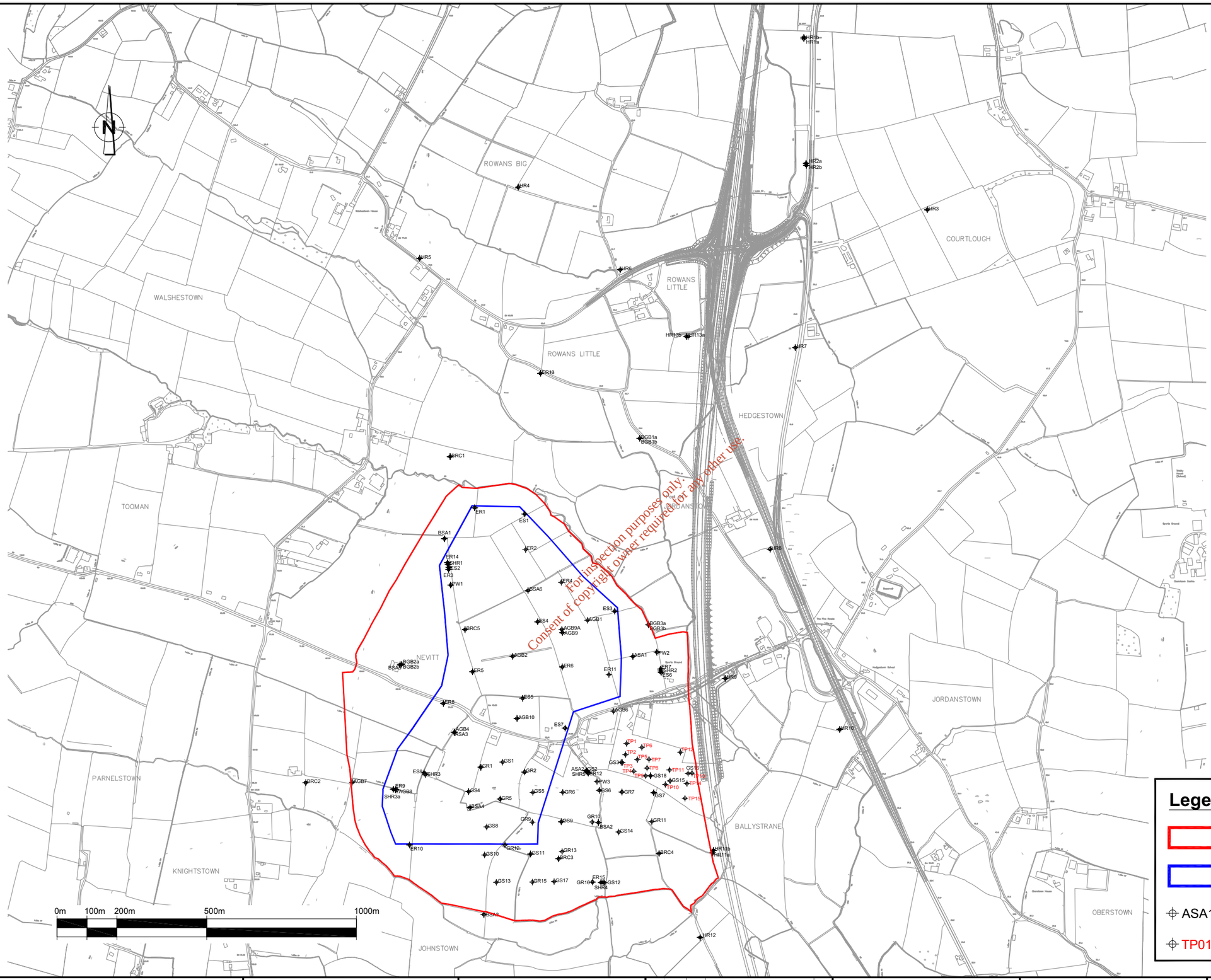
Landfilling occurred at the existing landfill site from 1994 until its closure in 2000.

21.9 REQUEST FOR INFORMATION

6) *Provide a bedrock contour map for the site area.*

21.10 RESPONSE TO REQUEST

A bedrock contour map depicting the elevation of the bedrock surface is given on **Figure 21.5.** In addition, the thickness of clay deposits underlying the site area has been provided in **Figure 21.6**. The clay deposits offer protection to the underlying groundwater quality.



Client:

Fingal County Council
Comhairle Chontae Fhine Gall

FINGAL COUNTY COUNCIL
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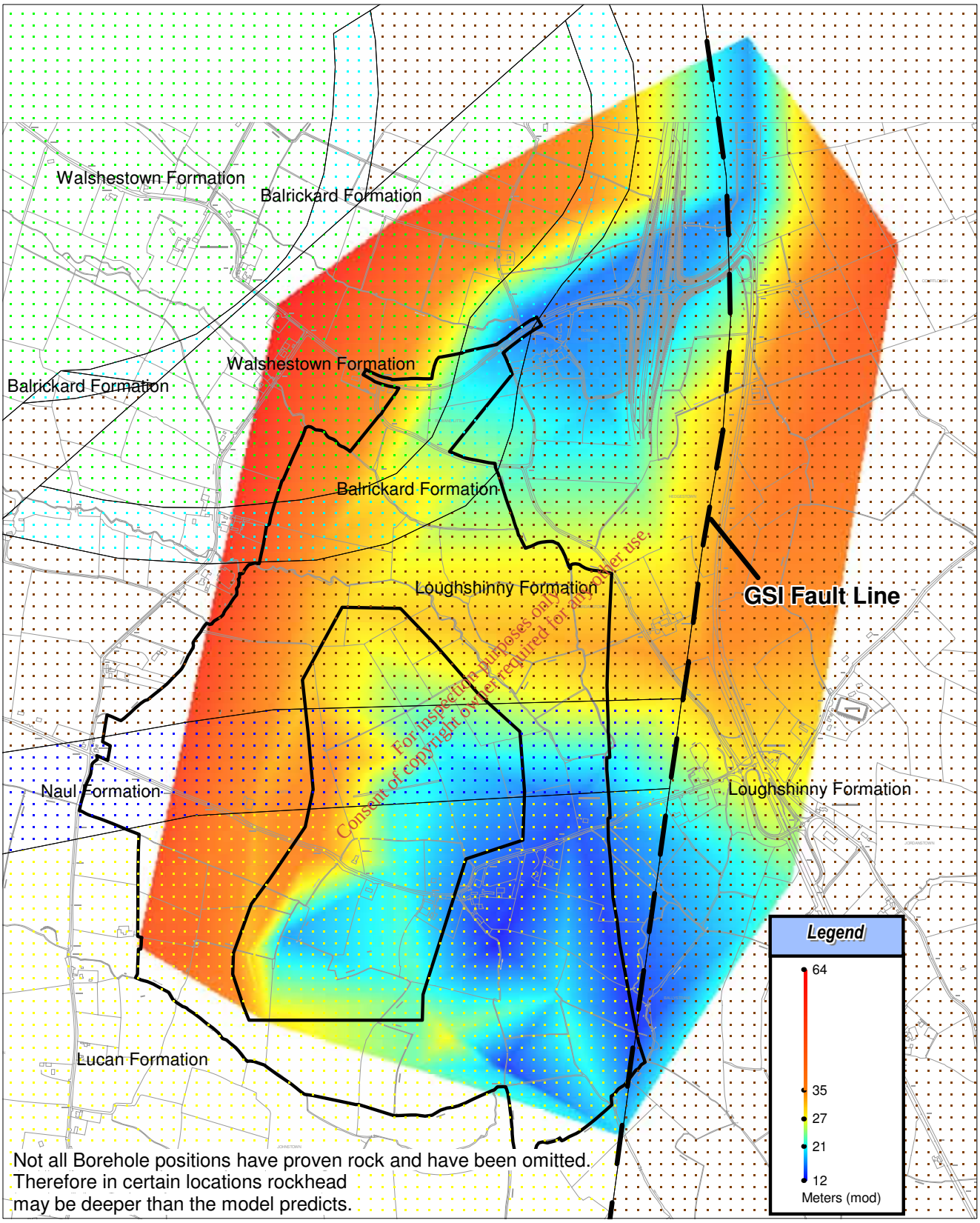
No.	Date	DR / PC	Amendment / Issue	App.
A01	Dec'06		Issue for Approval	SH

Project: FINGAL LANDFILL PROJECT

Title: BOREHOLE LOCATIONS

Drawn by:	HF	Job No: MDR0303	
Checked by:	FC	File No: MDR0303Fg0021.4A01	
Approved by:	SH	Drg. No: Fig. 21.4	Rev: A01
Scale: 1:12,500@A3			
Date: Dec. '06			



Ordnance Survey Ireland

Project	Fingal Landfill Project
Figure	21.5
Title	Bedrock Geology and Rockhead Elevation

Fingal County Council
Comhairle Contae Fhine Gall

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Issue Details			
Drawn:	DF	Project No.	MDR0303
Checked:	WO	File Ref.	
Approved:	FC	MDR0303MI0004A01	
Scale:	1:15,000 @ A4	Drawing No.	Rev.
Date:	13.12.2006	MI0004	A01

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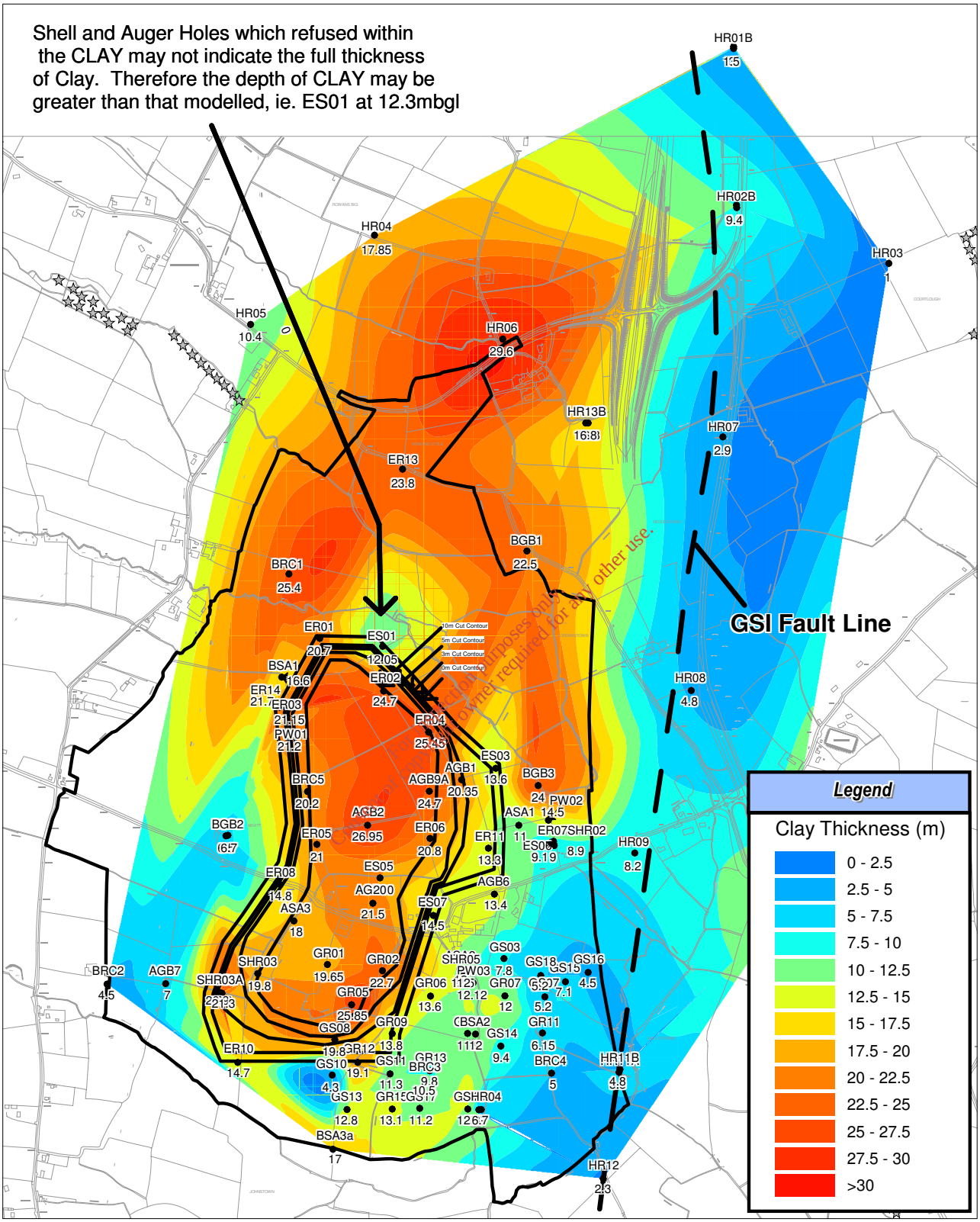

Project	Fingal Landfill Project	Figure	21.6
Title	Clay Thickness		

Fingal County Council
Comhairle Contae Fhine Gall

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Issue Details			
Drawn:	DF	Project No.	MDR0303
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Approved:	FC		MDR0303MI0006A01
Scale:	1:15,000 @ A4	Drawing No.	Rev.
Date:	13.12.2006	MI0006	A01

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22 SECTION J

22.1 REQUEST FOR INFORMATION

Provide information on possible contamination of ground, groundwater, or surface water from fire-water run-off in the event of a fire on-site and any provision for containment.

22.2 RESPONSE TO REQUEST

It is predicted that there are two independent areas within the landfill facility where fires may occur on site. The first is within the waste body. In the case of a fire within the waste body, which requires water to dose the fire, this water will be collected in the leachate collection system and transferred with the leachate to the leachate treatment plant. It is predicted that the volume of leachate generated from the fire water run-off in a small incidence will be insignificant in comparison with the leachate being generated and as such will have no effect on the leachate treatment system.

The second area is the reception /administration area within the site. Surface water management systems exist within this area and the run-off will be directed to a dedicated firewater holding pond. This fire pond will be separate from the surface water attenuation ponds and the water can be contained within this pond till such a time as it may be tankered off site for treatment at a dedicated facility or if suitable be treated in the on-site leachate treatment plant and discharged to the sewer.

23 ARTICLE 13 COMPLIANCE REQUIREMENTS

23.1 EIS NON-TECHNICAL SUMMARY

Provide a summary of the alternatives considered and the site selection process for the proposed development.

Please update the EIS documents as necessary, having regard to information requested in 'Article 12 Compliance Requirements'.

Your reply to this notice should include a revised non-technical summary (Application Form and EIS) which reflects the information you supply in compliance with the notice, insofar as that information impinges on the non-technical summary.

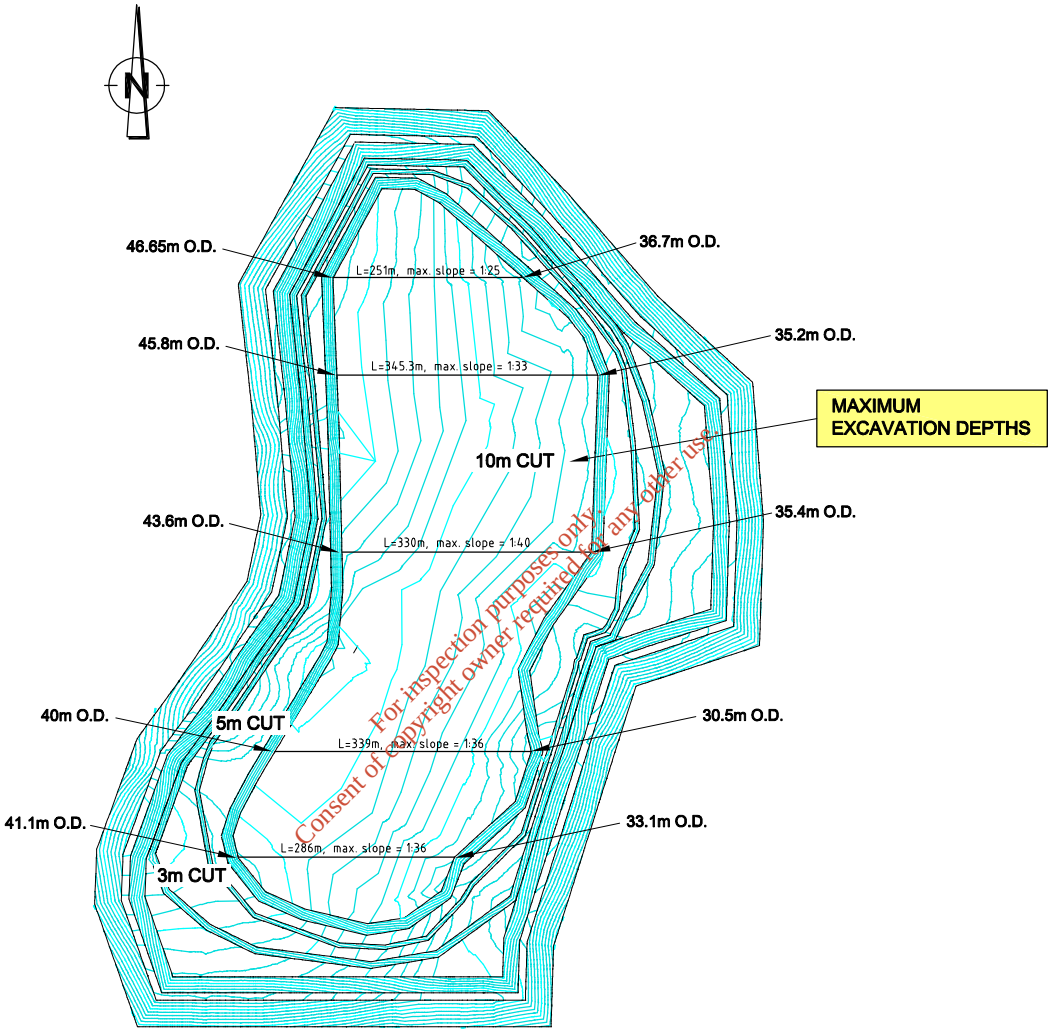
In the case where any drawings already submitted are subject to revision consequent on this request, a revised drawing should be prepared in each case. It is not sufficient to annotate the original drawing with a textual correction. Where such revised drawings are submitted, provide a list of drawing titles, drawing numbers and revision status, which correlates the revised drawings with the superseded versions.

Please supply the information in the form of a one original plus two copies within 6 weeks of the date of this notice. In addition submit sixteen copies of the requested information to the Agency in electronic searchable PDF format on CD-ROM. Please note that all maps/drawings should not exceed A3 in size.

*Please note that the application's register number is **W0231-01**. Please direct all correspondence in relation to this matter to **Noeleen Keavey, Licensing Unit, Office of Licensing & Guidance, Environmental Protection Agency, Headquarters, PO Box 3000, Johnstown Castle Estate, County Wexford** quoting the register number.*

23.2 RESPONSE TO REQUEST

An updated version of the EIS Non-Technical Summary, Volume 1 accompanies this Notice Response as a separate document.



Client:		NOTES			Project:	Title:	
FINGAL COUNTY COUNCIL **Comhairle Chontae Fhine Gall** County Hall, Swords, Co. Dublin Phone: 01 890 5000 Fax: 01 890 5809	RPS Consulting Engineers **RPS Consulting Engineers, Carnegie House, Library Road, Dun Laoghaire, Co. Dublin, Ireland.** T: +353 1 202 0870 - F: +353 1 202 0707 E: ireland@rpsgroup.com W: www.rpsgroup.com/ireland	1. This drawing is the property of RPS Consulting Engineers, it is a confidential document and must not be copied, used, or its content divulged without prior written consent. 2. All Levels refer to Ordnance Survey Datum, Malin Head. 3. DO NOT SCALE, use figured dimensions only, if in doubt ask.	No.	Date	Amendment / Issue	App.	FINGAL LANDFILL PROJECT	Response to Section D.3.f *(Article 14, 11/10/2006)*
			A01	Dec'06	Issue for Approval	LO'T		

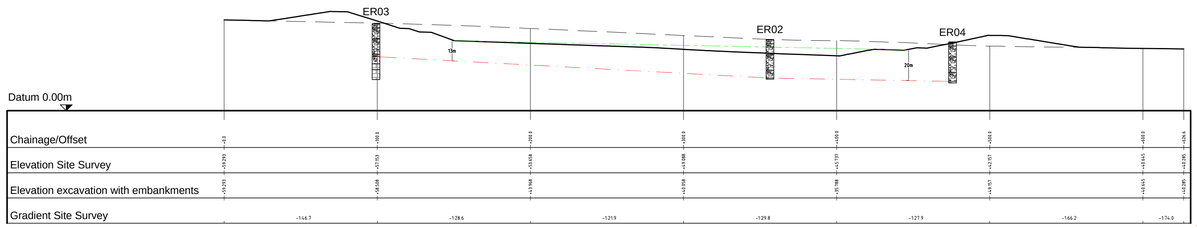
Drawn by:	HF	Job No: MDR0303	
Checked by:	EB	File No: MDR0303FG008.1A01	
Approved by:	LO'T	Drg. No: Fig. 8.1	Rev: A01
Scale: 1:10,000 @ A4			
Date: Dec. '06			

Legend (Cross Section) :

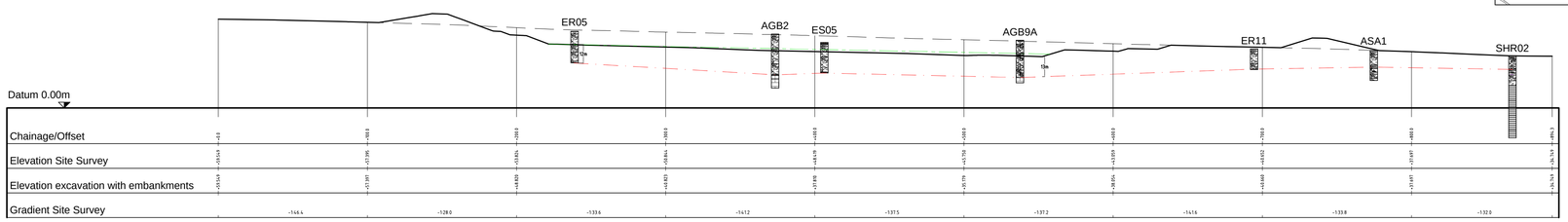
- Existing Ground Level
- Max. Excavation Depth
- Depth of Clay
- Slope 1:50
- Clay (Boulder)
- Gravel
- Bedrock
- Bedrock

Legend (Plan) :

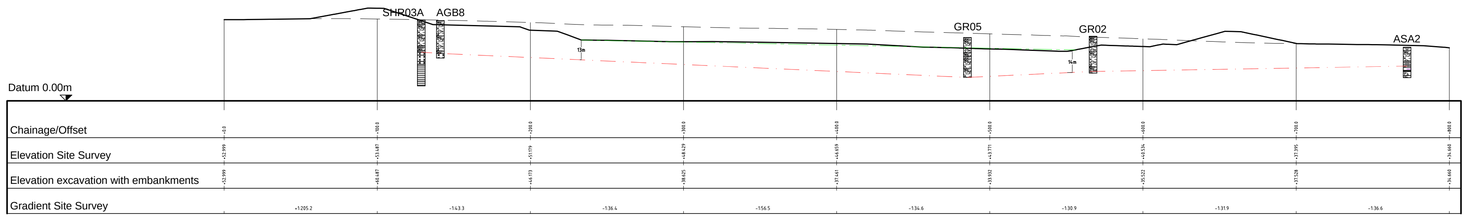
- Licensed Area Boundary
- Landfill Footprint
- 0m Cut Contour
- 3m Cut Contour
- 5m Cut Contour
- 10m Cut Contour



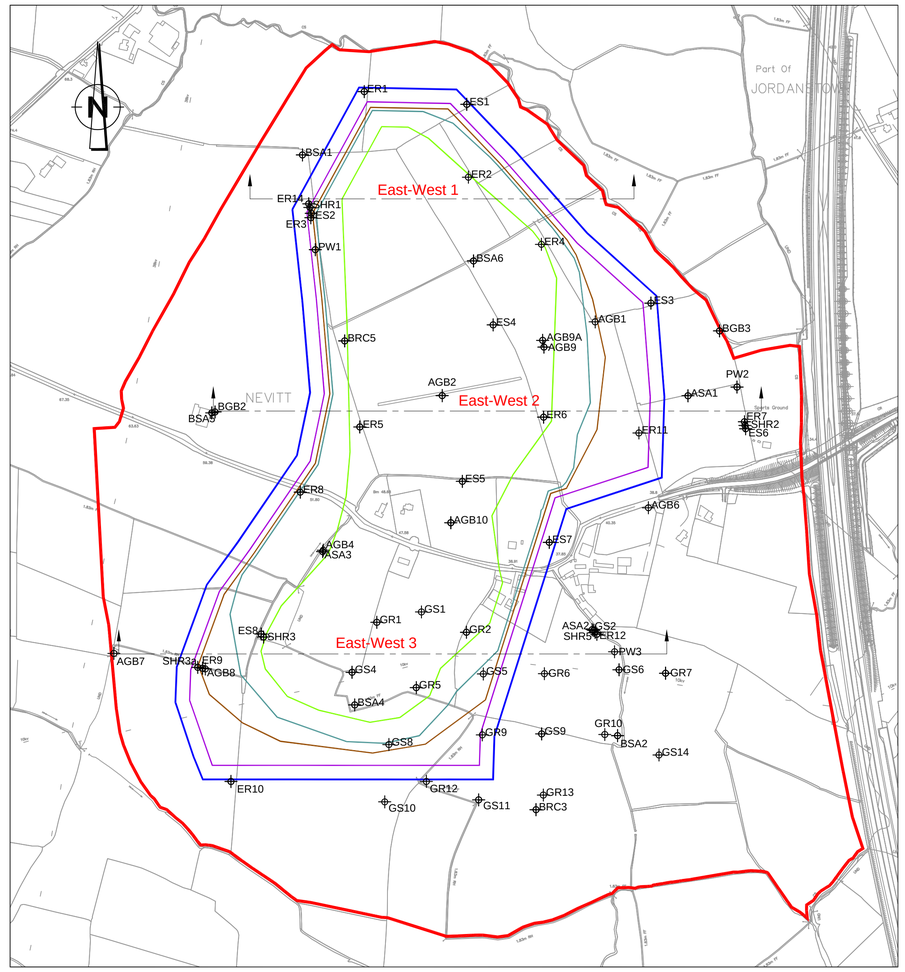
SECTION EAST-WEST 1
HORZ. SCALE 1:250
VERT. SCALE 1:250



SECTION EAST-WEST 2
HORZ. SCALE 1:250
VERT. SCALE 1:250



SECTION EAST-WEST 3
HORZ. SCALE 1:250
VERT. SCALE 1:250



Location Plan of Cross Sections
(Scale 1:5000)

Notes :

Sections are drawn in an East-West direction and the locations of some of the boreholes are offset from these lines. This is why some boreholes are not shown at existing ground levels on the sections.
These sections illustrate existing ground level and the max excavation depths of the landfill footprint. In addition a line showing a fall of 1:50 has been projected onto the base of the max excavation depths. These sections are provided to illustrate that the maximum excavation depths still fulfill the fall requirements (1:50 slope) within cells to allow for adequate leachate control.
The final cell layout and depths will be determined at detailed design stage and will be submitted as part of the SEW procedure. The basis of any detailed design will be the retention of a minimum of 10m clay overburden underneath the basal cell layers.

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NOTES

1. This drawing is the property of RPS Consulting Engineers, it is a confidential document and must not be copied, used, or its content divulged without prior written consent.
2. All Levels refer to Ordnance Survey Datum, Malin Head.
3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date	BY / CK	Amendment / Issue	App.
A01	Dec'06	HF / EB	Issue for Approval	LO'T

Project:
FINGAL LANDFILL PROJECT

Title:
Response to Section D.3.f
(Article 14, 11/10/2006)

Drawn by:	HF	Job No:	MDR0303
Checked by:	EB	File No:	MDR0303FG008.1A01
Approved by:	LO'T	Drg. No:	Fig. 8.1
Scale:	As shown @ A1	Rev:	A01
Date:	Dec. '06		