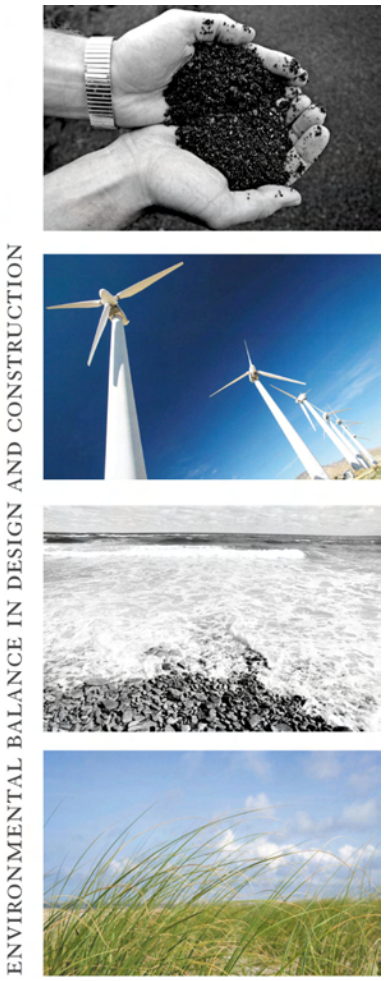


CONNAUGHT REGIONAL RESIDUAL LANDFILL, CO. GALWAY

ANNUAL ENVIRONMENTAL REPORT:

Report Period: January 2009 – December 2009

WASTE LICENCE REF. NO. W0178-01

Original

March 2010

FEHILY TIMONEY & COMPANY

CONNAUGHT REGIONAL RESIDUAL LANDFILL, CO. GALWAY

ANNUAL ENVIRONMENTAL REPORT:

Report Period: January 2009 – December 2009

WASTE LICENCE REF. NO. W0178-01

User is Responsible for Checking The Revision Status Of This Document

Rev. Nr.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
A	Draft Issue to Client	DB	DD	BG	22.03.10
0	Issue to Client	DB	C.Ryder/ K.Breslin	BG	31.03.10

Client: Greenstar

Keywords: Annual Environmental Report, landfill environmental monitoring, residual landfill

Abstract: This report details the Annual Environmental Report for the Connaught Regional Residual Landfill, Co. Galway for the reporting period from 1st January 2009 to 31st December 2009. This report was prepared in order to fully comply with the requirements of the EPA Waste Licence Reg. No. W0178-01.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF APPENDICES

1. INTRODUCTION

The Environmental Protection Agency (EPA) issued Greenstar with Waste Licence Reg. No. W0178-01 for its landfill at Killagh More, Ballybaun, Ballintober, Ballinasloe, County Galway on 26 July 2004. The facility is located approximately 2 km south west of Kilconnell village. The facility has been in operation since December 2005. Greenstar retained Fehily Timoney & Company (FTC) to prepare the Annual Environmental Report (AER) for the facility for the reporting period January 2009 to December 2009. This report has been prepared in accordance with Condition 11.11 and Schedule G of the waste licence.

The facility is situated in east County Galway, approximately 16 km west of the town of Ballinasloe. The landfill is located in an area bounded to the north by the Athenry to Ballinasloe road (R348) with local roads immediately to the east and south; the L7442 and the L7439, respectively. A site location map is provided in Appendix I.

This report addresses Condition 11.11 of the waste licence for the facility.

Condition 11.11 states that:

11.11.1 The licensee shall submit to the Agency for its agreement, within thirteen months from the date of grant of this licence, and by March 31st each year thereafter an Annual Environmental Report (AER).

11.11.2 The AER shall include as a minimum the information specified in Schedule G: Content of Annual Environmental Report of this licence and shall be prepared in accordance with any written relevant guidance issued by the Agency.

This report addresses the items listed in *Schedule G: Content of Annual Environmental Report* of the waste licence for the facility. This AER covers the reporting period from 1st January 2009 up to 31st December 2009.

2. WASTE ACTIVITIES & RECORDS

2.1. Waste Activities Carried out at the Facility

The Connaught Regional Residual Landfill (CRRL) is a fully engineered and contained landfill site. It is licensed to accept 100,000 tonnes per annum of waste, as follows:

Waste Type	Maximum (Tonnes per Annum)
Household	45,000
Commercial	27,500
Industrial non-hazardous	27,500
Total	**100,000**

Note 1: The tonnage of household waste, commercial waste and industrial waste may be altered with the prior agreement of the Agency provided that the total amount of these wastes accepted at the facility does not exceed the combined tonnage of 100,000 tonnes per annum (as specified in the total above).

The facility is also licensed to accept 27,320 tonnes per annum of Inert Waste for recover for the purposes of restoration and aftercare.

Waste activities at the facility are restricted to those outlined in *Part 1 - Activities Licensed* of the Waste Licence.

Licensed waste disposal activities, in accordance with the Third Schedule of the Waste Management Acts 1996 to 2008

Class 1. **Deposit on, in or under land (including landfill)**
This activity is limited to the disposal of non-hazardous waste into lined cells

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 5 **Specially engineered landfill, including placement into lined discrete cells which are capped and isolated from one another and the environment.**
This is the principal activity. This activity is limited to the disposal of non-hazardous waste into lined cells.

Class 6 **Biological treatment not referred to elsewhere in this Schedule which results in final compounds of 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 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 was 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.

Licensed waste recovery activities, in accordance with the Fourth Schedule of the Waste Management Acts 1996 to 2008

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.

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 is limited to 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.

2.2. Waste Quantities and Composition 2005-2009

The quantities and types of wastes accepted for disposal and recovery at CRRL are presented in Table 2.1 for the years 2005, 2006, 2007, 2008 and 2009.

Table 2.1 Waste Quantities Accepted at CRRL from 2005 - 2009

Waste Type	Description	Total Accepted 2005 (tonnes)	Total Accepted 2006 (tonnes)	Total Accepted 2007 (tonnes)	Total Accepted 2008 (tonnes)	Total Accepted 2009 (tonnes)	Licence Limit (tonnes)[Note]
Household		-	44,221.00	46,733.69	66,578.41	61,470.22	45,000
Commercial		-	27,024.00	27,494.63	30,730.16	35,500.04	27,500
Industrial non-hazardous	Misc. Non-Hazardous Industrial solid wastes	-	27,023.00	27,402.73	999.52	2667.85	27,500
Total Waste Intake		**161.50**	**98,268.00**	**101,631.05**	**98,308.09**	**99,638.11**	**100,000**
Inert wastes used for recovery purposes		-					
Cover / Engineering Material	Shredded timber - reused on site	-	2,690	4,482.60	6,950.90	4121.50	
Cover / Engineering Material	Recovered C&D Rubble	-	1,202	989.14	255.01	-	-
Cover / Engineering Material	Soil and fine material reused on site for daily and intermediate cover and liner protection	-	14,538	23,692.17	6,711.11	803.32	-
Total Waste Recovered		**-**	**18,430**	**29,163.91**	**13,917.02**	**4,924.82**	**27,320**
Total Site Intake		**-**	**116,698**	**130,794.96**	**112,225.11**	**104,562.93**	**127,320**

Note: *EPA agreement has been received concerning the redistribution of annual tonnages within Schedule A waste categories*

2.3. Calculated Remaining Capacity of the Facility

It is estimated that the facility accepted approximately 120,000 m^3 of waste in 2009. The remaining capacity of the facility has been calculated to be 947,125 m^3.

2.4. Methods of Deposition of Waste

Waste is delivered to the CRRL facility in heavy goods vehicles (HGVs) with the appropriate covers in place to prevent any loss of load. Each HGV passes over a weighbridge prior to proceeding to the active waste disposal area and the weight of the vehicle plus load is recorded. The weighbridge operator and/or facility manager may, at their discretion, request that the load be tipped in the Waste Inspection Area. Waste vehicles then proceed to the active waste disposal area where waste is deposited under the direction of a banks man.

Waste is deposited directly on a surface of waste close to and above the advancing tipping face. In accordance with Condition 5.3.1 of the Waste Licence, the active working face is confined to a height of 2.5 metres after compaction, a width of 25 metres and a slope no greater than 1 in 3. Deposited waste is spread in shallow layers on the inclined surface and compacted. The steel-wheeled compactor operates on the gradient of the more shallow face, pushing thin layers of wastes and applying compaction pressure to them. Light waste is mixed with heavier materials or covered with permeable soil drawn from stockpiles of heavy inert waste or fine sand stockpiles located on the site. Alternative fabric cover systems are also utilised as appropriate.

3. REPORT ON ENVIRONMENTAL EMISSIONS

This section of the AER has been compiled in accordance with emission limit values (ELVs) for the following media as detailed in Condition 6 and Schedule C of the waste licence for the facility.

3.1. Dust Deposition Limits

Dust deposition emission limit values are stipulated in Schedule C.3 of the waste licence, as follows:

Level ($mg/m^2/day$)
350

Dust monitoring was conducted at five locations on a quarterly basis during the 2009 reporting period. Monitoring of dust was carried out at the locations shown on Drawing No. 1322/01/101, Appendix I. Southern Scientific Services Ltd carried out the analysis of the dust deposition results from the facility. The certificates of analysis were included in the quarterly reports issued to the Agency.

Dust monitoring showed dust deposition at the facility to be below the ELV on all monitoring occasions during the reporting period.

3.2. Noise Emissions

Noise limits are stipulated in Schedule C.1 of the waste licence, as follows:

Day dB L_{Aeq} (15 minutes)	Night dB L_{Aeq} (15 minutes)
55	45

Noise monitoring was conducted at five locations on a quarterly basis during the 2009 reporting period and the results were issued to the Agency as part of the quarterly reports.

The measured noise levels, as represented by the L_{Aeq} over a 30-minute period, were all below the ELV of 55 dB for daytime noise, with the exception of the noise levels at N5 in Quarter 1. The dominant source of noise at N5 is persistent traffic on the R348 which is within 200 m of the monitoring location. N5 is the furthermost noise monitoring point from the landfill.

3.3. Landfill Gas Concentrations (in any buildings on/adjacent to the facility)

Landfill gas ELVs are stipulated in Schedule C.2 of the waste licence, as follows:

Methane	Carbon Dioxide
20 % LEL (1% v/v)	1.5% v/v

3.3.1. Landfill gas monitoring wells

Measured methane concentrations exceeded the emission limit in one well during Quarter 1 (LG5), in 5 no. wells during Quarter 2 (LG5, LG11, LG19, LG23 and LG24), in 8 no. wells during Quarter 3 (LG5, LG9,

LG11, LG19, LG21, LG22, LG23 and LG24) and in 9 no. wells in Quarter 4 (LG5, LG9, LG10, LG11, LG18, LG19, LG22, LG23 and LG24).

Elevated carbon dioxide concentrations were also recorded during the reporting period. The levels of carbon dioxide exceeded the emission limit in 9 no. wells during Quarter 1 (LG5, LG6, LG6-A, LG8, LG12, LG15, LG16, LG18 and LG20), in 11 no. wells in Quarter 2 (LG5, LG6, LG8, LG11, LG12, LG18, LG19, LG23, LG24, LG27 and LG28), in 15 no. wells in Quarter 3 (LG4, LG5, LG8, LG9, LG11, LG15, LG16, LG18, LG19, LG21, LG22, LG23, LG24, LG25 and LG28) and in 14 no. wells in Quarter 4 (LG4, LG5, LG6-A, LG9, LG11, LG16, LG18, LG19, LG20, LG22, LG23, LG24, LG25 and LG26). All results were reported to the Agency in a landfill gas incident report after each monthly monitoring event and also incorporated into the quarterly reports.

Gas monitoring carried out by White Young & Green (WYG) at Connaught Regional Residual Landfill in December 2005, prior to waste acceptance at the facility, identified elevated CH_4 & CO_2 levels at several perimeter boreholes. Their report concluded that elevated levels of CH_4 and CO_2 could be attributed to the large quantities of peat deposited in the area of the monitoring wells. A literature search carried out for that report demonstrated that the levels of carbon dioxide and methane measured in the landfill gas monitoring wells could be attributed to the natural background levels from the continuous decay of organic peat.

3.4. Surface Water Discharge Limits (measured at SW6 and SW7)

Surface water discharge emission limit values at monitoring locations SW6 and SW7 are stipulated in Schedule C.4 of the waste licence, as follows:

Level (Suspended Solids mg/l)
35

Suspended solids concentrations at SW6 and SW7 were below the 35 mg/l ELV throughout the 2009 reporting period. The results were included in the quarterly reports issued to the Agency.

4. SUMMARY ENVIRONMENTAL RESULTS

Environmental monitoring was carried out at the facility throughout the reporting period in accordance with Schedule D of the waste licence. All monitoring results were presented to the Agency in the quarterly reports and a summary of the monitoring results is presented below. The locations of all monitoring points are illustrated on Drawing No. 1322/01/101, Appendix I.

4.1. Biological Assessment

4.1.1. Electro-fishing Survey

Stillwaters Consultancy was commissioned to undertake an electro-fishing survey on selected sites in the environs of the CRRL and the survey was carried out on 2nd September 2009. The objective of the survey was to characterise fish populations in streams in the vicinity of the landfill site.

The report by Stillwaters Consultancy was provided to the Agency as part of the quarterly report for Quarter 3 2009 but the results of the survey are summarised in the table below and compared to results obtained in 2007 and 2008.

The report concluded that there were no major changes to species composition at the chosen sites to indicate that the landfill area is impacting on them.

Table 4.1 Summary of Electro-fishing Survey Results 2009

Site	Location	Site description	Species Recorded 2007	Species Recorded 2008	Species Recorded 2009
Site A	M 708 297	Overgrown bog drain. Peaty substrate.	Sticklebacks (c)	Sticklebacks (p)	Sticklebacks (p) Gammarus (p)
Site B	M 712 302	Bog drain ca. 1.5m deep, very overgrown.	No Sampling	Sticklebacks (p)	Stickleback (p)
Site C	M 707 304	Shallow stream ca. 5-10cm. Clean gravely substrate maintained by local farmer.	Sticklebacks (a) Gammarus (a)	Sticklebacks (c) Gammarus (p)	Sticklebacks (p) Gammarus (p)
Site D	M 709 309	Channel completely overgrown. Upstream Site surveyed in 2008	Sticklebacks (a) Crawfish (p)	Sticklebacks (c)	No species Recorded
Site E	M 699 313	Mainly silt with some rock.Channel overgrown except for stretch fished	Trout 1+ (c) Sticklebacks (c)	Stickleback (p)	Trout 1+ (p) Sticklebacks (p)
Site G	M 682 308	Shaded channel under bank cover. Good gravel and cobble substrate, Suitable salmonid habitat	Trout 0+ (c) Trout 1+ (c) Stoneloach (p) Stickleback(p) Crawfish (p)	Trout 0+, 1+ (c) Stoneloach (p) Sticklebacks (p) Crawfish (pl) Gudgeon (p)	Trout 0+ (pl) Trout 1+ (c) Stoneloach (p) Sticklebacks (p) Crawfish (p)

4.1.2. Macroinvertebrate Survey

Biological monitoring of surface water quality by an assessment of the macroinvertebrate community present was undertaken in accordance with Schedule D of the waste licence on the 16th July 2009 at four locations, IN1 – IN4. The detailed results of the survey were reported as part of the quarterly report for Quarter 3 2009.

A summary of the results from the survey is presented in the table below. When the results were compared to previous surveys since 2000 it showed that biological water quality appears to have deteriorated slightly at IN1, IN2 and IN3 but to have remained the same at IN4. The fact that the slight drop in biological water quality occurs both upstream and downstream of the site indicates that the deterioration is not likely to be as a result of activities on site.

Table 4.2 Summary of Macroinvertebrate Survey Results 2009

Sample	Water Quality	Quality Status	Q Index
IN1	Poor	Seriously Polluted	Q2
IN2	Poor	Seriously Polluted	Q2
IN3	Poor	Seriously Polluted	Q2
IN4	Doubtful	Moderately Polluted	Q3

Upon the recommendation of the Agency, the Small Stream Risk Score (SSRS) assessment will be used from 2010 onwards to assess the macroinvertebrate communities in the surface water environment surrounding the facility.

4.2. Surface Water Quality

Two surface water bodies are sampled on a quarterly basis, namely the Killaghmore Stream, which runs north to south to the west of the facility and the Ballintober Stream which flows east to west adjacent to part of the northern boundary of the site. 7 no. monitoring locations are sampled in accordance with Schedule D of the licence and these are shown on Drawing No. 1322/01/101 which is included in Appendix I. However, the SW2 was found to be dry on all occasions so the results for the other 6 locations were reported to the Agency as part of each quarterly report.

4.2.1. Surface Water Monitoring Results

The figures below present the results of the surface water monitoring undertaken in February, May, July and November of 2009. pH results were relatively consistent but the levels at all locations decreased slightly in the November 2009 monitoring event. The electrical conductivity results were also relatively consistent throughout the reporting period, with a slight increase in the July 2009 results and a decrease in the November 2009 results. All results for pH and conductivity were within normal ranges for surface water.

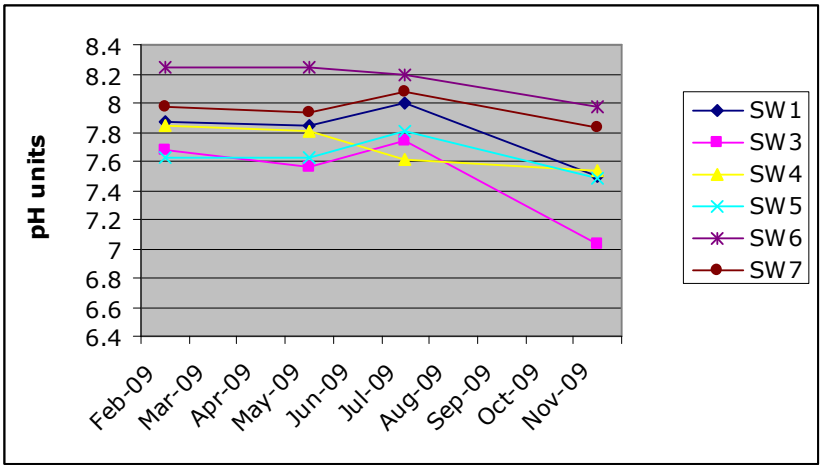


Figure 4.1 pH Results for Surface Water at CRRL - 2009

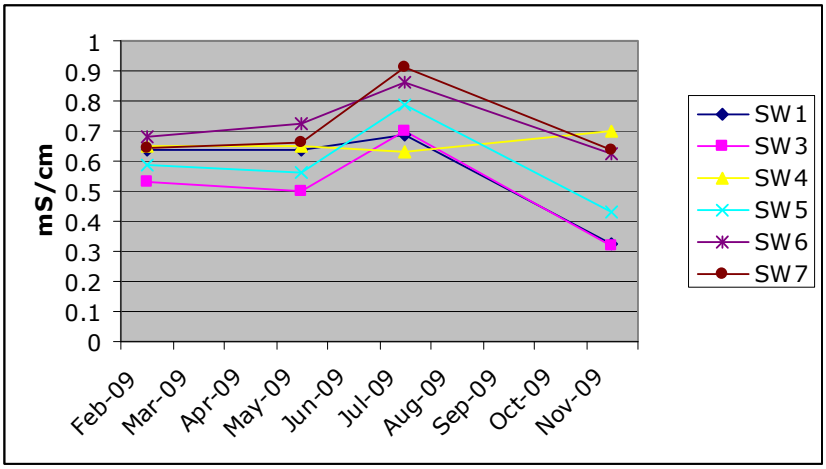


Figure 4.2 Electrical Conductivity Results for Surface Water at CRRL - 2009

The results for chloride and ammoniacal nitrogen in the surface waters surrounding the CRRL facility are presented below. There was a peak in the levels of both parameters in the February 2009 monitoring event but the levels stabilised for all monitoring locations over the last three quarters of 2009.

The levels of suspended solids were all within the normal range for surface waters with the exception of a peak of 54 mg/l recorded at SW1 in the July 2009 monitoring event. The SW1 monitoring location is upstream of the facility and is therefore not influenced by activities at the facility. The levels returned to normal in November 2009 and the limit of 35 mg/l for suspended solids recorded at SW6 and SW7 was not exceeded throughout the reporting period.

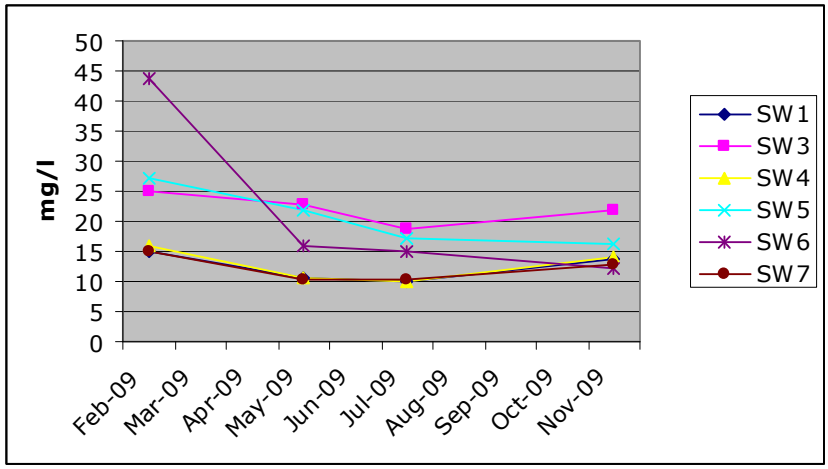


Figure 4.3 Chloride Results for Surface Water at CRRL - 2009

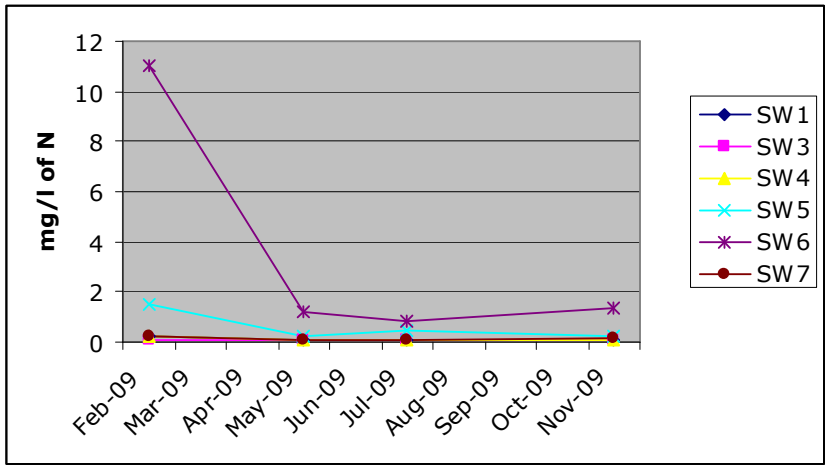


Figure 4.4 Ammoniacal Nitrogen Results for Surface Water at CRRL - 2009

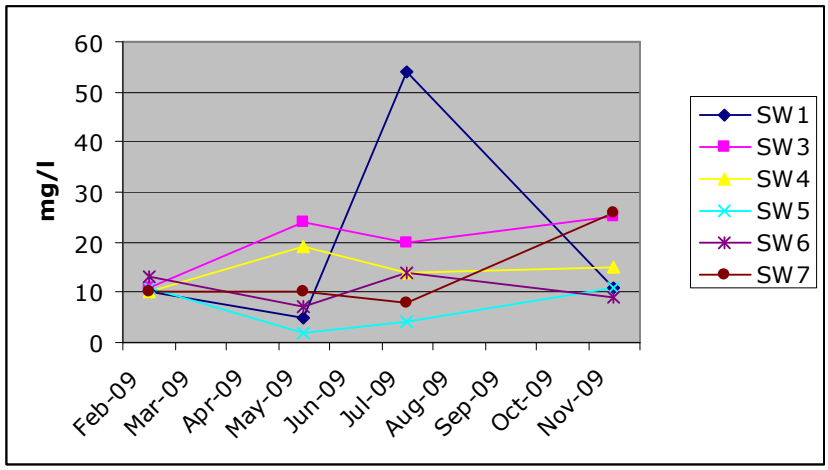


Figure 4.5 Total Suspended Solids Results for Surface Water at CRRL - 2009

4.3. Groundwater Quality

Groundwater monitoring was undertaken at 8 no. groundwater wells on the site during the reporting period and the results were reported to the Agency as part of the quarterly reports for the facility. The wells were monitored in accordance with Schedule D of the waste licence.

The trigger levels for groundwater were set out in the 2008 AER and are presented below. These have been reviewed and it is recommended that they should remain unchanged for 2010.

Table 4.3 Groundwater Trigger Levels at CRRL

Parameter	Units	GW1A	GW2	GW3	GW4A	GW5A	GW6	GW7	GW8
Ammoniacal Nitrogen	mg/l	1.92	6.36	5.40	3.60	8.52	7.44	2.40	3.72
Chloride	mg/l	20.40	46.80	24.0	39.60	32.40	24.0	18.0	37.20
Potassium	mg/l	1.92	2.88	1.44	1.08	21.0	4.20	3.0	0.96
Sodium	mg/l	14.40	20.40	16.32	17.22	20.40	50.40	37.20	20.40
pH (lower limit)	pH units	5.73	5.35	5.56	5.77	5.70	5.54	5.87	5.28
pH	pH units	9.02	9.79	9.38	9.14	9.22	10.56	9.5.	9.61
TOC	mg/l	60.0	55.2	27.6	60.0	74.4	48.0	21.6	39.6

The groundwater levels were recorded on a monthly basis and the results presented in Figure 4.6. The levels remained relatively stable throughout the reporting period. The pH and electrical conductivity levels recorded in the groundwater were within the normal ranges. There was a slight peak in the conductivity recorded at GW6 in July 2009 but this stabilised in the November 2009 monitoring event.

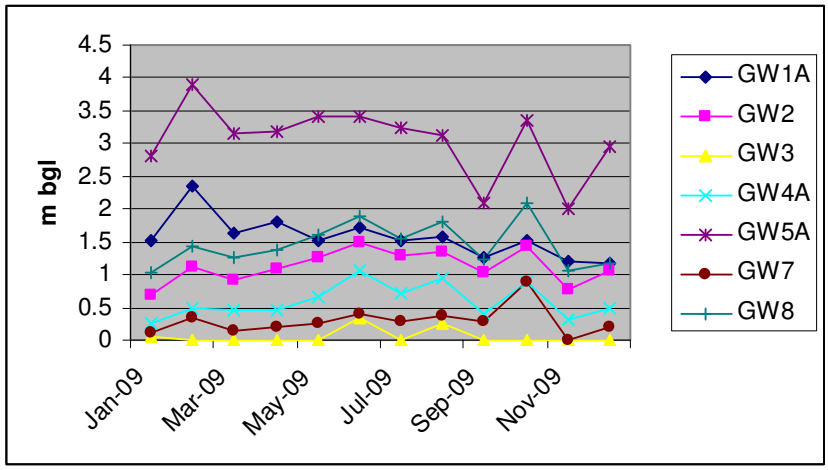


Figure 4.6 Groundwater Levels recorded at CRRL - 2009

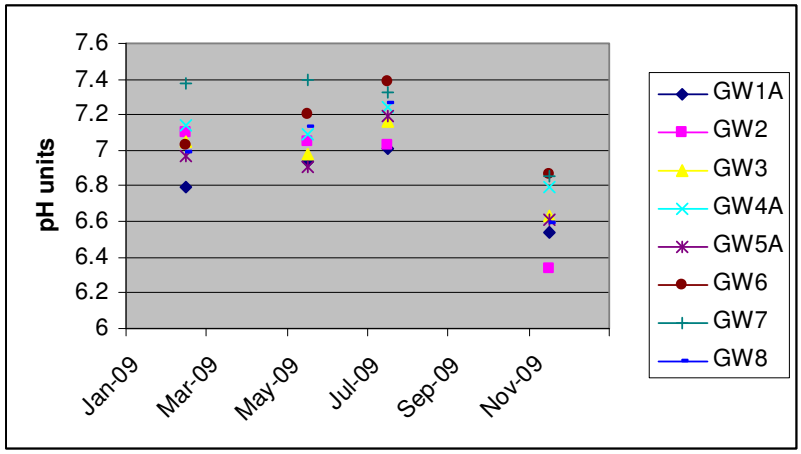


Figure 4.7 pH Results for Groundwater at CRRL - 2009

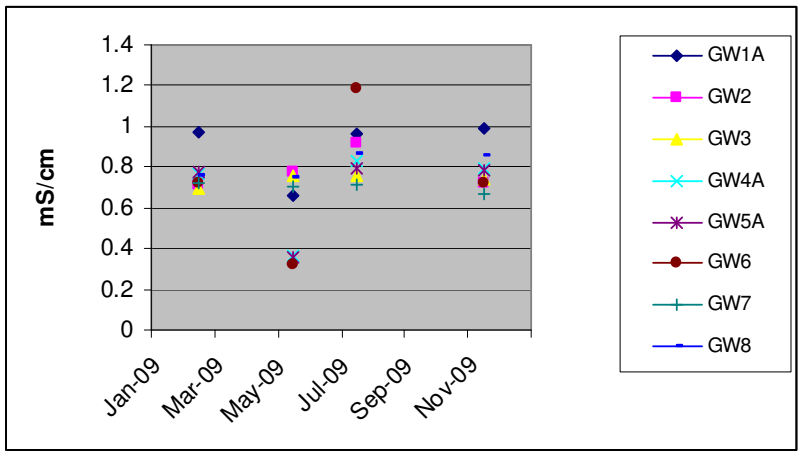


Figure 4.8 Electrical Conductivity Results for Groundwater at CRRL - 2009

The levels of chloride, ammoniacal nitrogen and total organic carbon (TOC) in groundwater are presented below for the reporting period. All levels recorded were below the trigger levels set out for groundwater, with the exception of a small spike in the TOC levels recorded at GW2 in February 2009. The GW2 monitoring location is up gradient of the facility and is therefore not influenced by activities at the facility. However, the results for the rest of the reporting period at this monitoring well were well below the trigger level and this trend is expected to continue in 2010.

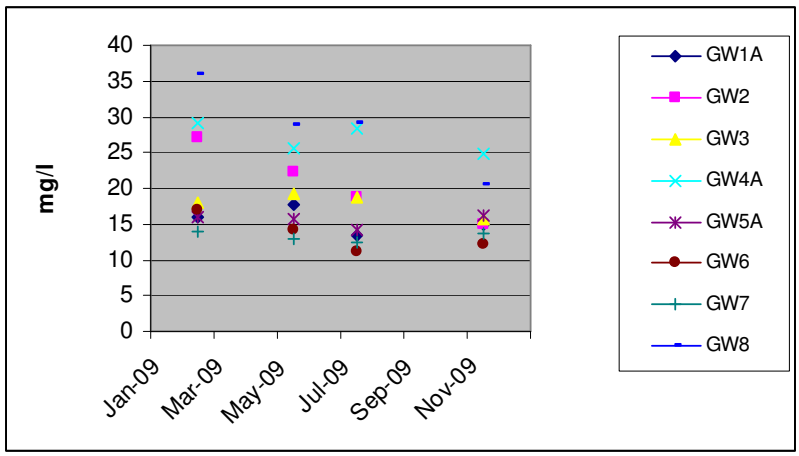


Figure 4.9 Chloride Results for Groundwater at CRRL - 2009

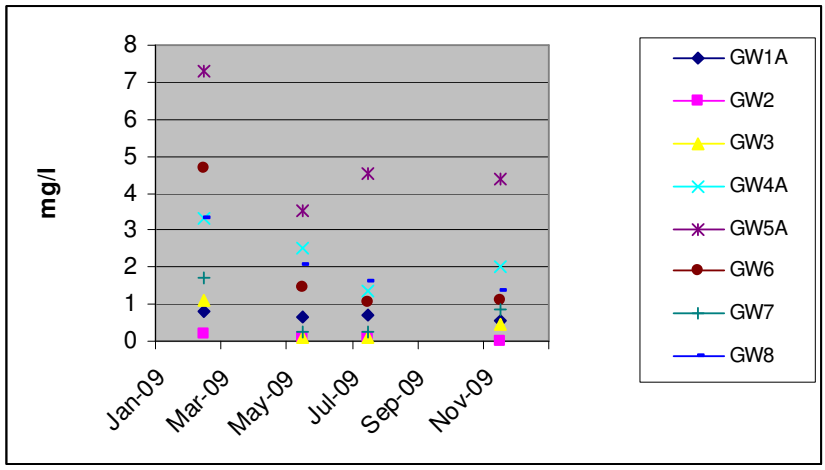


Figure 4.10 Ammoniacal Nitrogen Results for Groundwater at CRRL - 2009

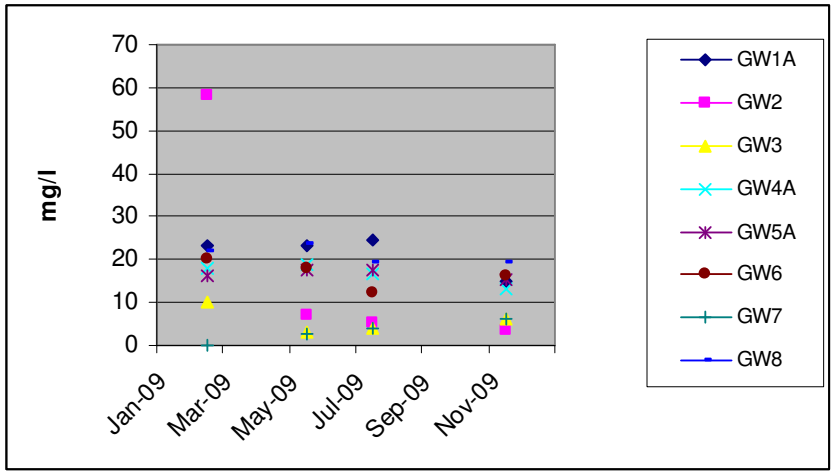


Figure 4.11 TOC Results for Groundwater at CRRL - 2009

4.4. Dust and PM_{10} Monitoring

As discussed in Section 3.1, no dust levels were recorded above the limit at the facility during the reporting period. The monitoring results were reported to the Agency as part of the quarterly reports.

PM_{10} levels are monitored on a quarterly basis at five locations surrounding the perimeter of the facility and these locations are presented on Drawing No. 1322/01/101 which is included in Appendix I. The results of this monitoring, including the certificates of analysis, were submitted to the Agency as part of the quarterly reports. All of the PM_{10} results were below the limit of 50 µg/l for the reporting period.

4.5. Leachate Monitoring

Chemical analysis of leachate samples is undertaken on an annual basis in accordance with Schedule D of the waste licence. Annual chemical analysis of the leachate cells was undertaken in July 2009 and the results were reported to the Agency as part of the Quarter 3 2009 report. The results are summarised below.

Table 4.4 Chemical Analysis of Leachate Samples from CRRL - 2009

Parameter	Units	LC1	LC2	LC3	LC4	LT
Ammoniacal Nitrogen as N	mg/l	1383.55	1649.9	1195.36	611.53	832.6
BOD	mg/l	1414	370	338	1329	603
Temperature	°C	16.2	15.9	17.1	11.9	-
Total boron	µg/l	7531	8649	4336	2126	4006
Cadmium	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Calcium	mg/l	64.9	110	63.9	96.6	149
Chloride	mg/l	977	1518	1005	664	773
Total Chromium	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
COD	mg/l	2480	2850	2140	3090	2280
Total copper	mg/l	0.6	0.8	0.2	<0.2	<0.2
Total cyanide	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoride	mg/l	0.3	0.3	0.2	0.3	0.2
Total iron	mg/l	1.3	1.6	1	62.1	12.5
Total lead	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Total magnesium	mg/l	159	285	158	37.4	146
Total manganese	mg/l	0.4	0.6	0.6	4	1
Total mercury	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total nickel	mg/l	0.3	0.5	0.2	<0.2	1
Ortho-phosphate	mg/l	5.5	7.7	4.3	<2	<2
Potassium	mg/l	885	1293	821	139	639
Sodium	mg/l	1301	1832	1175	201	911
Sulphate	mg/l	97.5	138.7	79	75.2	70.3
Total phosphorous	mg/l	6.6	11.24	7.96	2.28	6.28
TON as N	mg/l	<5	<5	<5	<5	<5
Total zinc	mg/l	0.317	0.617	0.204	0.468	<0.2

4.6. Noise Monitoring

Noise monitoring was discussed in Section 3.2 above. Monitoring of noise emissions from the facility is carried out on a quarterly basis at five locations as indicated on Drawing No. 1322/01/101 which is included in Appendix I. The results were reported to the Agency as part of the quarterly reports but are summarised below.

Table 4.5 L_{Aeq} Results for Noise Recorded at CRRL - 2009

	February 2009	June 2009	August 2009	December 2009
N1	48	40	33	39
N2	43	38	36	51
N3	47	41	38	51
N4	42	42	35	39
N5	68	51	50	53

With the exception of noise recorded in February 2009 at N5, all other results were within the 55dB limit for daytime noise at the facility boundary. The levels of noise at N5 are dominated by the noise of persistent traffic on the R348 road to the north of the facility.

5. RESOURCE AND ENERGY CONSUMPTION

The main resources consumed at the facility during the reporting period were electricity, water for potable supply & vehicle wheel cleaning, diesel fuel and hydraulic oils. The details are listed in Table 5.1 below.

Electricity consumption has increased by 55% from 2008 due to increased landfill flaring and leachate pumping as a result of progressive landfilling. Total water consumption is down 14% from 2008. This is mainly as a result of water consumption for dust suppression now being zero. Water for dust suppression is now obtained from the surface water lagoon and drains back into the surface water lagoon. It is therefore being reused and is not consumed.

Table 5.1 Energy and Resource Consumption at CRRL - 2009

Resource	Consumption
Electricity	295,400 (kWhr)
Water, Potable Supply	2,203,500 L
Water, Dust suppression	0.0 L
Water, Wheelwash	150,000 L
Total Water	2,353,500 L
Diesel	144,056 L
Hydraulic & Engine Oils	140 L
Grease	0.0 kg
Terram for road base	5,400 m^2
Imported Aggregates	6,567 tonnes
Soil materials from site stockpiles	27,386 tonnes

6. DEVELOPMENT AND RESTORATION WORKS

6.1. Development Works Undertaken in 2009

A number of development works were carried out during 2009. The main development works included:

- Continued construction of Phase 2 of the landfill i.e. Cells 4 to 9 c/w all ancillary infrastructure
- Completed construction of leachate storage lagoon c/w all ancillary infrastructure
- The installation of landfill gas management infrastructure. This included the installation of 32 vertical landfill gas extraction wells in Cells 2, 3, 4 and 5, the installation of 40 horizontal wells in Cells 2, 3, 4 and 5 and an additional 2,000 m^3/hr enclosed Haase back-up flare
- The installation of Geohess temporary gas barrier in Cells 2 and 3

6.2. Proposed Development Works to be Undertaken in 2010

The following development works are planned to be undertaken in 2010:

- Installation of a back-up 1,000 m^3/hr enclosed flare
- Continue the installation of landfill gas management infrastructure, which will include the installation of vertical and horizontal wells in Cells 3 and 4
- Continue construction of Phase 2 of the landfill, i.e. Cell 7 to 9 c/w all ancillary infrastructure
- Commence gas utilisation plant
- The installation of Geohess temporary gas barrier on remainder of Cell 3 and part of Cells 4 and 5

6.3. Restoration of Completed Cells/Phases

Progressive intermediate capping of cells at the landfill is ongoing. The placement of an intermediate cap on cells at the East Galway landfill comprising 0.5 m low permeability soils and Geohess temporary gas barrier, incorporating effective gas well seals, exceeds the temporary capping recommendations stipulated in the EPA Landfill Operational Practices Manual. The application of the temporary synthetic capping is regarded as being comparable to the final cap in terms of gas containment as well as minimising infiltration.

The suitability and effectiveness, as a gas containment membrane, of the intermediate cap has been audited on behalf of the EPA by Odour Monitoring Ireland during an assessment of total volatile organic compound surface emissions carried out on 25th June 2009. The assessment indicated that there were no diffuse emissions from the areas already temporarily capped with Geohess barrier capping material. The effectiveness of Geohess temporary gas barrier has also been proven during similar surveys carried out in 2007 and 2008.

The extent of the temporary Geohess impermeable gas barrier layer placed at the site at present is as follows:

Cell 1	100%	15,433 m^2
Cell 2	100%	15,433 m^2
Cell 3	45%	7,000 m^2

It is planned that the temporary impermeable barrier will be progressively extended over the coming months with a further 10% of Cell 3 and 35% of Cell 4 to be placed in May 2010. Further temporary impermeable barrier placement is scheduled for September 2010 and February 2011 and this will increase the capped portions of Cells 1 to 5 as follows:

	Present	May 2010	Sept 2010	Feb 2011
Cell 1	100 %	100 %	100 %	100 %
Cell 2	100 %	100 %	100 %	100 %
Cell 3	45 %	55 %	65 %	100 %
Cell 4	0 %	35 %	35 %	50 %
Cell 5	0 %	0 %	20 %	50 %

An approximate date for the commencement of final capping of Cells 1 and 2 was previously deemed to be May 2010 with capping of Cell 3 to commence in July 2011. The commencement of final capping works in Cells 1 and 2 this year would be premature. Gas production volumes in Cells 1 and 2 are significant at present. As the final capping process requires the phased removal of gas collection infrastructure, the commencement of final capping of Cells 1 and 2 at present would present a potential odour source which could be significant and therefore difficult to manage.

Final capping of the cells is best programmed to commence in line with the natural reduction in the gas generation rate of the cells and this would substantially reduce the risk of odorous emissions from the site during final capping works.

There are no tangible environmental benefits in replacing the temporary impermeable barrier cap at this point in time and to do so prior to the natural reduction in the gas generation rate of the cells could cause negative environmental effects over the duration of the capping works.

6.4. Site Survey

In accordance with Condition 8.7 of the waste licence a topographical survey of the facility is carried out annually. The survey for the 2009 reporting period is included in Appendix II.

7. LEACHATE VOLUMES

7.1. Volume of Leachate Transported Off Site

The volumes of leachate tankered off site on a monthly basis are presented below:

2009	Leachate Consigned off Site
Month:	**m^3**
January	2,619.30
February	2,694.52
March	2,260.87
April	1,732.16
May	1,627.54
June	1,745.02
July	1,919.14
August	1,756.88
September	1,841.08
October	1,825.72
November	3,004.18
December	5,480.92
Total	**28,507.33**

8. LANDFILL GAS

The table below presents the annual cumulative quantity of landfill gas captured and flared at the facility during the 2009 reporting period.

There is also a Flaretec Open Flare at the facility but this was not used to collect landfill gas during the 2009 reporting period. A summary of the estimated quantities of landfill gas collected at the facility from January 2009 to December 2009 is presented in Table 8.1.

The Emissions Testing Report carried out for the two enclosed flares at the facility was submitted to the Agency in the quarterly report for Quarter 1 2010.

Table 8.1 Summary of Landfill Gas Collected at CRRL in 2009

2009 - MONTH	Quantity of LFG Collected (m^3)								Total LFG	Total LFG Collected	Total Methane Collected	Total Methane Collected
	Connaught 1 Haase Flare				Connaught 2 Haase Flare							
	(m^3)	Flaring Total (m^3/hr)	Quantity of LFG Collected (kg CH_4)	(kg CO_2)	(m^3)	Flaring Total (m^3/hr)	Quantity of LFG Collected (kg CH_4)	(kg CO_2)	(m^3/hr)	(m^3)	(kg)	(kg/day)
Jan-09	1,602,665.5	2,154.1	420,568.7	783,649.5	0	0.00	0.0	0.0	2,154.1	1,602,665.5	420,568.7	13,566.7
Feb-09	1,405,461.7	2,091.5	382,402.7	658,634.4	0	0.00	0.0	0.0	2,091.5	1,405,461.7	382,402.7	13,186.3
Mar-09	1,701,400.0	2,290.0	444,416.6	780,330.1	4,912	6.60	1,281.4	2,252.8	2,296.6	1,706,312.0	445,698.0	14,377.4
Apr-09	1,731,500.0	2,409.0	443,581.2	882,372.4	50,940	70.75	13,033.6	25,959.0	2,479.8	1,782,440.0	456,614.8	15,220.5
May-09	1,829,900.0	2,460.0	481,921.0	882,304.6	2,325	3.13	611.5	1,121.0	2,463.1	1,832,225.0	482,532.5	15,565.6
Jun-09	1,695,400.0	2,504.0	451,365.7	784,224.2	0	0.00	0.0	0.0	2,504.0	1,695,400.0	451,365.7	15,045.5
Jul-09	1,872,900.0	2,517.0	501,309.4	925,062.8	0	0.00	0.0	0.0	2,517.0	1,872,900.0	501,309.4	16,171.3
Aug-09	1,836,600.0	2,469.0	482,367.6	871,136.1	0	0.00	0.0	0.0	2,469.0	1,836,600.0	482,367.6	15,560.2
Sep-09	1,641,200.0	2,279.0	423,981.0	765,587.0	0	0.00	0.0	0.0	2,279.0	1,641,200.0	423,981.0	14,132.7
Oct-09	1,750,000.0	2,349.0	442,041.6	778,610.0	0	0.00	0.0	0.0	2,349.0	1,750,000.0	442,041.6	14,259.4
Nov-09	1,575,600.0	2,188.0	408,164.8	704,104.1	0	0.00	0.0	0.0	2,188.0	1,575,600.0	408,164.9	13,605.5
Dec-09	1,745,400.0	2,346.0	439,075.8	773,142.4	0	0.00	0.0	0.0	2,346.0	1,745,400.0	439,075.8	14,163.7
Total Collected	20,388,027.2		5,321,196.1	9,589,157.6	58,177		14,926.5	29,332.8		20,446,204.2	5,336,122.7	174,854.8

9. INDIRECT EMISSIONS TO GROUNDWATER

The CRRL is a fully engineered and contained landfill and there are no indirect emissions to groundwater from the facility.

The potential sources of indirect emissions to groundwater from the facility are:

Landfill Base: The landfill site has a composite base lining system comprising a HDPE geomembrane and a 0.5 m thick layer of compacted Bentonite Enhanced Soil. A leak detection survey of the HDPE geomembrane after placement of the drainage stone layer was completed and defects to the HDPE liner were repaired in accordance with industry standards. A CQA report was then completed and submitted to the Agency.

Surface Water Collection and Treatment System: Surface water from the paved access roads and landfill cell swale drain is collected and discharged into the surface water lagoon along with groundwater collected at the interceptor sump located below the landfill cells. Water from the lagoon is then piped to a reed bed, which further filters the water before it is finally discharged into the nearby stream

Treated Sewage Effluent: There is a BioCycle wastewater treatment plant located adjacent to the weighbridge which treats the canteen and office wastewater prior to being pumped to the leachate holding tank via the foul water sump. Leachate (containing foul water) is tankered off-site to a waste water treatment plant via a vacuum tanker.

9.1. Groundwater Trigger Levels

In accordance with Condition 6.4.2 of the waste licence a set of groundwater monitoring trigger levels have been devised for the facility. These trigger levels, which were reviewed and submitted in 2008 AER, are used to assess groundwater quality and are presented in the table below. It is recommended that these trigger levels be maintained and groundwater monitoring results will be assessed against these trigger levels in 2010.

Parameter	Units	GW1A	GW2	GW3	GW4A	GW5A	GW6	GW7	GW8
Ammoniacal Nitrogen	mg/l	1.92	6.36	5.40	3.60	8.52	7.44	2.40	3.72
Chloride	mg/l	20.40	46.80	24.0	39.60	32.40	24.0	18.0	37.20
Potassium	mg/l	1.92	2.88	1.44	1.08	21.0	4.20	3.0	0.96
Sodium	mg/l	14.40	20.40	16.32	17.22	20.40	50.40	37.20	20.40
pH (lower limit)	pH units	5.73	5.35	5.56	5.77	5.70	5.54	5.87	5.28
pH	pH units	9.02	9.79	9.38	9.14	9.22	10.56	9.5.	9.61
TOC	mg/l	60.0	55.2	27.6	60.0	74.4	48.0	21.6	39.6

10. ANNUAL WATER BALANCE

10.1. Meteorological Data

For the first part of the year, the meteorological data for the CRRL facility was taken from the Birr weather station in Co. Offaly. However, an Automatic Weather Station (AWS) was opened at Gurteen on the 12th April 2008. The station measures air temperature, earth and soil temperatures, rainfall, wind speed and direction, humidity, solar radiation, cloud height and amount and present weather. It has replaced Birr as a synoptic station.

The monthly rainfall and potential evapotranspiration levels are presented below.

Birr, Co. Offaly			
Year	**Month**	**Rainfall (mm)**	**Potential Evapotranspiration (mm)**
2009	January	124.8	10.501
2009	February	15.6	15.312
2009	March	49.3	36.724
2009	April	106.1	50.448
2009	May	69.8	75.803
2009	June	67.6	96.996
2009	July	134.8	80.374
2009	August	98.2	63.477
2009	September	29.4	44.717
Gurteen, Co. Galway			
Year	**Month**	**Rainfall (mm)**	**Potential Evapotranspiration (mm)**
2009	October	77.3	23.019
2009	November	243.1	12.584
2009	December	49.2	5.471

10.2. Estimated Liquid In-Waste Volume

2009	Cell 1 Monthly uncapped Area (m^2)	Cell 2 Monthly uncapped Area (m^2)	Cell 3 Monthly uncapped Area (m^2)	Cell 4 Monthly uncapped Area (m^2)	Cell 5 Monthly uncapped Area (m^2)	Total uncapped area (m^2)	Rainfall (m)	Potential in-waste liquid volume (m^3)	Absorptive capacity of waste (assume 2%)	Balance (m^3)	Leachate Tankered off-site (m^3) Note
Jan	0	8,462	13,608	0	0	22,070	0.125	2,754.34	55.09	2,699.25	2,619.30
Feb	0	8,462	13,608	0	0	22,070	0.016	344.29	6.89	337.41	2,694.52
Mar	0	8,462	13,608	0	0	22,070	0.049	1,088.05	21.76	1,066.29	2,260.87
Apr	0	8,462	13,608	0	0	22,070	0.106	2,341.63	46.83	2,294.79	1,732.16
May	0	4,362	12,346	3,212	0	19,920	0.070	1,390.42	27.81	1,362.61	1,627.54
Jun	0	4,362	12,346	4,150	0	20,858	0.068	1,410.00	28.20	1,381.80	1,745.02
Jul	0	0	8,433	8,300	0	16,733	0.135	2,255.61	45.11	2,210.50	1,919.14
Aug	0	0	8,433	8,300	0	16,733	0.098	1,643.18	32.86	1,610.32	1,756.88
Sep	0	0	8,433	8,300	5,810	22,543	0.029	662.76	13.26	649.51	1,841.08
Oct	0	0	8,433	8,300	8,300	25,033	0.077	1,935.05	38.70	1,896.35	1,825.72
Nov	0	0	8,433	8,300	8,300	25,033	0.243	6,085.52	121.71	5,963.81	3,004.18
Dec	0	0	8,433	8,300	8,300	25,033	0.049	1,231.62	24.63	1,206.99	5,480.92
								23,142.47	**462.85**	**22,679.62**	**28,507.33**

Note The total volume of leachate tankered off site also includes office and weighbridge foulwater, run-off from within bunded areas and wheelwash and leachate removed from the landfill gas collection system

11. SCHEDULE OF ENVIRONMENTAL OBJECTIVES AND TARGETS

Table 11.1 Programme of Environmental Objectives and Targets for 2010

Objective	Target
Lower the environmental impacts associated with fugitive landfill gas emissions by continually developing the Facility's Gas Utilisation Infrastructure and landfill gas management techniques.	• Undertake quarterly VOC surveys to establish the areas were fugitive emissions are most prevalent (• Installation of gas extraction wells where fugitive emissions have been identified. • Apply impermeable geohess cover over filled areas of the landfill • Install a 1,000m^3 enclosed flare to further enhance back-up flaring capacity on site
Lower the potential environmental impacts associated with the generation of leachate. by reducing leachate generation	Reduce leachate generation by: • Incorporating improved leachate reducing design features into construction of Phases 2 of the Landfill. • Progressively the application of impermeable geohess cover over filled areas of the landfill.
Improve Health, Safety and Welfare	• Carry out Safety Statement review & Safety Statement training. • Identify appropriate training courses in Health and Safety management and arrange attendance for staff who hold a supervisory role • Arrange manual handling course for all staff to reduce likelihood of back injury (a primary reason for lost time through injury)
Staff Training	Continue to train staff on a regular basis in EMS system, waste licence and Emergency Response
Retain ISO 14001 Environmental Management System Certification	Two EMS audits scheduled for 2010 with the aim of retaining certification
Ensure all customers, contractors, site users & visitors are familiar with Greenstar's Environmental Policy	Circulate policy to all customers & contractors who attend site
Lower the potential environmental impacts associated with exhaust emissions from leachate tankers when pumping leachate from the Leachate Holding Tank or Leachate Lagoon	Develop a carbon filter unit which can be attached to the exhaust from the pump of the leachate tanker. The filter unit will reduce the potential for odorous fumes to emanate from the leachate storage areas when tankering leachate off-site
It is intended to install a landfill gas utilisation plant in 2010.	It is hoped this will achieve a negative carbon footprint for the facility through providing green energy to national grid
Aid in the environmental clean-ups required in light of the severe flooding in surrounding urban areas in Quarter 4 2009	In co-operation with Galway County Council and local Waste Hauliers and contractors the site will accept waste arising from clean-ups free of charge to aid in restoring local urban areas

Table 11.2 Schedule of Environmental Objectives and Targets for 2007-2012

Ref. No.	Objective	Ref. No.	Target	Resources Required	Person Responsible	Time Frame for Completion	Progress as of 31st December 2009
O-1	Lower the environmental impacts associated with fugitive landfill gas emissions by continually developing the Facility's Gas Utilisation Infrastructure and landfill gas management techniques.	T-1.1	Undertake quarterly VOC surveys of the waste surface over the next 5 years, to establish the areas were fugitive emissions are most prevalent.	External Consultant (circa €1,800 per survey)	Site Manager	Ongoing	Surveys carried out on Tuesday 7th April 2009, Thursday 11th June 2009 and Tuesday 15th September 2009
		T-1.2	Installation of gas extraction wells where fugitive emissions have been identified from the VOC surveys.	Circa €1,700 per borehole.	Site Manager	Ongoing	Additional vertical & horizontal gas extraction wells installed during 2009. There were 40 horizontal wells added to cells 2, 3, 4 & 5. A further 32 vertical wells were also added to cells 2, 3, 4& 5. This brings the total number of gas extraction points on site to approximately 300.
		T-1.4	Apply impermeable geohess cover over filled areas of the landfill.	€ 7/m2 approx	Site Manager	Ongoing	Geohess to be installed progressively over filled areas.
		T-1.5	Monitor and review the effectiveness of the perimeter odour neutralising infrastructure installed in 2007 and maintain record of performance.	Assistant Site Manager (80 man hours)	Site Manager	Ongoing	Wind direction Intelligence sensor incorporated in Dec 2008 to improve efficiency of system. Continually review market developments in this field.
		T-2.1	Reduce leachate generation by incorporating improved leachate reducing design features into construction of Phases 2 and 3 of the Landfill.	External Consultant & Site Manager (60 man hours)	Site Manager	Ongoing	Leachate reducing design features have been incorporating into Phase 2 development by reducing cell area. Their effectiveness will be reviewed and possibly replicated in Phase 3 development.
O-2	Lower the potential environmental impacts associated	T-2.2	Reduce leachate generation by applying impermeable geohess cover over filled areas of the landfill.	€ 7/m2 approx	Site Manager	Ongoing	Geohess to be installed progressively over filled areas.

Ref. No.	Objective	Ref. No.	Target	Resources Required	Person Responsible	Time Frame for Completion	Progress as of 31st December 2009
	with the generation of leachate. by reducing leachate generation	T-2.3	Lower the demand on WWTP's, risk of spillage, CO2 emissions associated with the off site treatment of leachate	External Consultant & Site Manager (60 man hours)	Site Manager	Ongoing	Ongoing implementation of site practices (Cell area reduction, Geohess application)
O-3	Lower the potential environmental impacts associated with litter by improving litter management techniques.	T-3.1	Investigate potential for construction of wind breaker berms for operation in windy conditions.	Assistant Site Manager (20 man hours)	Site Manager	Ongoing	Not possible due to lack of desirable material available to this facility to be used in the construction of such berms. Continued review of day to day litter reducing management techniques to ensure minimal litter generation. Obtain/source additional mobile litter cages for use at working face.
0-4	Minimise the amount of natural resources (water, power etc) consumed at the Facility.	T-4.1	Complete a second Energy Audit of the Facility to identify possibilities to improve energy efficiency and ascertain the facilities performance within an energy management matrix.	External Consultant (circa €5,000)	Site Manager	May 2010	Improve the facility's performance and current standing within the energy management matrix.
O-4	Minimise the amount of natural resources (water, power etc) consumed at the Facility.	T–4.2	Carry out assessment of the use of raw material at the Facility and identify opportunities for the improved efficiency in the use of raw materials.	Assistant Site Manager (40 man hours)	Site Manager	Ongoing	Facility actively pursues C & D materials, as a substitute for natural material, for engineering purposes. Natural material excavated during Phase 2 development to be reused on site where possible Wherever possible look for suitable engineering materials in order to limit the amount of virgin material used on site
		T–4.3	Carry out assessment of water usage at the facility and identify opportunities for improved efficiency of water usage.	Assistant Site Manager (40 man hours)	Site Manager	Ongoing	Water requirements on various sections of site being monitored to identify potentials for reductions.

Ref. No.	Objective	Ref. No.	Target	Resources Required	Person Responsible	Time Frame for Completion	Progress as of 31st December 2009
		T–4.4	Review Site safety statement	Assistant Site Manager (40 man hours)	Site Manager GM Landfill Group	Sept 2009	Independent H&S audit & Safety statement review carried out in Nov 2007. Safety statement review & training carried out annually.
O-5	I Improve Health, Safety and Welfare	T–5.1	Reduce lost time injuries by 5% over the next five years	Site Manager/Assistant Site Manager	All site Personnel	May 2010	Ongoing. Data being recorded and tracked. Arrange manual handling course for all staff to reduce likelihood of back injury (a primary reason for lost time through injury)
		T–5.2	Develop Accident Prevention Plan	Assistant Site Manager (80 man hours)	Site Manager GM Landfill Group	Ongoing	A procedure has been developed and incorporated into the EMS since 4th April 2009 with respect to the control and prevention of accidents on the site and any environmental impact of accidents
		T–5.3	Identify appropriate training courses in Health and Safety management and arrange attendance for staff who hold a supervisory role	Assistant Site Manager (120 man hours)	Site Manager GM Landfill Group	May 2010	Assistant Landfill Manager to be sent on Managing Safely (NIFAST) course
		T–5.4	Continue to train staff on a regular basis in EMS system, waste licence and Emergency Response.	Assistant Site Manager	Site Manager	Ongoing	Ongoing
O-6	Training	T–6.1	Retain ISO 14001 Environmental Management System Certification	Site Manager/Assistant Site Manager	Site Manager	Ongoing	Having attained certification in Q3 2009, there is a need to retain emphasis on the Environmental Management System and retain accreditation through a series of audits both internally and externally each year
		T–7.1	Ensure all customers, contractors, site users & visitors are familiar with Greenstar's Environmental	Site Manager/Assistant Site	Site Manager	Ongoing	Circulate policy to all customers & contractors who attend site.

Ref. No.	Objective	Ref. No.	Target	Resources Required	Person Responsible	Time Frame for Completion	Progress as of 31st December 2009
O-7	Operations		Policy	Manager			Incorporate Environmental Policy into site inductions
		T–7.2	Ensure all waste hauled to the site complies fully with the Waste Collection Permit Regulations	Site Manager	Site Manager	Ongoing	Though only fully licensed and permitted hauliers are accepted at this site, there is a need to ensure permit details held are updated regularly as vehicles on permit, waste types permitted etc are subject to change. This will be achieved through liaising with both customers and permit ting authorities.
		T–7.3	Review all Site Operational procedures	Site Manager/ Assistant Site Manager	Site Manager	Ongoing	Ongoing

12. FACILITY MANAGEMENT

12.1. New Procedures Developed During 2009

The following is a description of the work procedures developed during the reporting period with respect to the operation of the facility.

CRRL 07- Environmental Monitoring
The purpose of this procedure is to ensure a consistent approach to all environmental monitoring and reporting. This document outlines CRRL'S Environmental Monitoring Protocol with respect to self monitoring of water, gas migration wells and air emissions. This policy complies with Condition 8 of site waste licence W0178-01 and EPA correspondence 'EPA's Requirements on the Quality of Self Monitoring Compliance Data at Licensed Facilities'.

CRRL 24 Random Inspection of Incoming Loads
This procedure details a system of regular documented inspections of incoming wastes set up to comply with the requirements of the waste licence. This procedure has been amended to include documentation of feedback to customers in relation to the contents of their loads as suggested by the EPA in site audit in 2009.

CRRL 25-Handling and Storage of Batteries, Gas Cylinders and Tyres
The procedure is a guide which ensures that batteries, gas cylinders and tyres are quarantined from the waste-stream, and stored in a safe manner in accordance with licence requirements. This procedure was amended in 2009 to include documentation of feedback to customers in relation to the contents of their loads as suggested by the EPA in site audit in 2009.

CRRL 31-Odour management Plan
The procedure details among other items the protocol for carrying out odour assessments on a daily basis at relevant odour monitoring points. This procedure has been amended to include for both upwind and downwind monitoring locations to be visited and an odour assessment carried out at each as suggested by the EPA in site audit in 2009.

CRRL 34 Connaught 3 Uniflare Enclosed Flare Operation
The procedure is a guide which details the steps involved in starting and shutting down the 1,000m3 Uniflare (Connaught 3) on-site.

CRRL 38- Connaught 2 Haase Flare Operation
The procedure is a guide which details the steps involved in starting and shutting down the 2,000m3 Haase Flare (Connaught 2) on-site.

12.2. Site Testing and Inspection Reports

A site survey showing the levels of the facility at the end of the reporting period is included in Appendix II.

As per Schedule E of the waste licence, the integrity of the bunds and tanks are carried out every three years. These tests were reported to the Agency in the 2008 AER and thus, were not due to be carried out within this reporting period.

12.3. Reported Incidents and Complaints Summary

As was the case in 2008, the majority of incidents reported to the Agency during the 2009 reporting period were in relation to methane and carbon dioxide detected in the gas migration monitoring boreholes that exceeded the limits set out in the waste licence.

Previous monitoring at CRRL was carried out by White Young & Green (WYG) on the 6th and 13th of December 2005, prior to the facility accepting waste. These two rounds of landfill gas monitoring identified elevated CH_4 gas levels at LG14, LG16 and LG18 and elevated CO_2 levels at monitoring locations LG6, LG6-A, LG9, LG10, LG14, LG16 & LG18. The report on LFG monitoring carried out by WYG in December 2005 concluded the slightly high levels of CH_4 and CO_2 could be attributed to the large quantities of peat deposited in the area of the monitoring wells. A literature search carried out for that report demonstrated that the levels of carbon dioxide and methane measured in the landfill gas monitoring wells could be attributed to the natural background levels from the continuous decay of organic peat.

A summary of the reported incidents is presented below.

Table 12.1 Summary of Incidents at CRRL – 2009

Number	Date	Description	Action
I-09/01	21/01/2009	Elevated CH_4 levels in landfill gas monitoring borehole LG5. Elevated CO_2 levels were recorded at monitoring borehole's LG5, LG6, LG6A LG8, LG12, LG15, LG16, LG18 & LG20.	Incident Report Submitted. Previous monitoring carried out by White Young Green on the 6th and 13th December 2005 prior to facility accepting waste. These two monitoring events identified elevated methane gas levels at LG14, LG16 & LG18. Elevated CO_2 at locations LG6, LG6a, LG9, LG10, LG14, LG16 &LG18. The Report concluded that elevate levels of methane gas and Carbon Dioxide could be attributed to large quantities of peat deposited in the area of the monitoring wells.
I-09/02	11/02/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5. Elevated CO_2 levels were recorded at monitoring borehole's LG5, LG6, LG6A LG8, LG15, LG16, LG18 & LG20.	Incident Report Submitted.
I-09/03	11/03/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5. Elevated CO_2 levels were recorded at monitoring borehole's LG5, LG6, LG8, LG12 & LG18.	Incident Report Submitted.
I-09/04	30/04/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5. Elevated CO_2 levels at LG5, LG8, LG12 & LG18.	Incident Report Submitted.
I-09/05	19/05/2009	Small contained fire on Waste Compactor	Implemented site emergency procedures to control and eliminate fire. Incident Report Submitted.

Number	Date	Description	Action
I-09/06	28/05/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG23 & LG24. Elevated CO_2 levels at LG5, LG6, LG8, LG18, LG19, LG23, & LG24.	Incident Report Submitted.
I-09/07	30/06/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG11, LG19 & LG24. Elevated CO_2 levels at LG5, LG8, LG11, LG18, LG19, LG23, LG24 & LG28.	Incident Report Submitted.
I-09/08	17/07/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG11, LG22, LG23 & LG24. Elevated CO_2 levels at LG4, LG5, LG9, LG11, LG15, LG18, LG19, LG22, LG23, LG24, LG25, LG26 & LG28.	Incident Report Submitted.
I-09/09	17/07/2009	Small contained fire on haulage vehicle tyre	Implemented site emergency procedures to control and eliminate fire. Incident Report Submitted
I-09/10	31/08/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG11, LG19, LG21, LG22, LG23 & LG24. Elevated CO_2 levels at LG4, LG5, LG9, LG11, LG15, LG16, LG18, LG19, LG21, LG22, LG23, LG24 & LG28.	Incident Report Submitted.
I-09/11	29/09/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG11, LG19, LG22 & LG24. Elevated CO_2 levels at LG5, LG9, LG11, LG15, LG18, LG19, LG22, LG23, LG24, LG25 & LG28.	Incident Report Submitted.
I-09/12	22/10/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG10, LG11, LG18, LG19, LG22, LG23 & LG24. Elevated CO_2 levels at LG4, LG5, LG9, LG11, LG18, LG19, LG20, LG22, LG23, LG24, LG25 & LG26.	Incident Report Submitted.
I-09/13	30/11/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG11, LG19, LG22 & LG24. Elevated CO_2 levels at LG4, LG5, LG6A, LG9, LG16, LG18, LG19, LG20, LG22 & LG26.	Incident Report Submitted.
I-09/14	12/12/2009	Small contained fire on leachate haulage vehicle pump	Implemented site emergency procedures to control and eliminate fire. Incident Report Submitted
I-09/15	30/12/2009	Elevated CH_4 level in landfill gas monitoring borehole LG5, LG9, LG11, LG19, LG22 & LG24. Elevated CO_2 levels at LG4, LG5, LG9, LG16, LG19, LG20, LG22 & LG26.	Incident Report Submitted

The number of complaints to CRRL in the 2009 reporting period was significantly reduced from the number received in 2008. The facility management will strive to reduce the number of complaints even further in 2010 by continuing to implement best practice in the operation of the facility. A summary of the complaints received is presented below.

Table 12.2 Summary of Complaints to CRRL - 2009

No.	Date	Nature of Complaint	Complainant	Method of Communication
2009 1	05/01/2009	Odour	Marella Deely	Complainant (Phone) direct to Site
2	06/01/2009	Odour	Maureen Kelly	EPA (Phone & Letter)
3	06/01/2009	Odour	Anonymous	EPA (Phone & Letter)
4	07/01/2009	Odour	Margaret Lohan	EPA (Phone & Letter)
5	26/01/2008	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter)
6	02/02/2009	Odour, Silt in drains	Mr Brendan Kelly	EPA (Phone & Letter)
7	09/02/2009	Odour	Mrs Margaret Lohan	EPA (Phone & Letter)
8	10/02/2009	Odour	Mr Thomas Lohan	EPA (Phone & Letter)
9	11/02/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter)
10	16/02/2009	Odour, Noise	Anonymous	EPA (Phone & Letter)
11	17/02/2009	Odour	Mrs Margaret Lohan	EPA (Phone & Letter)
12	12/03/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter) & Complainant (Phone) direct to Site
13	12/03/2009	Odour	Mr Thomas Lohan	EPA (Phone & Letter)
14	26/03/2009	Odour, Litter, Birds	Mrs Brigid Seale	EPA (Phone & Letter)
15	11/04/2009	Odour, Flare, Birds	Mrs Margaret Lohan	EPA (Phone & Letter)
16	27/04/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter)
17	30/04/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Letter)
18	26/05/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Letter)
19	18/06/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter) & Complainant (Phone) direct to Site
20	24/06/2009	Odour	Mrs Brigid Seale	EPA (Phone & Letter)
21	10/08/2009	Waste Acceptance	Mr. Tom Seale	EPA (Phone & Letter)
22	01/09/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Letter)
23	15/09/2009	Odour, Swine Flu	Mrs Brigid Seale	EPA (Letter)
24	18/09/2009	Odour	Mrs. Maureen Kelly	EPA (Letter)
25	06/10/2009	Wheelwash, Vehicle parking	Mrs Brigid Seale	EPA (Letter)
26	05/10/2009	Odour	Mr. Joe Kelly	Complainant (Phone) direct to Site

No.	Date	Nature of Complaint	Complainant	Method of Communication
27	21/10/2009	Wheelwash + Community Liaison Committee representation	Mrs Brigid Seale	EPA (Letter)
28	06/11/2009	Odour	Mrs Fiona Cawley/Cunningham	EPA (Phone & Letter) & Complainant (Phone) direct to Site
29	27/11/2009	Odour	Margaret Lohan	EPA (Phone & Letter)
30	03/12/2009	Odour	Padraig Cunningham	EPA (Phone & Letter)

12.4. Review of Nuisance Controls

Greenstar Ltd is committed to operating the CRRL in the best possible manner using the best available techniques to minimise impacts on the environment and local residential neighbours. The CRRL welcomes communications from local residents and any interested parties and all reasonable and practical measures will be implemented to eliminate or minimise any issues or nuisances.

12.4.1. Bird Control

During the reporting period, the facility employed the services of Falcon Bird Control Services to provide an integrated approach to bird control at the site. This involved the use of kites, heli-kites, distress calls and various birds of prey including falcons. This method is preferred as it is non-destructive to the birds and by varying the timing and use of bird control measures it is a very effective method of control.

12.4.2. Vermin Control

Site personnel regularly checked for evidence of vermin on site during regular routine inspections. Pestguard were employed throughout the duration of the reporting period in order to control potential nuisance caused by rodents. Continuous baiting was carried out by Pestguard and adjusted as necessary to prevent any infestation of vermin at the facility.

12.4.3. Dust and Mud Control

Dust and mud control measures have been implemented at the facility since the start of the construction phase and have continued into the operation phase of the facility. These measures include the use of a wheelwash, road sweeper and the use of a water bowser to dampen access roads and stockpiles during periods of dry weather.

12.4.4. Litter Control

Litter is controlled by fencing which was installed around the landfill footprint as specified in the waste licence. Portable litter fencing is also used at the working face, which can be moved to various points around the working face depending on the wind direction. As part of the operational controls, all litter is collected at the end of the working day.

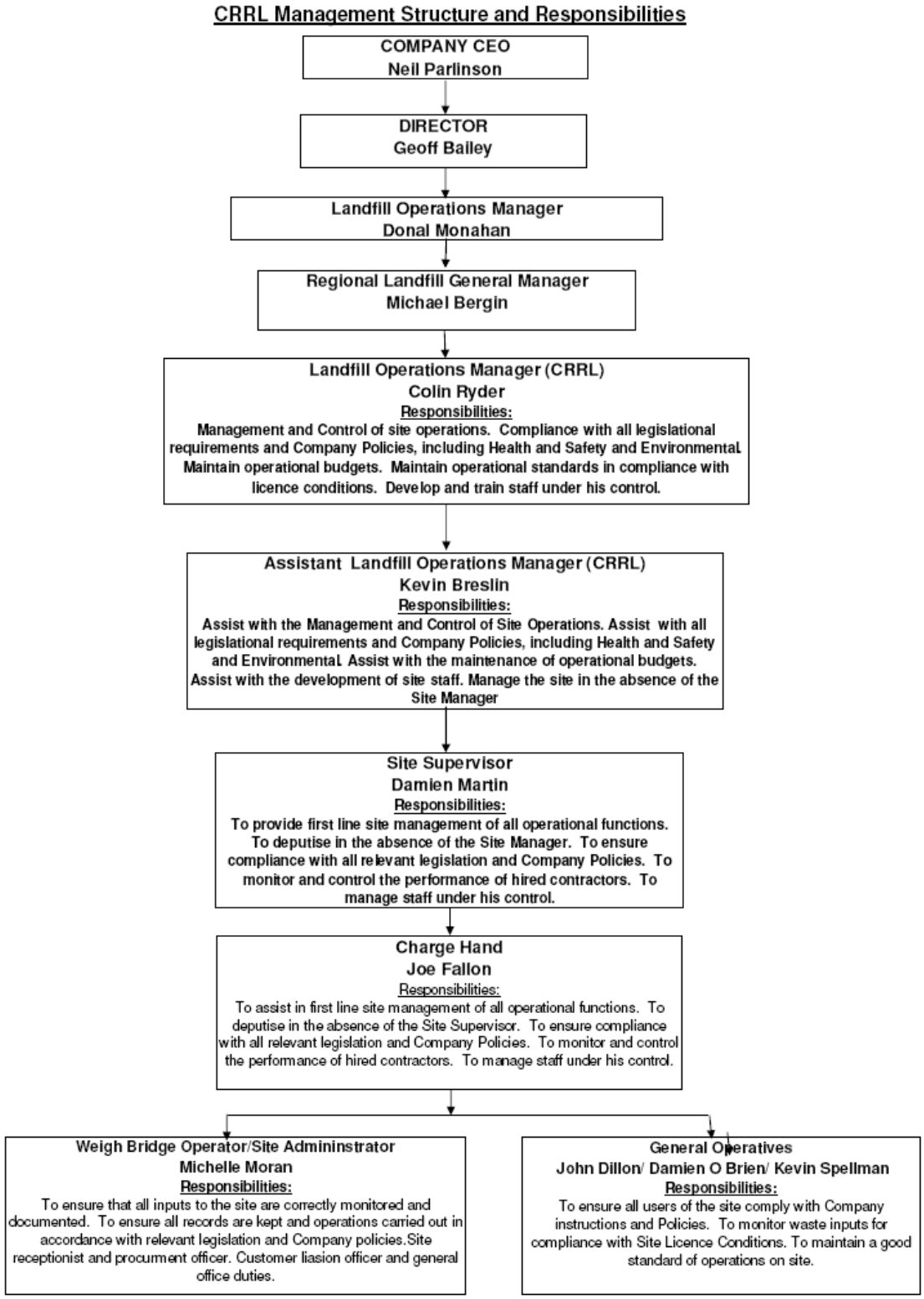
Good operational practices on site are the main controls to avoid nuisances. All waste deposited must be covered by the end of the working day. Adequate daily cover reduces the risk of odour, wind blown litter, vermin, flies and birds.

12.5. Report on Financial Provisions

Under condition 12.2.2, Greenstar has put in place a Bank Guarantee with Bank of Ireland to the value of €1,839,279**.** Details of this bank guarantee have been submitted to the EPA.

Condition 12.3 of the waste licence states that *"the licensee shall provide a statement in writing on an annual basis as part of the AER in respect of the determination of charges for the disposal of waste".* In relation to this matter Greenstar can confirm that the gate fee for the disposal of waste at the Connaught Regional Residual Landfill is appropriate in the current market and includes financial provision for the closure, restoration and aftercare of the site.

12.6. Management and Staffing Structure



12.7. Public Information Programme

Connaught Regional Residual Landfill pursues an active programme of disseminating information on its operations to interested parties. This is undertaken through a variety of means including site tours, the company website, presentations and open days.

The communications programme contains the following objectives:

- To promote public awareness of the Company's activities and environmental policies.
- To maintain an ongoing dialogue with authorities that have direct involvement with waste disposal activities.
- To make available Environmental Performance Data relating to the site
- To disseminate information relating to the operation and management of the site as appropriate.
- To encourage liaison between the site and local residents and those who may be affected by the site operations.
- To provide general information on Waste Management Issues.
- To ensure all users and customers of the site are conversant with the requirements of the Site Licence.
- To ensure that all objectives are, where possible, measurable and quantifiable.

The objectives of the programme are met through the following elements as appropriate:

- Personal Contact
- Residents Meetings/Liaison Groups
- Information Displays
- Information Packs
- Site Visits
- Web Page
- Educational Links
- Published Information

12.8. Environmental Management System

In accordance with Condition 2.3 of the waste licence an Environmental Management System is maintained at the facility and updated annually. The current Environmental Management Plan is enclosed in Appendix III.

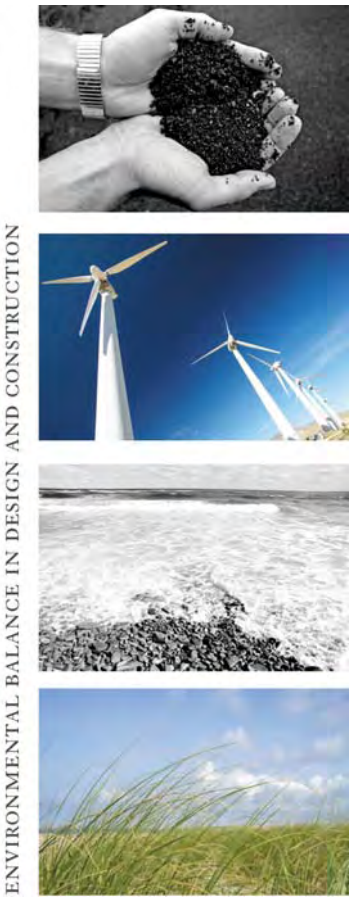
12.9. Report on Staff Training

Table 12.3 Staff Training Matrix for CRRL

	Colin Ryder	Kevin Breslin	Damien Martin	Michelle Moran	John Dillon	Damien O Brien	Kevin Spellman	Paul McDermott	Sean McKendry
Training Unit	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Renton	Daly
Fas Waste Mgmt (Complete)	01/12/2005	Spring 2010 (TBC)	March. 07						
Safe Pass Course (Expiry Date)	Feb. 2014	Feb. 2014	Oct. 2011		Feb. 2011	Nov. 2011	Dec. 2011	May. 2013	Oct. 2010
Risk Assessment Workshop	08/07/2009	08/07/2009	08/07/2009	08/07/2009	08/07/2009	08/07/2009	08/07/2009	08/07/2009	08/07/2009
H & S Instructions	30/04/2008	03/11/2008	30/04/2008	29/07/2008	30/04/2008	30/04/2008	30/04/2008	30/04/2008	25/04/2009
First Aid (Expires)	20/05/2011	20/05/2011	20/05/2011			Oct. 2010			
Turbo Flo BA Course		20/02/2009	20/02/2009			20/02/2009	20/02/2009		
Fire Safety	23/10/2009	23/10/2009	23/10/2009	23/10/2009	23/10/2009	23/10/2009	23/10/2009	23/10/2009	23/10/2009
Fire Evacuation (Date Due)	22/03/2010	22/03/2010	22/03/2010	22/03/2010	22/03/2010	22/03/2010	22/03/2010	22/03/2010	22/03/2010
Chemical Handling (3)	08/07/2009	08/07/2009	20/06/2008		20/06/2008	20/06/2008	20/06/2008		
Manual Handling (3)	10/03/2010	10/03/2010	10/03/2010	10/03/2010	10/03/2010	10/03/2010	10/03/2010	10/03/2010	10/03/2010
Intro to licence 178-1	11/12/2009	11/12/2009	11/12/2009	18/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	18/12/2009
Emergency Response Procedure	11/12/2009	11/12/2009	11/12/2009	18/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	18/12/2009
Waste Acceptance Procedures	11/12/2009	11/12/2009	11/12/2009	18/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	18/12/2009

	Colin Ryder	Kevin Breslin	Damien Martin	Michelle Moran	John Dillon	Damien O Brien	Kevin Spellman	Paul McDermott	Sean McKendry
Training Unit	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Greenstar	Renton	Daly
Site Operational Procedures	11/12/2009	11/12/2009	11/12/2009	18/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	18/12/2009
Env. Monitoring	26/06/2008	04/12/2008	26/06/2008						
Complaints Procedure	23/02/2009	23/02/2009	26/06/2008	25/07/2008					
Corrective Action Procedures	23/02/2009	23/02/2009	26/06/2008						
Landfill Compactor (Expiry date)			Feb. 2013					Feb. 2013	
Excavator 360 (Expiry Date)			Dec. 2012				May. 2011		Jul. 2009
Dumper (Expiry Date)			Feb. 2012		Feb. 2012	Nov. 2012	Feb.2011		
Dozer			Feb. 2012						
Boom and Scissors Lift (Expiry Date)			Dec. 2011			Nov. 2011	May. 2012		
TMS Training	09/09/2009	09/09/2009							
HR Disciplinary & Grievance	23/04/2009	23/04/2009	23/04/2009						
Energy Awareness	06/10/2009	06/10/2009	06/10/2009						
EMS Awareness Annual EMS Training	11/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	11/12/2009	24/02/2009

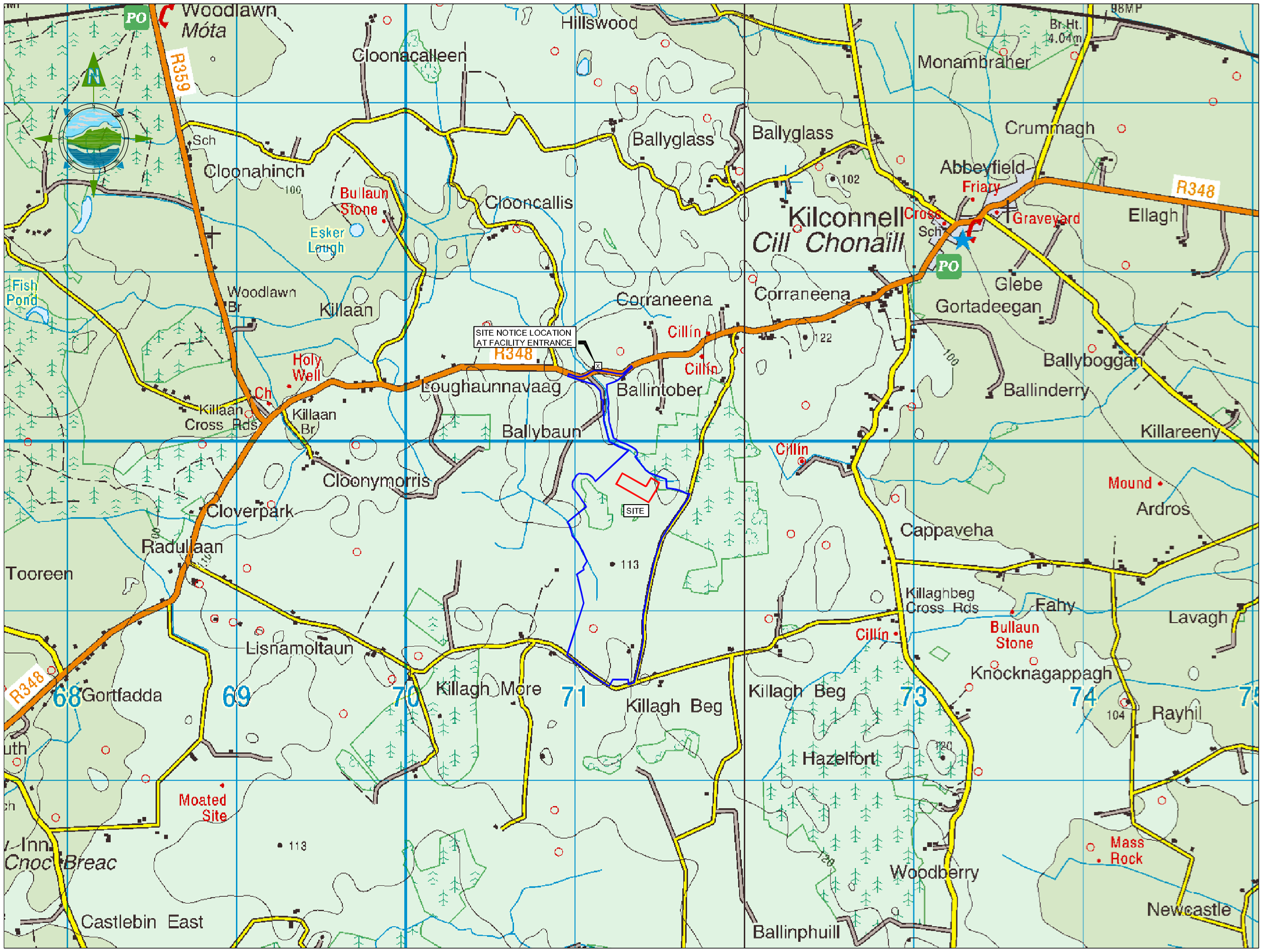
	Training Key		Not Applicable		Scheduled/Pending



ENVIRONMENTAL BALANCE IN DESIGN AND CONSTRUCTION

Appendix I

Maps



GENERAL LEGEND

LANDS UNDER CONTROL OF DEVELOPER

ACTIVITY BOUNDARY

SITE NOTICE LOCATION

[X]

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. DISCOVERY MAPPING SHEET NO: M-1622

210m 0 210m 420m 630m

Issue	Date	Description	By	Chkd.
D01	13-07-07	ISSUED FOR REVIEW	MN	MC

Client: greenstar

Project:

EAST GALWAY LANDFILL
PLANNING APPLICATION 2007

Title:

REGIONAL SITE LOCATION MAP

Scale @ A1: 1:10,560

Prepared by:	Checked:	Date:
M. Nolan	M. Conroy	July 2007

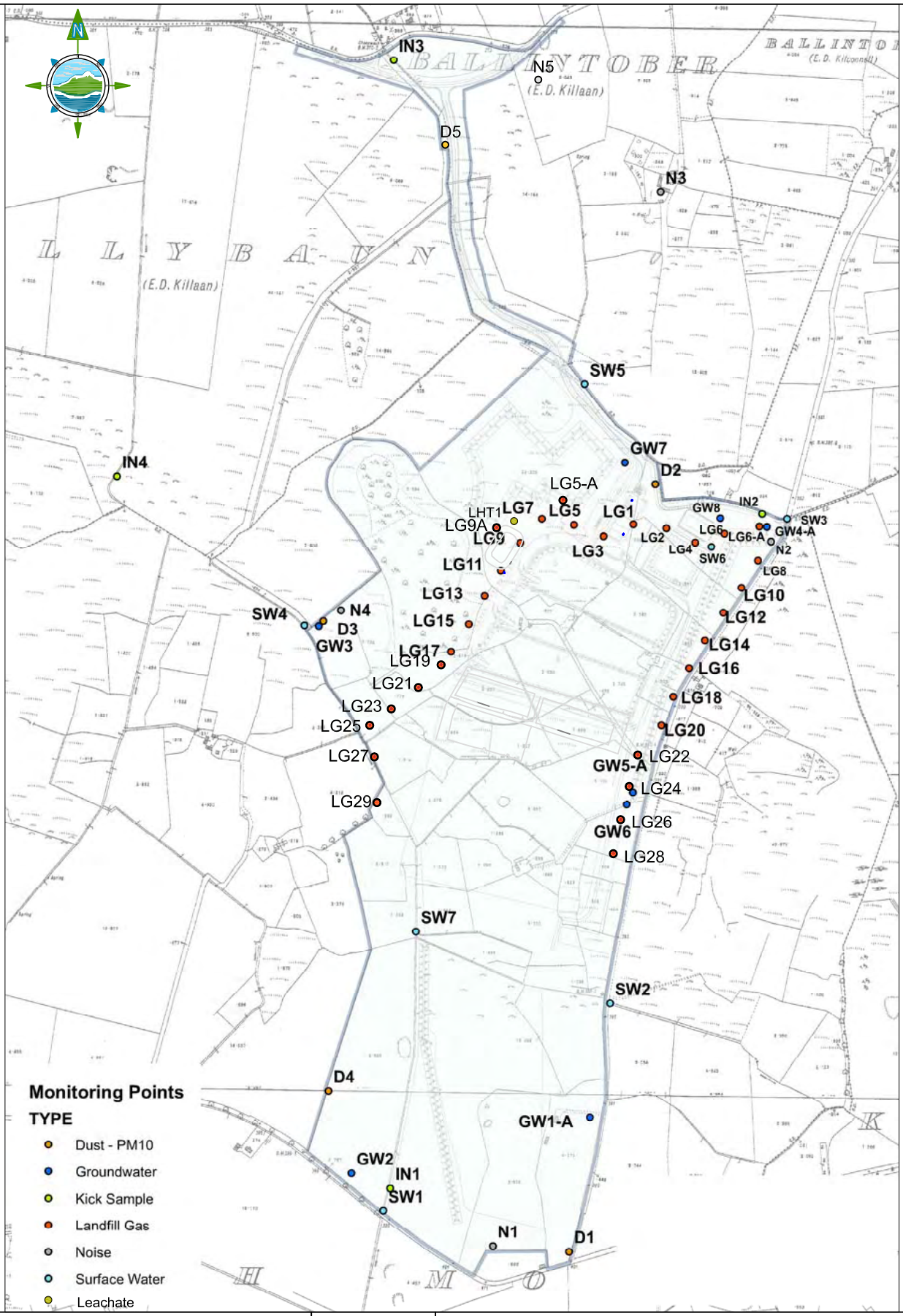
Project Director: D. Grehan

TOBIN
Patrick J. Tobin & Co. Ltd.
Consulting, Civil and Structural Engineers,
Block 10-3, Blanchardstown Corporate Park,
Dublin 15, Ireland.
tel: +353-(0)1-8030406
fax:+353-(0)1-8030409
e-mail: info@tobin.ie
www.tobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd., or copyright holder, except as agreed for use on the project for which the document was originally issued.

Drawing No.: 2228-2200 Issue: D01

Ordnance Survey Ireland License No EN 0016007 ©Ordnance Survey Ireland and Government of Ireland



Client: GREENSTAR LTD	Prepared by: R.K.	TOBIN Consulting Engineers, Market Square, Castlebar, Co. Mayo, Ireland. tel: +353-(0)94-9021401 fax:+353-(0)94-9021534 e-mail: castlebar@tobin.ie www.tobin.ie
Project: CONNAUGHT REGIONAL RESIDUAL LANDFILL	Checked: D.O'S.	Patrick J. Tobin & Co. Ltd.
Title: LANDFILL ENVIRONMENTAL MONITORING LOCATIONS	Date: 24.09.09	
	Project DIrector: M.F.G.	
	Drawing Status: LG29 ADDED	
	Scale @ A4: N.T.S.	

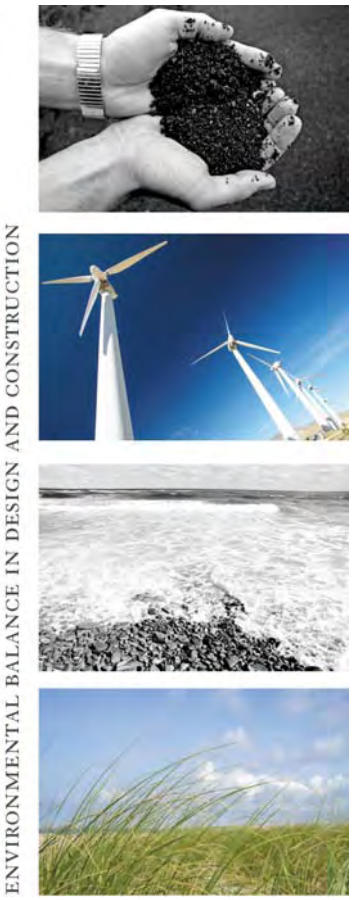
TOBIN Consulting Engineers will not be liable for any use of this document for any purpose other than that for which it was originally prepared and provided. Except where specifically and explicitly agreed in writing by TOBIN Consulting Engineers, as copyright holder, no part of this document may be reproduced or transmitted in any form and this document shall not be relied upon by any third party for any purpose.

Drawing No. 3588-1604

Revision: A

Ordnance Survey Ireland Licence number EN 0016009. ©

J:\Projects\3588 East Galway Landfill\Drawings\Preliminary\3588-1604 A - Environ Mon Locations.dwg, 3588-1604, 10/02/2010 10:18:36, ray kelly



Appendix II

Topographical Survey

LEGEND

N

PHASE 1 - CELL 1

PHASE 1 - CELL 2

PHASE 1 - CELL 3

PHASE 2 - CELL 4

PHASE 2 - CELL 5

PHASE 2 - CELL 6

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE

3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES

4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
A	16-02-10	ISSUED TO CLIENT	R.K.	C.McG.

Client:
CONNAUGHT REGIONAL RESIDUAL LANDFILL

Project:
QUARTERLY SURVEY

Title:
TOPOGRAPHICAL SITE SURVEY JANUARY 2010

Scale @ A1: 1 : 650

Prepared by:	Checked:	Date:
R.K.	C.McG.	JAN '10

Project Director: MICHAEL F. GARRICK

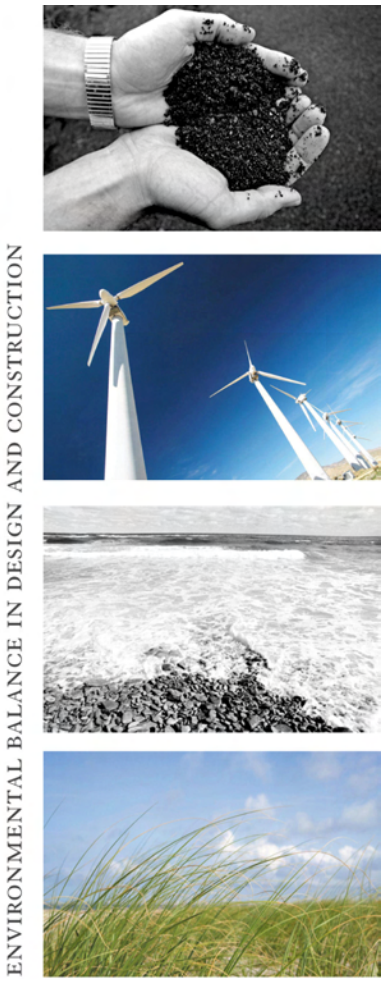
TOBIN
Patrick J. Tobin & Co. Ltd.
TOBIN Consulting Engineers,
Market Square, Castlebar,
Co. Mayo, Ireland.
tel: +353-(0)94-9021401
fax:+353-(0)94-9021534
e-mail: castlebar@tobin.ie
www.tobin.ie

TOBIN Consulting Engineers will not be liable for any use of this document for any purpose other than that for which it was originally prepared and provided. Except where specifically and explicitly agreed in writing by TOBIN Consulting Engineers, as copyright holder, no part of this document may be reproduced or transmitted in any form and this document shall not be relied upon by any third party for any purpose.

Drawing No.: 3588-1607

Revision: A

J:\Projects\3588 East Galway Landfill\Drawings\Preliminary\Quarterly Surveys\3588-1607 Rev A.dwg, 1607, 16/02/2010 17:00:31, ray kelly



Appendix III

Environmental Management Plan 2010

ENVIRONMENTAL MANAGEMENT PLAN

FOR

EAST GALWAY RESIDUAL LANDFILL

WASTE LICENCE NO.W0178-01

Prepared By: -

Greenstar Ltd.,
Killagh More, Ballybaun and Ballintober,
Killconnell,
Co Galway.

Rev 2: 12th March 2010

TABLE OF CONTENTS

PAGE

APPENDIX 1 - Engineering Design Maps

APPENDIX 2 - Corrective Action Procedures

APPENDIX 3- Awareness & Training Procedures

1. INTRODUCTION

This is the revised Environmental Management Plan (EMP) for the East Connaught Regional Landfill. The operator of the landfill is Greenstar Holdings Ltd. (Greenstar). Greenstar was granted a Waste Licence (Reg. No.W0178-01) to construct and operate the landfill by the Environmental Protection Agency (Agency) on 26th July 2004.

An initial EMP was prepared before the facility opened in 2006. This document is updated to reflect the on-going development of the site, operational experience and the implementation of the Schedule of Objectives and Targets.

1.1 Scope

The EMP is required under Condition 2.3.2.2 of the Waste Licence (Reg. No.W0178-01). The document is based on and contains the information specified in the Agency's Manual on Landfill Operational Practices and the Draft Guidance on Environmental Management and Reporting to the Agency.

The document describes the design and operation of the facility and presents details of the operator, the waste types and volumes that have been and will be accepted for disposal and recovery, engineering details, capacity, operational controls including surface water management, leachate and landfill gas control and management, environmental monitoring programmes and closure and aftercare measures. It also contains a revised Schedule of Objectives and Targets and the methods by which those objectives and targets will be achieved.

The document is based on information compiled during the preparation of the Waste Licence application, the detailed design of the engineering works and the on-going environmental monitoring programme.

1.2 Purpose

The EMP serves as a guidance document for facility staff and describes operational control and management practices that are applied at the facility. The EMP is also a core element of the Environmental Management System (EMS) for the facility and is designed to facilitate the management of site activities so as to comply with regulatory requirements and best landfill practice and to effectively implement the EMS. The Environmental Management System (EMS)

for the facility is now certified to ISO 14001 standard. Certification was received on 16th July 2009.

1.3 EMS Documentation

The EMS documentation prepared for the facility in addition to this EMP includes: -

1.3.1 Corrective Action Procedures (CAP)

The objective of the Procedures (CAP) is to ensure that the appropriate corrective action is taken should the requirements of the Waste Licence and the EMS not be fulfilled. A copy of the procedures are included in Appendix 2.

1.3.2 Awareness and Training Procedures

The objective of the Procedure is to ensure that the awareness and training needs of the facility personnel are identified and the required training provided. A copy of the Procedure is included in Appendix 3.

1.3.3 Communications Programme

Greenstar has prepared a Communications Programme with the aim of effectively communicating with the public about the environmental performance of the facility.

1.4 Annual Review

The EMP will, as a core element of the EMS, be subject to an annual review throughout the facility's operational life. The review will take account of operational experience, the progressive development of the facility, changes in regulatory requirements and developments in landfill technology and operations.

2. SITE DESCRIPTION

2.1 Site Location

The site is located in the townlands of Killagh More, Ballybaun and Ballintober, Ballinasloe, Co. Galway and encompasses an area of 60.8 ha. It is approximately 2.5 km southwest of Kilconnell village and 4.5 km northwest of Cappataggle village. The site is located in a segment of land, which is bounded to the north by the Ballinasloe to Athenry Road (R348) with local roads immediately adjacent to the east and south, the L7442 and L7439 respectively. The area consists of low lying undulating topography interspersed with a number of small hills.

Residential use in the surrounding area is predominantly single dwelling with adjacent farmyards. There are only 5 No. residential dwellings within or near a 500 m radius of the landfill cell area, with the nearest being 475 m away, and only a further 13 No. within 1000 m of the footprint. The surrounding land use is mainly low intensity livestock farming, with some commercial forestry on lands to the east.

2.2 Site Development

The facility will be developed in three phases. Phase 1, which was completed in December 2005, involved the initial site development works, construction of 3 engineered landfill cells and the provision of the supporting infrastructure including the waste reception area, weighbridges, leachate holding tank, ESB substation, site offices, weather station and groundwater and surface water control measures. The layout is shown on Drawing No 2228-2600.

The two subsequent phases will each involve the construction of 6 smaller additional engineered cells per phase, i.e. 12 additional cells in total, provision and progressive expansion of an active gas management and flaring system, progressive landscape works and the progressive capping and restoration of completed landfill cells. Construction of Phase 2 commenced in Summer 2008.

2.3 Geology and Hydrogeology

The geology and hydrogeology of the area is described in detail in the EIS submitted with the Waste Licence Application and is summarised below.

2.3.1 Bedrock Geology

The bedrock beneath the site comprises Lower Carboniferous dark limestones and shales belonging to the Calp Formation. The depth to rock ranges from 3 to 9.5 m across the site.

2.3.2 Quaternary Geology

Prior to development the natural ground conditions across the site comprised the higher ground consisting of a series of hillocks composed of 0.2 - 0.3 metres of sandy clay top soil and subsoil overlying a 0.4 - 0.6 m layer of glacial deposits comprising gravelly sandy clays that graded into a silty clayey till. In the lower lying ground the subsoil consisted of peat ranging in thickness from 3 - 4 metres overlying silty clayey tills. The permeability of the till ranges from $1.08x10^{-8}$ m/s to $5.12x10^{-9}$ m/s, which are considered to be low permeability.

2.3.3 Aquifer Status

The bedrock beneath the site is classified as a Locally Important Aquifer using the classification system prepared by the Geological Survey of Ireland (GSI). The direction of groundwater flow is from the south to the north/north west.

A well search identified that there are no beneficial users of groundwater within 500 m of the site and all of the residents within 1 km of the site are connected to the Kilconnell Public Supply, which is more than 2.5 km from the landfill cell footprint.

2.3.4 Aquifer Vulnerability

The vulnerability of the bedrock aquifer is, based on the type and thickness of the subsoil categorised as High to Extreme in accordance with the classification system prepared by the GSI. The response matrix for landfill location as promoted by the GSI indicates that it is acceptable to locate engineered contained landfills in areas underlain by Locally Important Aquifers with this vulnerability rating.

2.3.5 Groundwater Quality

Groundwater monitoring carried out prior to the start of development works established that groundwater beneath the site contains elevated ammonia levels. Such levels are often associated with peat rich environments and agricultural activities. The groundwater monitoring carried out since the facility began accepting waste has confirmed that site activities have not impacted on water quality.

2.4 Hydrology

2.4.1 Drainage Pattern

The original drainage pattern comprised a network of dug field boundary drains extending across the site. The Ballintober Stream forms part of the northern boundary and there is a large drain running north to south (Killaghmore Stream) in the western area of the site. The site drainage enters tributaries of the Raford River, which is to the south-west of the site. To compensate for the loss of the internal site drains during site development perimeter drains have been installed around the landfill cell footprint to intercept surface water flow and divert it to the Ballintober Stream via a settlement lagoon.

2.4.2 Surface Water Quality

Water quality monitoring, including biological and chemical assessment, of the surface water drains around the site prior to development established that the drainage system has been impacted by surrounding agricultural land use (animal grazing) and could be classified as Slightly Polluted.

The surface water monitoring carried out since the facility began accepting waste has confirmed that site activities have not impacted on water quality.

2.5 Meteorology

The annual average rainfall is of the order of 1091 mm, with average monthly rainfall ranging from 66 mm in the drier months to 110 mm in the wetter winter months. The estimated annual evapotranspiration is approximately 445 mm. The prevailing wind is from the South-southwest, with an average wind speed of 10 knots.

3. TYPES OF WASTE ACCEPTED & CONSIGNED

3.1 Wastes Accepted

Schedules A and F of the Waste Licence (Reg. No. 178-1) defines the type and maximum quantities of waste that can be accepted for disposal and recovery. A total of 100,000 tonnes of waste can be accepted for disposal annually. The following types and maximum annual quantities of such wastes are: -

- Household 45,000 tonnes
- Commercial 27,500 tonnes
- Industrial Non Hazardous 27,500 tonnes

The amounts of the individual waste categories may be altered with the prior approval of the Agency provided that the total amount does not exceed 100,000 tonnes per annum.

The following types of inert waste can be accepted for recovery: -

- Concrete,
- Subsoil,
- Stone, Rock and Slate,
- Solid Road Plainings, Solid Tarmacadam and Solid Asphalt,
- Brickwork,
- Clay.
- Other suitable wastes - with the prior approval of the Agency

The following information is recorded for each load of waste arriving at the facility in accordance with the requirements of Condition 10.2: -

- the date and time;
- the name and waste collection permit details of the haulier;

- the vehicle registration number;
- the name of the producer(s)/collector(s) of the waste as appropriate;
- the name of the waste facility (if appropriate) from which the load originated including the waste licence or waste permit register number;
- a description of the waste including the associated EWC codes;
- the quantity of the waste, recorded in tonnes; and
- the name of the person checking the load.

3.2 Wastes Consigned

The only waste that is routinely consigned from the facility is leachate generated in the landfill cells, cleanings from the grit and oil interceptors, waste oils/filters generated during the on-site maintenance of the fixed and mobile plant used at the site and small amounts of recyclable office/canteen waste. Unsuitable waste inadvertently delivered to the facility and removed during the waste inspection procedures are consigned on an as needed basis.

Greenstar operate a source segregation policy to maximise the recovery of potential recyclables from the office waste. All recovered materials are transferred off-site to Agency approved and licensed recovery/recycling facilities.

The following information is recorded for each load either consigned, or rejected from the site in accordance with the requirements of Condition 10.2: -

- details of the date of the occurrence,
- the types of waste and the facility to which they were removed (including the waste licence/permit and waste collection permit).

3.3 Waste Records

Greenstar maintains records of all characterisation testing carried out by waste producers and confirmatory testing conducted by or on behalf of Greenstar, for a minimum of three years (Ref. Section 5.6.5).

Greenstar maintains records of all waste received, recovered, consigned and disposed at the facility for three years. The records include details of the type, quantities and EWC codes, as required by Condition 10.3 a) of the Waste Licence (Reg. No.W0178-01).

3.4 Site Capacity

The volumes of waste placed and the remaining void space are calculated annually and reported in the Annual Environmental Report (AER).

4. SITE DESIGN & DEVELOPMENT

4.1 Engineering Details

The engineering design details for the facility are shown on the Drawings listed in Table 4.1 and an overview of the design is presented in this Section.

The construction of the cells; leachate storage tank; groundwater and surface water control measures including the surface water settlement lagoon and wetlands; the installation of landfill gas flares and the final capping are all *Specified Engineering Works*, which must be carried out in accordance with Condition 3.2 of the Waste Licence Reg. No.W0178-01. The prior approval of the Agency must be obtained before any such works are carried out.

The design of the lining and capping systems are specified in Conditions 3.12 and 4.4 of Waste Licence and are in accordance with the design specifications set in the EU Directive of Landfill of Waste, the Agency's Manual on Landfill Site Design and best industry practice.

4.2 Site Development

The initial phase involved the provision of three (3) landfill cells and all of the supporting infrastructure required to operate the facility in compliance with the Waste Licence. Completion of Phases 2 & 3 will involve the provision of additional landfill cells, which will be half the size of Phase 1 cells, and the associated expansion of leachate, landfill gas and surface water control measures.

The development works require the excavation of suitable materials from designated borrow area(s) for use in the construction of the site infrastructure. Activities in the borrow pit area are managed in accordance with Conditions 3.16.3, 5.7.1 iii) and 5.12 of the Waste Licence (W0178-01), which specify the surface water control, landscaping and nuisance mitigation measures. The borrow area(s) will be restored and landscaped using the natural subsoils and peat removed from the landfill cell footprint.

The Killaghmore Stream traverses the extreme southwest of the landfill footprint. Its position necessitated the diversion of a short length of this stream. Approximately 80 m of the stream was rerouted through a new channel. The diversion occurred during Phase 2 development work.

Table 4.1 Engineering Design Details (See Appendix 1)

Drawing No.	Title
2228-2600	Specified Engineering Works - Overall Site General Arrangement Plan
2228-2601	Specified Engineering Works General Arrangement Phase 1 - Sheet 1 of 2
2228-2602	Specified Engineering Works General Arrangement Phase 1 - Sheet 2 of 2
2228-2605	Specified Engineering Works - Basal Lining System Embankment Details and Intercell Bunds
2228-2607	Specified Engineering Works - Phase I Leachate Collection
2228-2608	Specified Engineering Works - Site Surfacing Plan
2228-2609	Specified Engineering Works - Site Fencing Plan
2228-2612	Specified Engineering Works - Road Construction Details
2228-2614	Specified Engineering Works - Surface Water Lagoon and Engineered Wetland Layout Plan
2228-2615	Specified Engineering Works - Leachate Collection Tank Elevation and Section
2228-2618	Specified Engineering Works - Waste Quarantine Area General Arrangement
2228-2623	Submission to EPA - Landscaping Implementation Plan - Sheet 1 of 2
2228-2624	Submission to EPA - Landscaping Implementation Plan - Sheet 2 of 2
3588-1604A	Landfill Environmental Monitoring Locations

A natural gas pipeline runs through the southern portion of the site, approximately 370 m south of the final landfill footprint. The location of the pipeline has been identified in accordance with Condition 3.20 of the Waste Licence (Reg. No.W0178-01) so as to avoid accidental damage during development, landscaping, restoration and maintenance works.

4.3 Site Preparation and Services

The preparatory works for Phase 1 involved the clearance of vegetation, excavation of in-situ subsoils and raising to formation levels using imported clean aggregate. The excavated peat and wet silts were stored in the material storage area, constructed at the location shown on Drawing No. 2228-2600. The storage was in accordance with the Conditions 3.16.4 and 5.5 of the Waste Licence (Reg. No.W0178-01).

The facility has a 110 kW electricity supply, a water supply from a local group scheme and phone lines. The surface water drainage system is shown on Drawing Nos. 2228-2600, 2601 & 2602. Sanitary wastewater from the offices and canteen is treated in an on-site wastewater treatment plant and the treated effluent is pumped to the leachate storage tank.

4.4 Site Facilities

The site facilities include: -

- Waste Reception Area,
- Weighbridges (2 No.),
- Wheel Wash,
- Waste Quarantine & Inspection Areas,
- Landfill Cells,
- Leachate Storage Tank & Leachate Storage Lagoon,
- Landfill Gas flares (4 No.)
- Surface Water Pond,
- Administration Block (offices, stores, canteen, toilets and showers),
- ESB Sub-Station,
- Standby Generator (Diesel),
- Oil Storage Tank.

The site layout is shown on Drawing No. 2228-2600. The drawing will be reviewed as required to include any new facilities provided, during the phased development of the site.

4.5 Facility Roads, Access Roads & Hardstanding

The Specification for the roads and hardstanding areas is based on 'Specification for Roadworks', published by the National Roads Authority. The various types of surfacing are described on Drawing No. 2228-2608, with details on Drawing No. 2228-2612 and the construction complies with the requirements of Condition 3.5.1.

4.5.1 Main Access Road

The main access road linking the existing R348 to the landfill runs for approximately 820m over existing farmland (see Drawing Nos. 2228-2600 and 2228-2608). It comprises (see Drawing No. 2228-2612): -

Wearing Course	-	HSC Hot Rolled Asphalt, 40 mm thick
Base Course	-	Dense Bitumen Macadam, 60 mm thick
Roadbase	-	Heavy Duty Macadam, 150 mm thick
Sub-base	-	Clause 804, 150 mm thick
Capping	-	Granular material Grade 6F1/6F2, up to 600 mm thick (to be assessed on CBR test results).

4.5.2 Infrastructure Access Roads & Car Parking Areas

The infrastructure access road runs for approximately 150 m linking the car park, office, quarantine area and fuel bund (see Drawing No. 2228-2601). The road and car park design is the same as the main access road. Precast concrete kerbs and road gulleys are provided, with a piped gravity drainage system discharging to the surface water lagoon via an alarmed oil/water separator. Isolation joints are provided at all interfaces with concrete structures or concrete hardstanding.

4.5.3 Reinforced Concrete Hardstanding

Reinforced concrete hardstanding has been provided at locations adjacent to the fuel bund, quarantine area and leachate holding tank, where increased wear resistance is required for turning vehicles (see Drawing No. 2228-2601). The hardstand comprises 250 mm thick reinforced concrete slab, to details provided in Drawing No. 2228-2615 and 2228-2618.

4.5.4 Jeep Track

A track, as shown on Drawing No. 2228-2608, and detailed on Drawing No. 2228-2612. has been provided to allow access to the perimeter fence and monitoring infrastructure.
The pavement design of the track is as follows: -

Wearing course	-	200 mm Cl.804
Sub-base	-	depending on ground conditions up to 675 mm fill with two layers of geogrids as per specification.

4.6 Site Buildings

The locations of the administration block, weighbridge maintenance garage and ESB Sub-Station are shown on Drawing No. 2228-2600. The design of all of the buildings took into consideration the guidance given in the DOE publication "Protection of New Buildings and Occupants from Landfill Gas, as specified in Condition 3.15.5 of the Waste Licence (Reg. No. 178-1).

4.7 Waste Inspection and Quarantine Areas

Waste inspection and quarantine areas required under Condition 3.7.1 of the Waste Licence (Reg. No. 178-1) are located as shown on Drawing No. 2228 - 2600 to the details shown on Drawing No. 2228-2618. The areas are bounded on 3 sides by a 1.5 m high reinforced concrete wall. Both areas are provided with longitudinal falls to allow run-off to drain directly to a sump.

4.8 Wheel Wash

A wheel wash is provided in accordance with Condition 3.9.1 of the Waste Licence (Reg. No. 178-1). Water is supplied to the wheel wash from the on-site surface water lagoon. The wheel wash drains to the leachate collection system, as specified by Condition 3.9.1.

4.9 Landfill Cells

The landfill is designed as a containment facility. Waste is only disposed in the engineered landfill cells which comprise a lining system, as specified in Condition 3.12 of the Waste Licence (Reg. No.W0178-01). The basal and side wall lining system design complies with the recommendations in the Agency's Landfill Manual Landfill Design and comprises a minimum of: -

- A composite liner consisting of a 0.5 m layer of Bentonite Enhanced Sand (BES) with a hydraulic conductivity of less than or equal to $5x10^{-10}$ m/s overlain by a 2 mm thick high density polyethylene (HDPE) layer;

- A geotextile protection layer placed over the HDPE layer;

- A 500 mm thick drainage layer placed over the geotextile layer with a minimum hydraulic conductivity of $1x10^{-3}$m/s on the base on the cell and incorporating HDPE collection drains.

Details of the engineering specification for the landfill cells constructed in Phase 1 are shown on Drawing No. 2228-2605. The construction of all the cells is the subject of a comprehensive

construction quality assurance (CQA) programme. Copies of the CQA reports are submitted to the Agency for approval before waste is deposited in the cells.

4.10 Leachate

The facility is designed to minimise leachate generation. Surface water run-off and groundwater flow is directed away from the fill area by means of interceptor drains installed outside the landfill cells and an underlying groundwater drainage layer. The landfill cells are designed as fully contained areas and the construction is subject to a comprehensive construction quality assurance and validation process, details of which are submitted to the Agency.

Leachate is collected by means of a series of perforated pipes constructed in drainage stone layer on top of the basal liner which has a fall of 1: 150 towards internal collection sumps. The leachate is pumped from the sumps, using submersible pumps and a sloping shaft side riser, to the leachate transport lines from where it flows by gravity to the leachate pumping station located beside the holding tank. The leachate is pumped from the station into the holding tank. Details of the collection system are shown on Drawings No. 2228-2607 and 2228-2615.

The precast concrete leachate storage tank has a capacity of 500 m^3, which based on water balance calculations prepared as part to the application for the waste licence, provides for more than 80 hours retention when the maximum hourly rate of leachate generation will occur. The water balance calculations were based on guidance presented in the EPA Landfill Manual on Landfill Site Design. In addition to this tank a leachate storage lagoon of 5000m3 capacity was constructed in 2009 for additional leachate storage.

Annual water balance calculations will be completed during the preparation of the Annual Environmental Report (AER) and based on recorded rainfall data and the volumes of leachate removed from the site. The calculations will be used to assess the suitability of the existing and proposed leachate management facilities that will be progressively provided in the additional Phases.

The leachate holding tank is provided with a lining system as shown on Drawing No. 2228-2615. A concrete spill pad is provided in the loading bay at the tank. The road tankers used to remove the leachate are parked in the bay while leachate is removed from the tank. The pad is graded to prevent the escape of any spills that may occur during tanker loading.

The leachate is removed off-site for treatment at a waste water treatment plant approved by the Agency in accordance with Condition 11.8 of the Waste Licence (Reg. No.W0178-01).

4.11 Landfill Gas

The landfill cells are fully contained by the engineered lining system (Ref. Section 4.1). An active abstraction and flaring system has been provided and gas collection wells are progressively installed in the cells and connected to the abstraction system.

The design of the gas abstraction system meets the specifications set in Condition 3.15.2 of Waste Licence (Reg. No. W178-01) and proposals for the gas equipment were agreed with the Agency as required under Condition 3.2.1.

4.12 Surface Water

All rainfall on the active landfill cells is characterised as leachate and is collected in the leachate collection system. The surface drainage from all roads, hardstanding areas and all areas of the facility where the surface water has the potential to become contaminated is directed to the surface water lagoon in the north of the site. The surface water in the administration area is directed to an oil interceptor. Run-off from the swale around the perimeter of the landfill cells is collected and discharged directly to the surface water lagoon via a separate inlet.

The lagoon is sized to accommodate run-off from a 12 hour storm event with a return period of 1:50 years. Details of the lagoon are shown on Drawing No. 2228-2614. The inlet to the pond is fitted with a Class 1 Full Oil interceptor, as specified in Condition 3.16.6 of the Waste Licence (Reg. No W178-01). Water from the lagoon outfalls to a reed bed system, as shown on Drawing No. 2228-2614.

4.13 Groundwater

To eliminate the potential for groundwater to adversely impact the construction of the landfill cells, the design incorporates a basal groundwater drainage layer. Groundwater intercepted by the drainage layer is directed to a sump from where it is be pumped to the surface water lagoon.

4.14 Site Security

The fencing layout is shown on Drawing No. 2228-2609. Anti-intruder fencing and a gateway and a CCTV system have been provided at the facility entrance. Security personnel are employed at all times when the site in not in operation.

4.15 Monitoring Infrastructure

The existing groundwater, surface water, noise, dust and PM_{10} monitoring locations are shown on Drawing 3588-1604 A. Additional landfill gas, groundwater and surface water monitoring points will be provided during the progressive development of the facility as specified in Conditions 3.19 1, 3.19.2, 3.19.3 and 3.19.4 of the Waste Licence (Reg. No.W0178-01).

Any monitoring infrastructure which is damaged or proves to be unsuitable for its purpose is replaced within three (3) months of being damaged or identified as being unsuitable, as specified in Condition 3.19.5 of the Waste Licence (Reg. No.W0178-1).

4.16 Fire Control

The facility obtains its fire fighting water supply from the surface water lagoon.
Emergency response procedures are in place which are to be followed in the event of a fire.

4.17 Landscaping

The fill area is sited to maximise the screening value of existing boundary hedgerows. The development phasing sequence is from the north to the south, with the initial phase at the maximum distance from the nearest residence to allow time for maturing of additional screen planting. Landscaping measures are implemented in accordance with the programme prepared in compliance with Condition 5.7.1 of the Waste Licence (Reg. No. W0178-01) and the Drawings submitted 2228-2623 & 2624.

4.18 Fuel & Chemical Storage

Diesel for the mobile plant and back-up generator is stored in a 10,000 litre tank provided with a containment bund in the administration area, next to the waste inspection and quarantine areas. The bund design meets the specification in Condition 3.11 of the Waste Licence (Reg. No.W0178-01).

Small quantities of lubricating and hydraulic oils used in plant maintenance are stored on a bunded pallet inside the maintenance shed.

4.19 Capping System

The final profile will be a maximum of 124 mOD Malin and the shape will be as shown on Drawing No 2228-2623. When the final fill levels have been reached, the cells will be capped with a low permeability capping system as specified in Condition 4.4 of the Waste Licence Reg. No. W0178-01), which includes: -

- Top soil (150 - 300 mm);
- Subsoils such that the total thickness of top soil and subsoils is at least 1 m;
- Drainage layer of 0.5 m thickness having a minimum hydraulic conductivity of $1x10^{-4}$m/s (or equivalent as agreed by the Agency);
- Compacted mineral layer of a minimum 0.6 m thickness with a permeability of less than $1x10^{-9}$m/s or a geosynthetic material (e.g. GCL) or similar that provides equivalent protection; and
- Gas collection layer of natural material (minimum 0.3 m) or a geosynthetic layer.

4.20 Restoration

The fill area will be restored in accordance with detailed Restoration Plans prepared in compliance with Condition 4.1 of the Waste Licence (Reg. No.W0178-01). The Restoration Plans will include details of the planting and reinstatement end use.

5. OPERATIONAL MATTERS

5.1 General Description of the Operation

The facility is an engineered, non-hazardous landfill, with deposition and covering of treated waste in specially designed and constructed landfill cells. The cells are designed to facilitate the effective control of emissions and are provided with a low permeability composite lining and leachate collection system.

An active landfill gas extraction and flaring system has been provided and progressively extended to collect and flare landfill gas. Construction and Demolition waste is recovered on-site for use in the construction of site roads and restoration works. The only wastes regularly consigned from the facility are leachate and waste oils generated during on-site plant and equipment maintenance.

5.2 Operating Procedures

Greenstar has prepared a comprehensive set of Operating Procedures (OP) that cover all aspects of the day to day management of the facility and contingency measures. The OP's are based on the requirements of the Waste Licence, the Agency's Landfill Manual on Landfill Operations and the Agency's draft BAT for Landfill. The OPs form part of the facility's ISO 14001 certified EMS and are subject to regular review based on operational experience, legislative changes and improvements in best practice.

5.3 Site Management

The Site Management Team comprises: -

- Facility Manager,
- Deputy Facility Manager,
- Foreman,
- Weighbridge Operator,
- Plant operators,
- General Operatives,
- Administration.

The Facility Manager and Deputy Manager(s) are suitably qualified and experienced and have undergone appropriate training, as specified by Conditions 2.1.1 and 2.1.2 of the Waste Licence (Reg. No.W0178-01) and the training and awareness requirements of the EMS. Greenstar maintains training records of all training provided to facility personnel.

The roles and responsibilities of all members of facility staff are set out in the Management Structure, which is specified in Condition 2.2 of the Waste Licence (Reg. No.W0178-01). This document is subject to annual review and will be amended to reflect any change in facility personnel.

5.4 Operational & Waste Acceptance Hours

The operational and waste acceptance hours are specified in Condition 1.6.1 of the Waste Licence (Reg. No.W0178-01). The facility is operational between 7.30 and 18.30 Monday to Friday and. 7.30 to 14.30 on Saturday Waste can be accepted at the facility for disposal between 8.00 and 17.45, Monday to Friday and 8.00 to 13.45 on Saturday.

5.5 Access Control

The only access point to the facility is off the R348. The internal traffic control system requires all waste vehicles entering the facility to pass the weighbridges. The access gates are locked shut outside of operational hours.

Signage is provided on the eastern approach to the entrance off the R348 identifying the site and the access point. Access to the weighbridges is controlled by means of automated barriers. All visitors must report to the administration building and provide their name, company/organisation, vehicle registration number and purpose of visit.

5.6 Waste Acceptance Procedures

5.6.1 Treatment of Waste

Condition 1.5.4 of the Waste Licence (Reg. No.W0178-01) stipulates that, with the exception of inert waste, only treated waste is accepted at the facility for disposal. The method by which this is achieved is described in the Waste Acceptance Procedures prepared in accordance with Condition 11.5.1 of the Waste Licence (Reg. No.W0178-01).

5.6.2 Waste Collection Permits

Greenstar only accepts waste from holders of waste collection permits under the Waste Management (Collection) Permit Regulations 2007 (as may be amended) unless exempted, or from licensed/permitted facilities as stipulated in Condition 1.5.1 of the Waste Licence (Reg. No.W0178-01). Greenstar must be provided with copies of up to date collection permits before waste is accepted from a waste collector.

5.6.3 Waste Characterisation

Greenstar may require waste producers to characterise the waste prior to acceptance at the facility in accordance with procedures approved by the Agency, as specified in Condition 11.5.1 of the Waste Licence (Reg. No. 178-1).

Such waste characterisation must meet all waste acceptance criteria set by Greenstar including methods to distinguish between inert, non-hazardous and hazardous waste as defined in the European Council Decision of 19th December 2002 establishing the criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of the Directive 1999/31/EC on the landfill of waste. The producer/holder of the waste must, if requested, provide documentation that the waste meets Greenstar's specification. Waste not conforming to Greenstar's specification will neither be accepted nor deposited at the site.

5.6.4 Waste Inspection

All documentation accompanying waste delivery records is checked at the weighbridge and the waste is also visually inspected at the weighbridge using overhead CCTV cameras where practical. If the checks identify that the waste does not comply with Greenstar's specifications it is not accepted.

Where there are doubts about the nature of the waste, the delivery vehicle is directed to the waste inspection area, where it may be off-loaded. If following inspection the waste is considered to be acceptable it is, where practical, reloaded on to the delivery vehicle and moved to the active fill area. If this is not practical the waste is removed to the fill area by Greenstar plant.

If the material is identified as not suitable it is, where practical, loaded onto the delivery vehicle and the driver instructed to remove it off-site. If this is not practical the waste is moved to the Waste Quarantine Area for storage pending removal by the waste producer/waste collector. Unsuitable waste shall not be stored in the Quarantine Area for more than one month as specified in Condition 5.2 of the Waste Licence (Reg. No.W0178-01).

All waste placed in the landfill cells is inspected by Greenstar personnel at the waste face to confirm that the wastes are suitable. Where operatives identify unsuitable waste

this is, if practical, reloaded onto the delivery vehicle and removed from the facility. If this is not possible the waste is removed from the active fill area and stored in the Waste Quarantine Area, pending removal off-site by the waste producer/waste collector.

5.6.5 Waste Records

The following information on each waste load delivered to the facility is recorded as required by Condition 10.2 of the Waste Licence (Reg. No. W0178-01): -

- The date and time,
- The name and Waste Collection Permit details of the haulier,
- Vehicle registration number,
- The name of the producer(s) / collector(s) of the waste as appropriate,
- The name of the waste facility (if appropriate) from which the load originated, including the waste licence or waste permit register number,
- Description of the waste including the associated EWC codes,
- Quantity of waste (in tonnes),
- Name of person checking loads and,
- Where loads of waste are removed or rejected details of the date of occurrence, the types of waste and the facility to which they were removed (including the waste licence/permit and or waste collection permit details).

5.7 Phasing of Filling

The facility will be developed in series of three (3) Phases and each Phase will involve the construction of a number of landfill cells. Phase 1 was completed December 2005 and involved the construction of 3 cells. The construction of Phase 2 commenced in the summer of 2008. Phase 2 involves the construction of 6 cells. Phase 2 cells are half the size of cells in Phase 1.

The landfill cells are filled sequentially. For practical reasons it is not be possible to fill to final levels in any one cell without filling in the adjacent cell(s). The progress of the filling and the future development of the phases will be reviewed annually and amendments incorporated into the EMP.

5.8 Equipment

The following plant may be used at the facility for waste activities:

- Landfill Compactors (2: 1 No Duty & 1 No Standby.),
- Back-hoe Excavator (2 No.),
- Dumper, A25 (1 No.),
- Tractor and trailer (1 No.),
- Road sweeper (1 No.),
- Water Bowser (1 No.),
- Landfill Gas flares (4 No.)
- Standby Generator (1 No.),
- Duty and Standby electrical and diesel powered pumps (6 No.).

The plant list will be revised annually to reflect any changes or additions arising from amendments to waste activities. The list does not include plant and equipment used in the phased site development works.

5.9 Waste Placement

Unless otherwise agreed with the Agency only one working face is in use in the active landfill cell, as required by Condition 5.3 of the Waste Licence (Reg. No.W0178-01). The working face is limited to 2.5 m in height after compaction, 25 m wide and a slope of 1:3.

The residual household, commercial and industrial waste is deposited directly on the surface of the immediately preceding layer of waste close to the advancing tipping face by the waste delivery vehicle. The waste is spread in shallow layers, on the inclined surface and compacted using a steel wheeled compactor. All large, hollow objects or other large items are crushed or flattened using the compactor. The working face is covered with suitable material at the end of each working day.

The deposited waste is not excavated or disturbed without the prior approval of the Agency, as specified in Condition 5.8.3 of the Waste Licence (Reg. No.W0178-01).

The completed areas of the landfill cells are profiled so that there are no depressions where water may accumulate. The filled cells will be permanently capped within 12 months of the cells reaching the final fill levels, as specified in Condition 5.8.5 of the Waste Licence (Reg. No.W0178-01).

5.10 Cover Requirements

The waste is covered at the end of every working day using suitable material-150 mm of inert material, as specified in Condition 5.8.3 of the Waste Licence (Reg. No.W0178-01**).** Adequate stockpiles of cover material are maintained on-site at all times. The daily cover material is either imported or recovered on-site from the Construction and Demolition wastes or taken from the onsite borrow pit.

The active fill area is inspected daily and where the daily and intermediate cover material has been eroded, washed off or otherwise removed this material is replaced by the end of the working day as required by Condition 5.4.1 to the Waste Licence (Reg. No.W0178-01).

5.11 Off-Site Disposal and Recovery

Wastes consigned from the facility must be conveyed by waste contractors approved by the Agency, as specified by Condition 5.11.1 of the Waste Licence (Reg. No.W0178-01). Greenstar maintains and regularly updates a register of approved waste contractors.

All waste transferred from the facility must go to an appropriately licensed/permitted facility agreed by the Agency, as specified in Condition 5.11.2 of the Waste Licence (Reg. No.W0178-01). Greenstar maintains and regularly updates a register of approved facilities.

All wastes consigned from the facility must be transported in a manner that does not adversely affect the environment, as specified in Condition 5.11.3 of the Waste Licence (Reg. No.W0178-01). Greenstar personnel inspect each vehicle transporting waste off-site to ensure that it is suitable to transport the particular waste.

5.12 Water, Leachate and Gas Control Measures

5.12.1 Surface Water Control Measures

Two inlets to the surface water lagoon are provided, which deliver water from the perimeter swale and site roads. Isolation valves are provided near both inlets to stop inflow where necessary, as specified in Condition 3.16.5 of the Waste Licence (Reg. No. 178-1). Surface water from impermeable areas of the site where there is the potential for contamination passes through a grit trap and a Class 1 Full Oil interceptor before discharge to the lagoon, as specified in Condition 3.16.6. of the Waste Licence (Reg. No.W0178-01).

The water in the lagoon discharges to the Ballintober Stream via a reed bed system. The reed bed design was based on consultation with the Western Regional Fisheries

Board as required by Condition 3.16.5 of the Waste Licence (Reg. No.W0178-01). The outfall from the pond to the wetland area is controlled by an actuated penstock. The penstock also allows the retention of water within the pond in the event that monitoring indicates contamination of the surface water.

5.12.2 Leachate Management

Leachate accumulating in the cells is pumped from collection sumps located inside the cells via side risers to the leachate main from where it flows to a leachate pumping station located adjacent to the above ground leachate storage tank.

The leachate is pumped from the station to the tank, which has a capacity of 500 m^3 or to the leachate lagoon, which has a capacity of 5,000 m^3 The pumps are controlled by means of a systems control and data acquisition system (SCADA) that continuously monitors the level in the landfill cells, pumping chambers,storage tank and lagoon and activates the pumps to ensure the level does not exceed 1 m above the liner as specified in Condition 5.13.1 of Waste Licence (Reg. No.W0178-01).

High level alarms are fitted in the pump chambers and in the storage tank and lagoon. A freeboard of 0.75m is maintained in the storage tank as required by Condition 5.13.1 of the Waste Licence (Reg. No.W0178-01). The maintenance of the 0.75 m freeboard at all times in the storage tank requires the regular removal of leachate from the tank. The leachate is removed using fully enclosed road tankers operated by a permitted waste collector.

The leachate is treated at an off-site waste water treatment plant (WWTP). WWTP's used by this facility include Galway County Council Tuam STP, Celtic Anglican Waste WWTP (Ringsend), Rilta Industrial WWTP (Rathcoole), and Enva Industrial WWTP (Shannon) which were agreed in advance with the Agency, as specified in Condition 5.13.3 and 11.8.1 b) of the Waste Licence (Reg. No.W0178-01).

Greenstar has prepared written procedures for the proper handling of leachate at the site, as specified in Condition 11.8.1 e) of the Waste Licence (Reg. No.W0178-01). The procedure specifies the corrective actions to be taken in the event of a spill at the ground surface. Greenstar maintains an adequate supply of containment booms and/or suitable absorbent material to contain and absorb any spill at the facility. Facility personnel have been provided with appropriate training to deal with any such incidents.

It is not intended to pre-treat the leachate at the facility. If at some time in the future pre-treatment is being considered Greenstar will submit details to the Agency for prior approval. Leachate may be recirculated in cells that have been capped and restored to the Agency's satisfaction and subject to the Agency's prior approval, as required by Condition 5.13.4 of Waste Licence (Reg. No. 178-1).

5.12.3 Landfill Gas Control Measures

The primary measures to prevent landfill gas migration and to allow the efficient collection of gases for flaring and possible utilisation are the landfill lining system, supported by active abstraction. Greenstar have completed an assessment of the feasibility of the utilisation of landfill gas in accordance with Condition 11.7 of the Waste Licence (Reg. No.W0178-01). The assessment concludes that utilisation is feasible depending on cost and timeframe to secure grid connection. Greenstar are working towards securing a connection to the National grid. Greenstar will install gas utilisation system within the timeframe agreed with the Agency.

5.13 Noise Emission Controls

Noise emissions are mitigated by the following methods, which are based on the requirements of Condition 7. 6.1 of the Waste Licence (Reg. No.W0178-01): -

- Low sound level plant is used on-site,
- Speed restrictions on all internal site roads,
- Fitting of acoustic panels on the engine bays and exhaust silencers on all heavy machinery used on-site, and
- Compliance with BS 5528 Noise Control on Construction and Open Sites.

5.14 Odour Emission Controls

Odour emissions are controlled by the following operational procedures and engineering controls: -

- The daily working area is limited in size,
- Daily covering of waste,
- Provision and progressive expansion of an active gas abstraction and flaring system in operational cells,
- Provision of a low permeability cap incorporating a landfill gas collection system on completed cells.

5.15 Litter Control

Litter control is achieved by the following methods which are specified in Condition 7.3 of the Waste Licence (Reg. No. W0178-01) and also best practice: -

- Daily covering of the waste,
- Suspension of waste disposal during adverse weather conditions,
- Provision and maintenance of permanent and portable litter fencing and netting around the perimeter of all waste disposal areas. The fencing is provided prior to the placement of waste,
- Daily inspection of litter control infrastructure. All defects are repaired by the end of the working day on which the defect was discovered. If it is only possible to effect a temporary repair on the day a permanent repair must be completed within three days,
- Loose litter or other waste occurring on or in the vicinity of the site is collected immediately or no later than 10 am of the next working day after such waste is discovered in compliance with Condition 7.3.4,
- Greenstar requires all vehicles delivering waste to and removing waste and materials from the facility to be appropriately covered.

5.16 Dust Emission Controls

Dust emissions are minimised and controlled by the following, which are specified in Conditions 7.4 and 7.5 of the Waste Licence (Reg. No.W0178-01) and also best practice: -

- Paved roads,
- Mandatory use of the wheel wash by waste vehicles leaving the site except those whose exemption has been approved by the Agency,
- Routine road sweeping,
- Daily cover of the deposited waste,
- Capping and seeding of landfill cells,
- Vegetation of soil stockpiles,
- Use of water bowser to dampen roads and stockpiles as required.

5.17 Bird Control

The primary measure for the prevention of birds gathering and feeding at the facility is the appropriate daily covering of waste. The use of birds of prey and/or other bird scaring techniques are employed on a daily basis, as required by Condition 7.7.1 of the Waste Licence (Reg. No.W0178-01). Gas operated scaring devices are not used.

5.18 Vermin and Other Pest Control

Vermin control is carried out in accordance with the Programme for the Control and Eradication of Insect and Rodent Infestations at the Facility, prepared under Condition 11.6.1 of the Waste Licence (Reg. No.W0178-01). Greenstar maintains records of the vermin control programme implemented at the facility, as required by Condition 10.6 of the Waste Licence (Reg. No.W0178-01).

The records include: -

- Date and time when spraying of insecticide is carried out;
- Contractor details;
- Contractor logs and inspection reports;
- Details of the rodenticide(s) and insecticide(s) used;
- Operator training details;
- Details of any infestation;
- Mode, frequency, location and quantity of application; and
- Measures to contain sprays within the facility boundary.

5.19 Wheel Wash

The wheel wash is inspected daily as specified in Condition 5.14.4 of the Waste Licence (Reg. No.W0178-01). Solid material removed from the wheel wash is disposed of in the landfill. Dirty water is directed to the leachate collection system as specified in Condition 3.9.1 of the Waste Licence (Reg. No.W178-01).

5.20 Operational and Safety Rules and Emergency Response Procedures

Greenstar has prepared operating procedures that cover all aspects of facility operations (Ref. Section 5.2). Greenstar has prepared a Health & Safety Plan and, as specified in Condition 9.2 of the Waste Licence (Reg. No.W0178-01), has also prepared Emergency Response Procedures (ERP). All Greenstar personnel and contractors working on-site must be familiar with and adhere to Greenstar's Health & Safety and ERP requirements.

5.21 Environmental Monitoring Programme

Greenstar implements a comprehensive environmental monitoring programme at the facility in compliance with Conditions 8.1 to 8.12 of the Waste Licence (Reg. No.W0178-01). The type of monitoring, monitoring locations and frequency is set out in Schedule D of the Waste Licence and summarised in Table 5.1. Any amendments to the frequency, locations, methods and scope of the monitoring can only be made with the prior approval of the Agency as specified in Condition 8.2 of the Waste Licence (Reg. No.W0178-01).

Greenstar maintains records of all the monitoring carried out at the facility. The records include the names and qualifications of all the persons who carry out all sampling and monitoring and who provide the interpretation of the sampling and monitoring results, as specified in Condition 10.3 (e) of the Waste Licence (Reg. No.W0178-01).

Table 5.1 Environmental Monitoring Programme

Condition	Monitoring Item		Frequency
Table D.1. & Table D.3.	Dust samples (5 number)		Quarterly
Table D.1. & Table D.3.	PM_{10} (5 number)		Quarterly
Table D.1. & Table D.4.	Noise (5 number locations)		Quarterly
Table D.1. & Table D.5.	Ground water (8 number)	Levels Analysis Analysis	Monthly Quarterly Annually
Table D.1. & Table D.5.	Surface water (7 number)	Inspection Analysis Analysis	Monthly Quarterly Annually
Table D.1. & Tables D.2 and D7	Landfill Gas		
Table D.1. & Table D.5.	Leachate		
8.8.1	Biological Assessment (4 locations)		Annually
8.7	Topographical Survey		Annually
8.9	Archaeological Assessment		*
8.10	Stability Assessment		Annually
8.11.1	Nuisance Monitoring		Weekly
Table D6	Meteorological Monitoring		Daily

* To be carried out prior to development of any undisturbed area:

5.22 Incidents

Greenstar will, where an incident occurs, notify the Agency in accordance with Condition 9.1 of the Waste Licence (Reg. No.W0178-01).

An incident is defined as follows: -

- An emergency;
- Any emission that does not comply with the requirements of the licence;
- Any exceedance of the daily duty capacity of the waste handling equipment;
- Any trigger level specified in the licence which is attained or exceeded;
- Any indication that environmental pollution has, or may have taken place.

Greenstar will, in accordance with Condition 11.2 of the Waste Licence (Reg. No.W0178-01) notify the Agency as soon as is practicable and in any case no later than 10 am the following working day of the occurrence of an incident and submit a written report within 5 days of the occurrence of the incident, or earlier if practicable. Where the incident involves a discharge to surface water Greenstar will inform the WRFB no later than 10 am the following working day after the incident.

Where follow up actions are taken in response to the incident e.g. clean-up Greenstar will, as specified in Condition 11.2 of the Waste Licence (Reg. No. W0178-01), prepare and submit a report to the Agency on the actions no later than 10 days after the start of the works.

5.23 Complaints

Greenstar has established a procedure for recording and responding to complaints received in relation to the management and operation of the facility. All complaints are recorded in a Complaint Log, as specified in Condition 10.4 of the Waste Licence (Reg. No.W0178-01). The information recorded includes: -

- Date and time of the complaint;
- Name of the complainant;
- Details of the nature of the complaint;
- Actions taken on foot of the complaint and the results of such actions; and
- The response made to each complainant.

The Facility Manager or nominated Deputy Manager must be informed of the complaint and are responsible for the investigation of the complaint and the implementation of any corrective measures. In the event that corrective actions are required to address the cause of the complaint Greenstar records the actions on the Complaint log and communications to the complainant.

5.24 Reports

The full reporting requirements are set out in Schedule E of the Licence and are summarised in Table 5.2. The reports, in conjunction with the AER, are required under Condition 11 of the Waste Licence (Reg. No. W0178-01) and also meet the reporting requirements of the EMS. The preparation of the AER involves a review of the progress in achieving the EMS Objectives and Targets, reports on site development works, resource consumption, changes to existing or introduction of new operating procedures and an assessment of the impacts of site activities.

Table 5.2 Reporting Requirements

Report	**Frequency**	**Submission Date**
EMS Updates	Annually	1 month after reporting year
AER	Annually	1month after reporting year
Incidents	As they occur	Within 5 days of the incident
Bund, tank, integrity testing	3 years	1 month after end of 3 year period
Specified Engineering Works	As they arise	2 months prior to works
Landfill Gas monitoring	Quarterly	10 days after reporting quarter
Surface Water Monitoring	Quarterly	10 days after reporting quarter
Groundwater Monitoring	Quarterly	10 days after reporting quarter
Leachate Monitoring	Quarterly	10 days after reporting quarter
Meteorological Monitoring	Annually	1 month after reporting year
Dust Monitoring	3 times a year	10 days after reporting period
Noise Monitoring	Bi-Annually	1 month after the reporting period
Any other monitoring	As they occur	Within 10 days of obtaining results

6. SCHEDULE OF OBJECTIVES & TARGETS

Objectives and Targets should cover both the short, medium and long term and be based on operational experience in order to ensure that they are both realistic and achievable. They should not be confined solely to compliance with regulatory requirement as this is the minimum performance criteria and the aim of the EMS is to achieve continual improvement environmental performance.

The Schedule of Objectives and Targets for 2007 - 2012 is presented in Table 6.1. It includes details of the resources required, responsible person and target completion date.

6.1 Schedule of Objectives and Targets

Programme of Objective and Targets – 2007 to 2012

Ref. No.	Objective	Ref. No.	Target	Resources Required	Person Responsible	Time Frame for Completion	Progress as of 31st December 2009
O - 1	Lower the environmental impacts associated with fugitive landfill gas emissions by continually developing the Facility's Gas Utilisation Infrastructure and landfill gas management techniques.	T - 1.1	Undertake quarterly VOC surveys of the waste surface over the next 5 years, to establish the areas were fugitive emissions are most prevalent.	External Consultant (circa €1,800 per survey)	Site Manager	Ongoing	Surveys carried out on Tuesday 7th April 2009, Thursday 11th June 2009 and Tuesday 15th September 2009
		T - 1.2	Installation of gas extraction wells where fugitive emissions have been identified from the VOC surveys.	Circa €1,700 per borehole.	Site Manager	Ongoing	Additional vertical & horizontal gas extraction wells installed during 2009. There were 40 horizontal wells added to cells 2, 3, 4 & 5. A further 32 vertical wells were also added to cells 2, 3, 4& 5. This brings the total number of gas extraction points on site to approximately 300.
		T - 1.4	Apply impermeable geohess cover over filled areas of the landfill.	€ 7/m2 approx	Site Manager	Ongoing	Geohess to be installed progressively over filled areas.
		T - 1.5	Monitor and review the effectiveness of the perimeter odour neutralising infrastructure installed in 2007 and maintain record of performance.	Assistant Site Manager (80 man hours)	Site Manager	Ongoing	Wind direction Intelligence sensor incorporated in Dec 2008 to improve efficiency of system. Continually review market developments in this field.

		T - 2.1	Reduce leachate generation by incorporating improved leachate reducing design features into construction of Phases 2 and 3 of the Landfill.	External Consultant & Site Manager (60 man hours)	Site Manager	Ongoing	Leachate reducing design features have been incorporating into Phase 2 development by reducing cell area. Their effectiveness will be reviewed and possibly replicated in Phase 3 development.
O - 2	Lower the potential environmental impacts associated with the generation of leachate. by reducing leachate generation	T - 2.2	Reduce leachate generation by applying impermiable geohess cover over filled areas of the landfill.	€ 7/m2 approx	Site Manager	Ongoing	Geohess to be installed progressively over filled areas.
		T - 2.3	Lower the demand on WWTP's, risk of spillage, CO2 emissions associated with the off site treatment of leachate	External Consultant & Site Manager (60 man hours)	Site Manager	Ongoing	Ongoing implementation of site practices (Cell area reduction, Geohess application)
O - 3	Lower the potential environmental impacts associated with litter by improving litter management techniques.	T - 3.1	Investigate potential for construction of wind breaker berms for operation in windy conditions.	Assistant Site Manager (20 man hours)	Site Manager	Ongoing	Not possible due to lack of desirable material available to this facility to be used in the construction of such berms. Continued review of day to day litter reducing management techniques to ensure minimal litter generation. Obtain/source additional mobile litter cages for use at working face.
0 - 4	Minimise the amount of natural resources (water, power etc) consumed at the Facility.	T - 4.1	Complete a second Energy Audit of the Facility to identify possibilities to improve energy efficiency and ascertain the facilities performance within an energy management matrix.	External Consultant (circa €5,000)	Site Manager	May 2010	Improve the facility's performance and current standing within the energy management matrix.

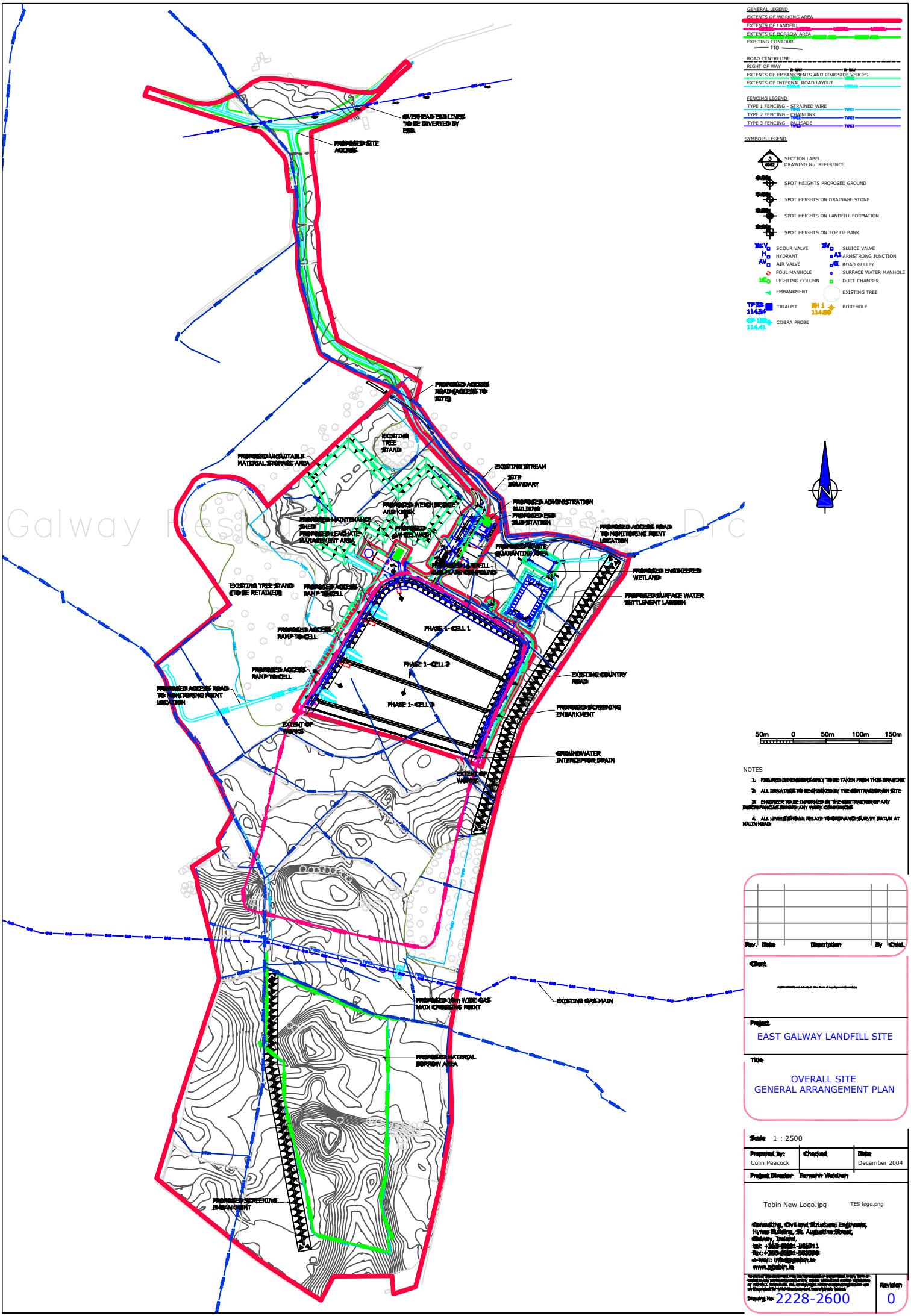
O - 4	Minimise the amount of natural resources (water, power etc) consumed at the Facility.	T – 4.2	Carry out assessment of the use of raw material at the Facility and identify opportunities for the improved efficiency in the use of raw materials.	Assistant Site Manager (40 man hours)	Site Manager	Ongoing	Facility actively pursues C & D materials, as a substitute for natural material, for engineering purposes. Natural material excavated during Phase 2 development to be reused on site where possible Wherever possible look for suitable engineering materials in order to limit the amount of virgin material used on site
		T – 4.3	Carry out assessment of water usage at the facility and identify opportunities for improved efficiency of water usage.	Assistant Site Manager (40 man hours)	Site Manager	Ongoing	Water requirements on various sections of site being monitored to identify potentials for reductions.
		T – 4.4	Review Site safety statement	Assistant Site Manager (40 man hours)	Site Manager GM Landfill Group	Sept 2009	Independent H&S audit & Safety statement review carried out in Nov 2007. Safety statement review & training carried out annually.
O - 5	I Improve Health, Safety and Welfare	T – 5.1	Reduce lost time injuries by 5% over the next five years	Site Manager/Assistant Site Manager	All site Personnel	May 2010	Ongoing. Data being recorded and tracked. Arrange manual handling course for all staff to reduce likelihood of back injury (a primary reason for lost time through injury)
		T – 5.2	Develop Accident Prevention Plan	Assistant Site Manager (80 man hours)	Site Manager GM Landfill Group	Ongoing	A procedure has been developed and incorporated into the EMS since 4th April 2009 with respect to the control and prevention of accidents

							on the site and any environmental impact of accidents
		T – 5.3	Identify appropriate training courses in Health and Safety management and arrange attendance for staff who hold a supervisory role	Assistant Site Manager (120 man hours)	Site Manager GM Landfill Group	May 2010	Assistant Landfill Manager to be sent on Managing Safely (NIFAST) course
		T – 5.4	Continue to train staff on a regular basis in EMS system, waste licence and Emergency Response.	Assistant Site Manager	Site Manager	Ongoing	Ongoing
O-6	Training	T – 6.1	Retain ISO 14001 Environmental Management System Certification	Site Manager/Assistant Site Manager	Site Manager	Ongoing	Having attained certification in Q3 2009, there is a need to retain emphasis on the Environmental Management System and retain accreditation through a series of audits both internally and externally each year
O-7	Operations	T – 7.1	Ensure all customers, contractors, site users & visitors are familiar with Greenstar's Environmental Policy	Site Manager/Assistant Site Manager	Site Manager	Ongoing	Circulate policy to all customers & contractors who attend site. Incorporate Environmental Policy into site inductions
		T – 7.2	Ensure all waste hauled to the site complies fully with the Waste Collection Permit Regulations	Site Manager	Site Manager	Ongoing	Though only fully licensed and permitted hauliers are accepted at this site, there is a need to ensure permit details held are updated regularly as vehicles on permit , waste types permitted etc are subject to change. This will be achieved through liasing with both

							customers and permit ting authorities.
		T – 7.3	Review all Site Operational procedures	Site Manager/Assistant Site Manager	Site Manager	Ongoing	Ongoing

APPENDIX 1

Engineering Design Maps


GENERAL LEGEND
EXTENTS OF WORKING AREA
EXTENTS OF LANDFILL
EXTENTS OF BORROW AREA
EXISTING CONTOUR
ROAD CENTRELINE
RIGHT OF WAY
EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES
EXTENTS OF INTERNAL ROAD LAYOUT
FENCING LEGEND
TYPE 1 FENCING - STRAINED WIRE
TYPE 2 FENCING - CHAINLINK
TYPE 3 FENCING - PALISADE
SYMBOLS LEGEND
SECTION LABEL
DRAWING No. REFERENCE
SPOT HEIGHTS PROPOSED GROUND
SPOT HEIGHTS ON DRAINAGE STONE
SPOT HEIGHTS ON LANDFILL FORMATION
SPOT HEIGHTS ON TOP OF BANK
SCOUR VALVE
HYDRANT
AIR VALVE
FOUL MANHOLE
LIGHTING COLUMN
SLUICE VALVE
ARMSTRONG JUNCTION
ROAD GULLEY
SURFACE WATER MANHOLE
DUCT CHAMBER
EMBANKMENT
EXISTING TREE
TRIALPIT
BOREHOLE
COBRA PROBE
OVERHEAD ESB LINES TO BE DIVERTED BY ESB
PROPOSED SITE ACCESS
PROPOSED ACCESS ROAD (ACCESS TO SITE)
EXISTING TREE STAND
PROPOSED UNSUITABLE MATERIAL STORAGE AREA
EXISTING STREAM
SITE BOUNDARY
PROPOSED ADMINISTRATION BUILDING
PROPOSED ESB SUB-STATION
PROPOSED WEIGHBRIDGE AND KIOSK
PROPOSED MAINTENANCE SHED
PROPOSED LEACHATE MANAGEMENT AREA
PROPOSED WHEELWASH
PROPOSED ACCESS ROAD TO MONITORING POINT LOCATION
PROPOSED QUARANTINE QUARANTINE AREA
PROPOSED LANDFILL SURFACE EXCAVATION
PROPOSED ENGINEERED WETLAND
PROPOSED SURFACE WATER SETTLEMENT LAGOON
EXISTING TREE STAND (TO BE RETAINED)
PROPOSED ACCESS RAMP TO CELL
PHASE 1 - CELL 1
PHASE 1 - CELL 2
PHASE 1 - CELL 3
EXISTING COUNTRY ROAD
PROPOSED SCREENING EMBANKMENT
EXTENT OF WORKS
GROUNDWATER INTERCEPTOR DRAIN
EXISTING GAS MAIN
PROPOSED 14m WIDE GAS MAIN CROSSING POINT
PROPOSED MATERIAL BORROW AREA
50m 0 50m 100m 150m
NOTES
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
Rev. Date Description By Chkd.
Client
Project
EAST GALWAY LANDFILL SITE
Title
OVERALL SITE
GENERAL ARRANGEMENT PLAN
Scale 1 : 2500
Prepared by: Colin Peacock
Checked
Date: December 2004
Project Director Eamonn Waldron
Tobin New Logo.jpg
TES logo.png
Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353 (0)91-565211
fax: +353 (0)91-565398
e-mail: info@tobin.ie
www.tobin.ie
Drawing No. 2228-2600
Revision 0

ENTRANCE GATE.

PROPOSED METEROLOGICAL STATION

ADMINISTRATION BUILDING. (See Drawing No. 2228-2610 for details).

PROPOSED ESB SUBSTATION

PROPOSED REPOSITORY FOR UNSUITABLE MATERIALS

WEIGHBRIDGE KIOSK. (See Drawing No. 2228-2611 for details).

WEIGHBRIDGE

WASTE INSPECTION, QUARANTINE AND FUEL STORAGE AREA. (See Drawing No. 2228-2618 for details).

ENGINEERED WETLAND. (See Drawing No. 2228-2614).

PROPOSED REPOSITORY FOR UNSUITABLE MATERIALS

MAINTENANCE SHED. (See Drawing No. 2228-2613 for details).

LEACHATE MANAGEMENT AREA. (See Drawing No. 2228-2615 for details).

WHEELWASH

LANDFILL GAS FLARE COMPOUND. (See Drawing No. 2228-2619 for details).

SURFACE WATER LAGOON. (See Drawing No. 2228-2614).

LEACHATE TANK. (See Drawing No. 2228-2615 for details).

PERFORATED PIPE IN FRENCH DRAIN

RC HEADWALL TO PERFORATED PIPE

PROPOSED 6m WIDE ACCESS TO PROPOSED STORAGE AREA.

PHASE 1 - CELL 1

4m WIDE JEEP TRACK. (See Drawing No. 2228-2612 for details).

RC HEADWALL TO PERFORATED PIPE

6m WIDE ACCESS RAMP TO LANDFILL. SWALE TO BE PIPED UNDER ACCESS RAMP.

1.0m HIGH INTERCELL BUND

PHASE 1 - CELL 2

1.0m HIGH INTERCELL BUND

GENERAL LEGEND

EXTENTS OF LANDFILL

EXTENTS OF BORROW AREA

EXISTING CONTOUR 110

ROAD CENTRELINE

EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES

EXTENTS OF INTERNAL ROAD LAYOUT

FENCING LEGEND

TYPE 1 FENCING - STOCKPROOF TYPE FENCE

TYPE 2 FENCING - CHAINLINK TYPE FENCE

TYPE 3 FENCING - SECURITY TYPE FENCE

SYMBOLS LEGEND

3 / 6062 SECTION LABEL DRAWING No. REFERENCE

SPOT HEIGHTS PROPOSED GROUND

SPOT HEIGHTS ON DRAINAGE STONE

SPOT HEIGHTS ON LANDFILL FORMATION

SPOT HEIGHTS ON TOP OF BANK

SCV SCOUR VALVE

SV SLUICE VALVE

H HYDRANT

AJ ARMSTRONG JUNCTION

AV AIR VALVE

G ROAD GULLEY

MH MANHOLE

SWMH SURFACE WATER MANHOLE

LC LIGHTING COLUMN

DC DUCT CHAMBER

EMBANKMENT

EXISTING TREE

TP 33 114.54 TRIALPIT

BH 1 114.00 BOREHOLE

CP 133 114.41 CBRA PROBE

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project: EAST GALWAY LANDFILL SITE

Title: SPECIFIED ENGINEERING WORKS GENERAL ARRANGEMENT PHASE 1 SHEET 1 OF 2

Scale 1 : 1000 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

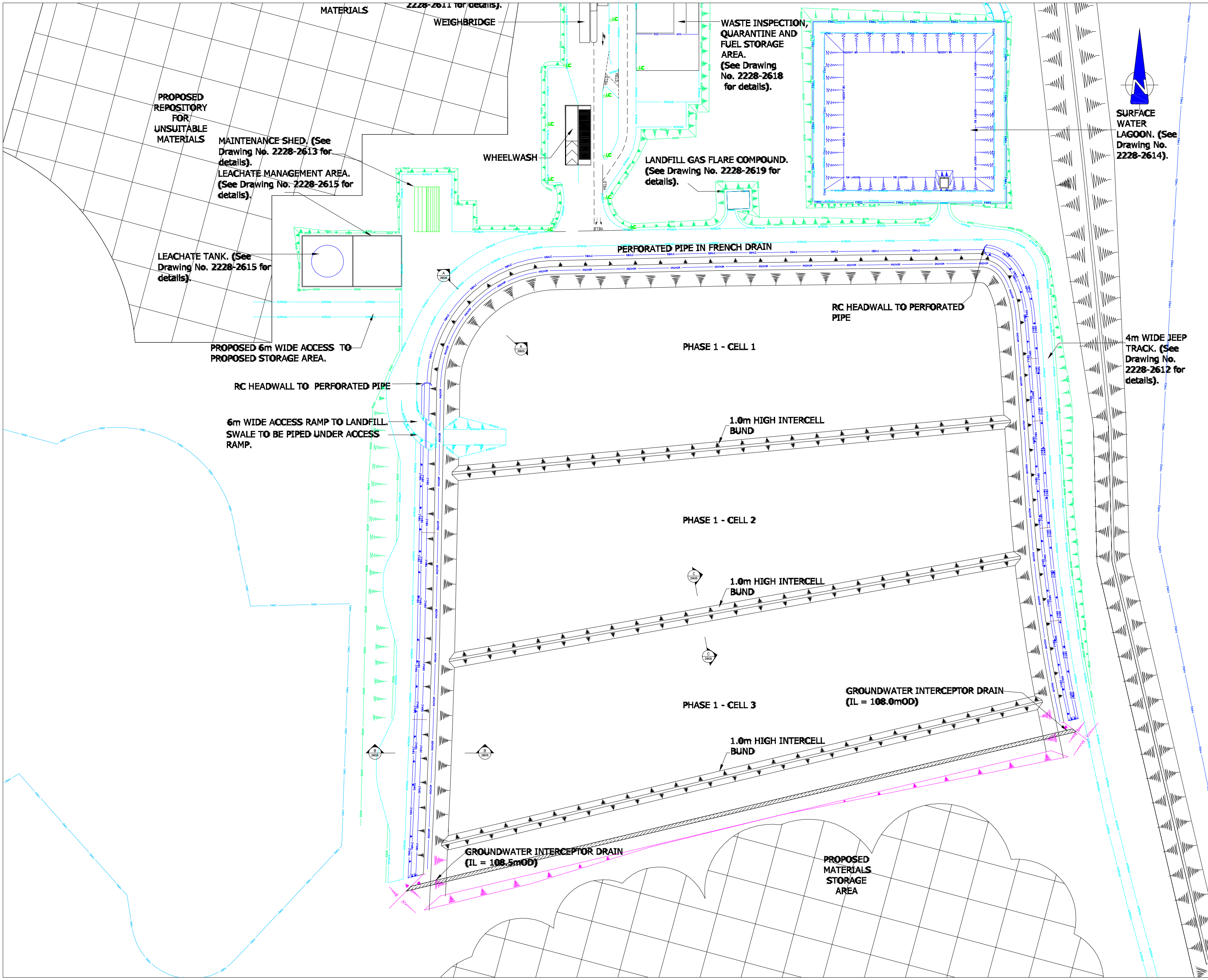
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. Any copyright holder consent so granted for use on the project for which the document was originally issued.

Drawing No. 2228-2601

Revision 1



GENERAL LEGEND

EXTENTS OF LANDFILL
EXTENTS OF BORROW AREA
EXISTING CONTOUR — 110 —

ROAD CENTRELINE
EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES
EXTENTS OF INTERNAL ROAD LAYOUT

FENCING LEGEND
TYPE 1 FENCING - STOCKPROOF TYPE FENCE
TYPE 2 FENCING - CHAINLINK TYPE FENCE
TYPE 3 FENCING - SECURITY TYPE FENCE

SYMBOLS LEGEND

SECTION LABEL
DRAWING No. REFERENCE
SPOT HEIGHTS PROPOSED GROUND
SPOT HEIGHTS ON DRAINAGE STONE
SPOT HEIGHTS ON LANDFILL FORMATION
SPOT HEIGHTS ON TOP OF BANK
ScV SCOUR VALVE — SV SLUICE VALVE
H HYDRANT — AJ ARMSTRONG JUNCTION
AV AIR VALVE — G ROAD GULLEY
FOUL MANHOLE — SURFACE WATER MANHOLE
LC LIGHTING COLUMN — DUCT CHAMBER
EMBANKMENT — EXISTING TREE
TP 33 114.54 TRIALPIT — BH 1 114.80 BOREHOLE
CP 133 114.41 COBRA PROBE

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
GENERAL ARRANGEMENT PHASE 1
SHEET 2 OF 2

Scale 1 : 1000 @ A2

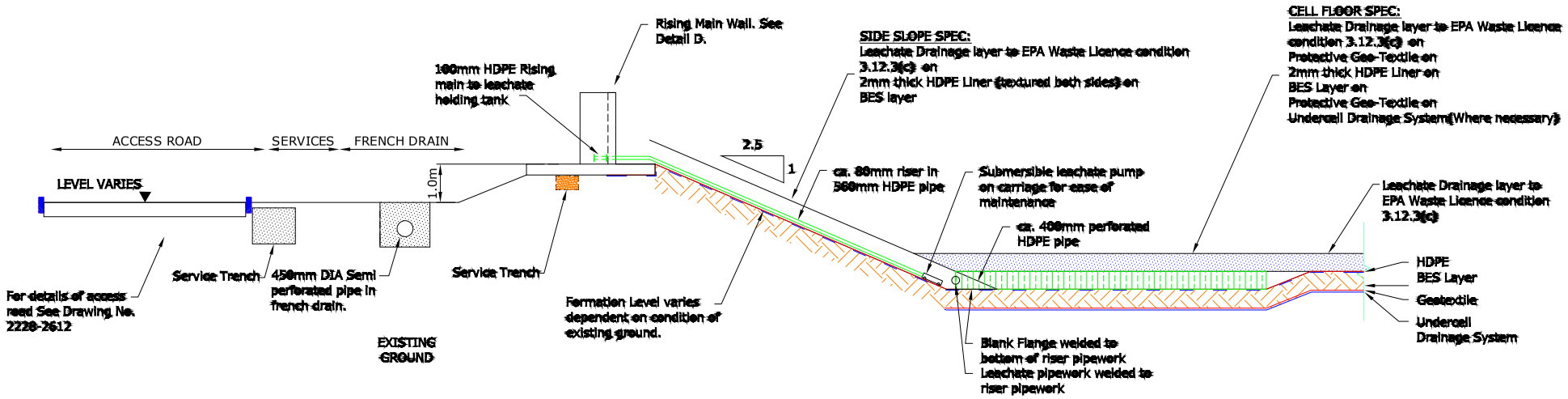
Prepared by:	Checked	Date
Colin Peacock		December 2004

Project Director Eamonn Waldron

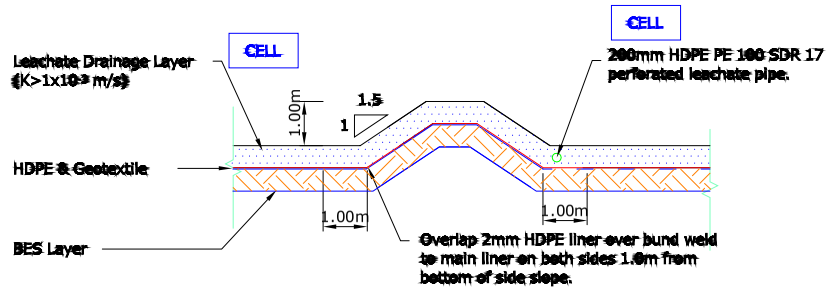
Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

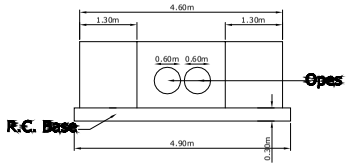
Drawing No. 2228-2602 — Revision 0



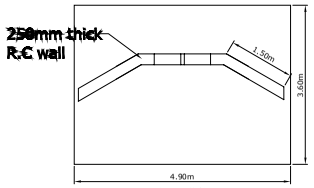
DETAIL A (See Drawing No. 2607)
SECTION THROUGH LEACHATE SUMP AND UPSLOPE RISER



DETAIL C (See Drawing No. 2607)
TYPICAL SECTION THROUGH INTERCELL BERM

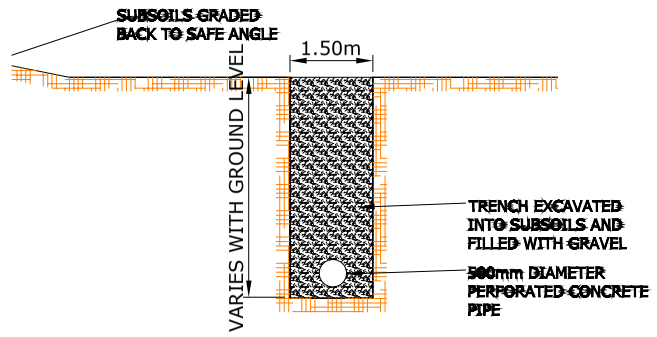


ELEVATION



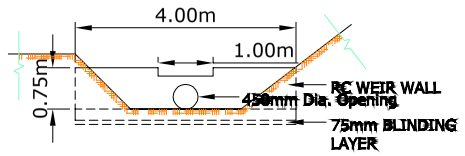
PLAN

DETAIL D
RISING MAIN WALL

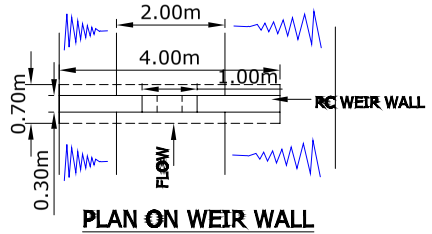


DETAIL 'E' GROUNDWATER INTERCEPTOR DRAIN

SCALE 1:100



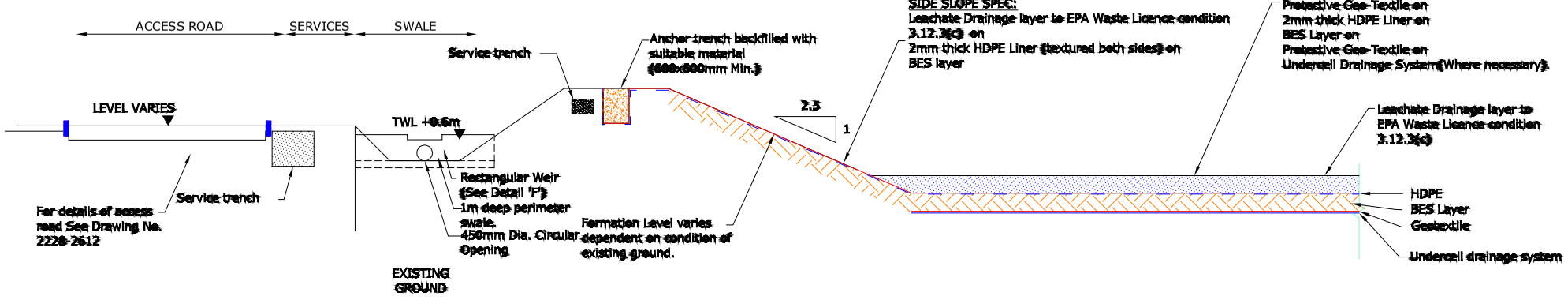
ELEVATION ON WEIR WALL



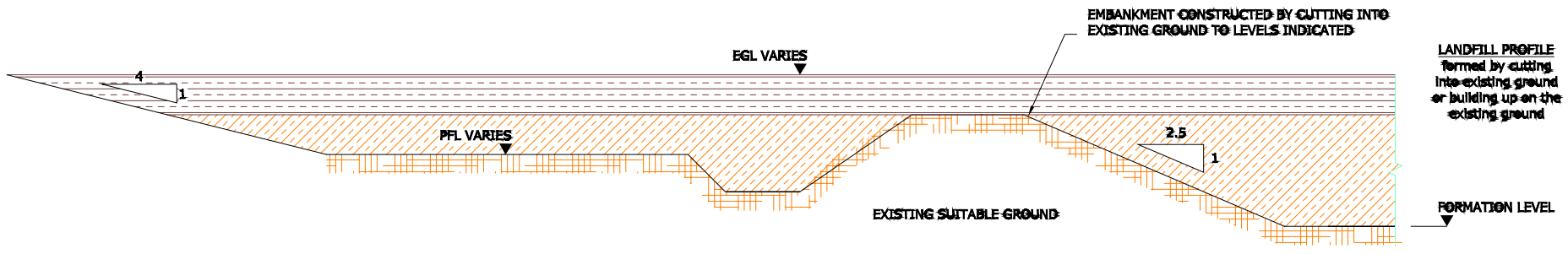
PLAN ON WEIR WALL

DETAIL 'F' RECTANGULAR WEIR

SCALE 1:100



DETAIL B (See Drawing No. 2607)
TYPICAL SECTION THROUGH BERM



SECTION T1 - TYPE 1 EMBANKMENT CONSTRUCTION
SHOWN INDICATIVELY ONLY

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date:	Description	By	Chkd.

Client:

Project:
EAST GALWAY LANDFILL SITE

Title:
SPECIFIED ENGINEERING WORKS
BASAL LINING SYSTEM
EMBANKMENT DETAILS AND INTERCELL BUNDS

Scale: 1 : 125 @ A2 Unless otherwise stated

Prepared by:	Checked	Date
Colin Peacock		December 2004

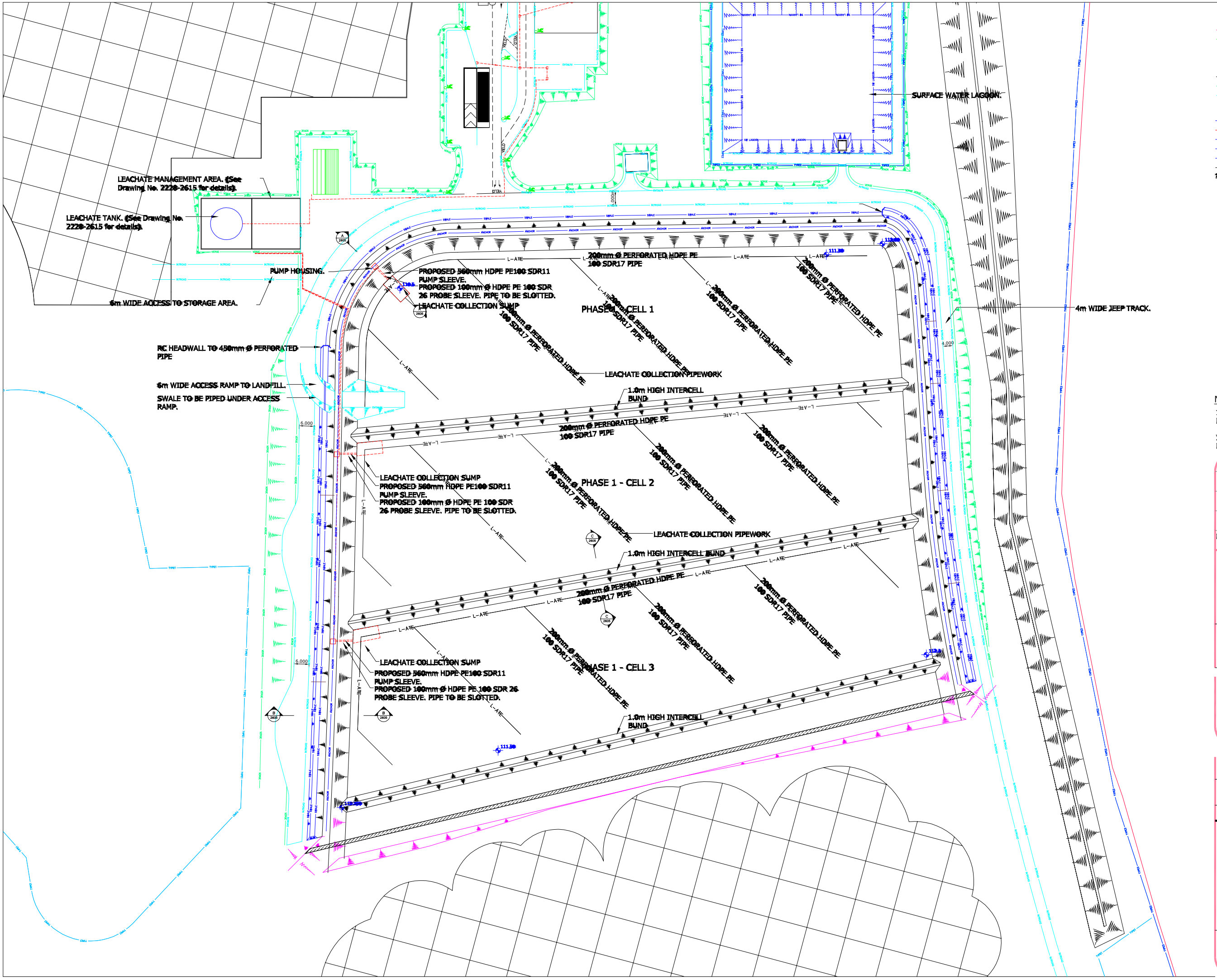
Project Director: Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtebin.ie
www.pjtebin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. and copyright holder is not to be agreed for use on the project for which this document was originally issued.

Drawing No. 2228-2605

Revision 1



GENERAL LEGEND

EXTENTS OF LANDFILL
EXTENTS OF BORROW AREA
EXISTING CONTOUR 110

ROAD CENTRELINE
EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES
EXTENTS OF INTERNAL ROAD LAYOUT

DRAINAGE LEGEND
EXTENTS OF SURFACE WATER LAGOON AND ENGINEERED WETLAND
FOUL DRAINAGE AND LEACHATE COLLECTION PIPEWORK
FRENCH DRAIN
SURFACE WATER DRAINAGE
EXTENTS OF SWALE AND PERFORATED PIPE
PERFORATED LEACHATE COLLECTION PIPEWORK

SYMBOLS LEGEND

3 / 6062 SECTION LABEL / DRAWING No. REFERENCE
SPOT HEIGHTS PROPOSED GROUND
SPOT HEIGHTS ON DRAINAGE STONE
SPOT HEIGHTS ON LANDFILL FORMATION
SPOT HEIGHTS ON TOP OF BANK
Sc.V SCOUR VALVE
H HYDRANT
AV AIR VALVE
FOUL MANHOLE
LC LIGHTING COLUMN
EMBANKMENT
SV SLUICE VALVE
AJ ARMSTRONG JUNCTION
RG ROAD GULLEY
SURFACE WATER MANHOLE
DUCT CHAMBER
EXISTING TREE
TP 33 114.54 TRIALPIT
BH 1 114.88 BOREHOLE
CP 133 114.41 CONRA PROBE
DE DE-WATERING BOREHOLE

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.
2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date:	Description	By	Chkd.

Client:

Project:
EAST GALWAY LANDFILL SITE

Title:
SPECIFIED ENGINEERING WORKS
PHASE 1
LEACHATE COLLECTION PIPEWORK

Scale: 1 : 1000 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

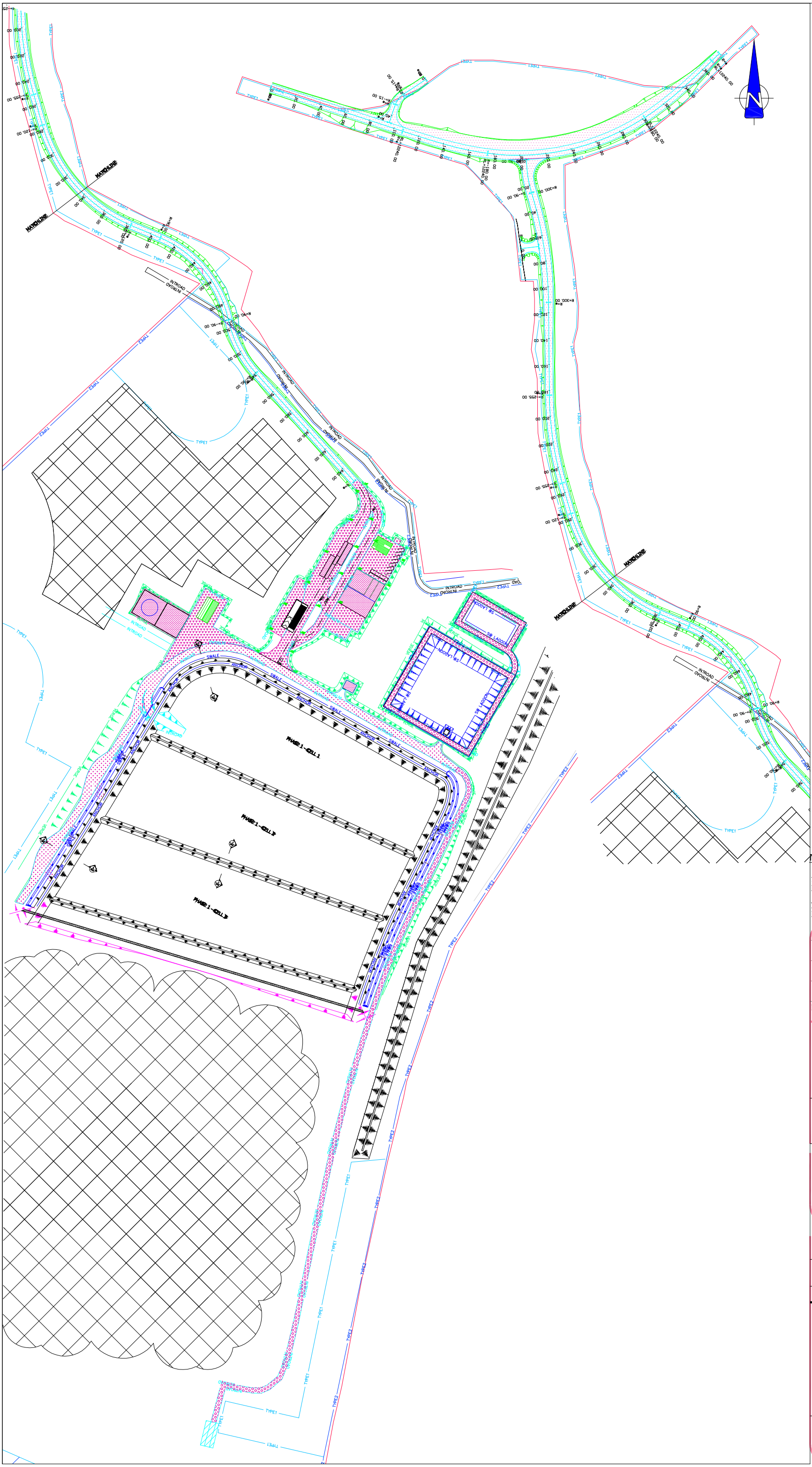
Project Director: Eamonn Waldron

TOBIN Patrick J. Tobin & Co. Ltd. TES CONSULTING ENGINEERS
Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. or any right holder to whom we have agreed the use on the project for which this document was originally issued.

Drawing No. 2228-2607

Revision 1



GENERAL LEGEND

EXTENTS OF LANDFILL
EXTENTS OF BORROW AREA
EXISTING CONTOUR 110

ROAD CENTRELINE
EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES
EXTENTS OF INTERNAL ROAD LAYOUT

SYMBOLS LEGEND

- SECTION LABEL / DRAWING No. REFERENCE
- SPOT HEIGHTS PROPOSED GROUND
- SPOT HEIGHTS ON DRAINAGE STONE
- SPOT HEIGHTS ON LANDFILL FORMATION
- SPOT HEIGHTS ON TOP OF BANK
- SCOUR VALVE
- SLUICE VALVE
- HYDRANT
- ARMSTRONG JUNCTION
- AIR VALVE
- ROAD GULLEY
- FOUL MANHOLE
- SURFACE WATER MANHOLE
- LIGHTING COLUMN
- DUCT CHAMBER
- EMBANKMENT
- EXISTING TREE
- TRIALPIT
- BOREHOLE
- COBRA PROBE
- DE-WATERING BOREHOLE

- Road Type 1, Access Road -Regional Road
- Road Type 2, Internal Road
- Road Type 3, Jeep Track
- Road Type 4, Carpark
- Road Type 5, Concreted Areas

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
SITE SURFACING PLAN

Scale 1 : 2000 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

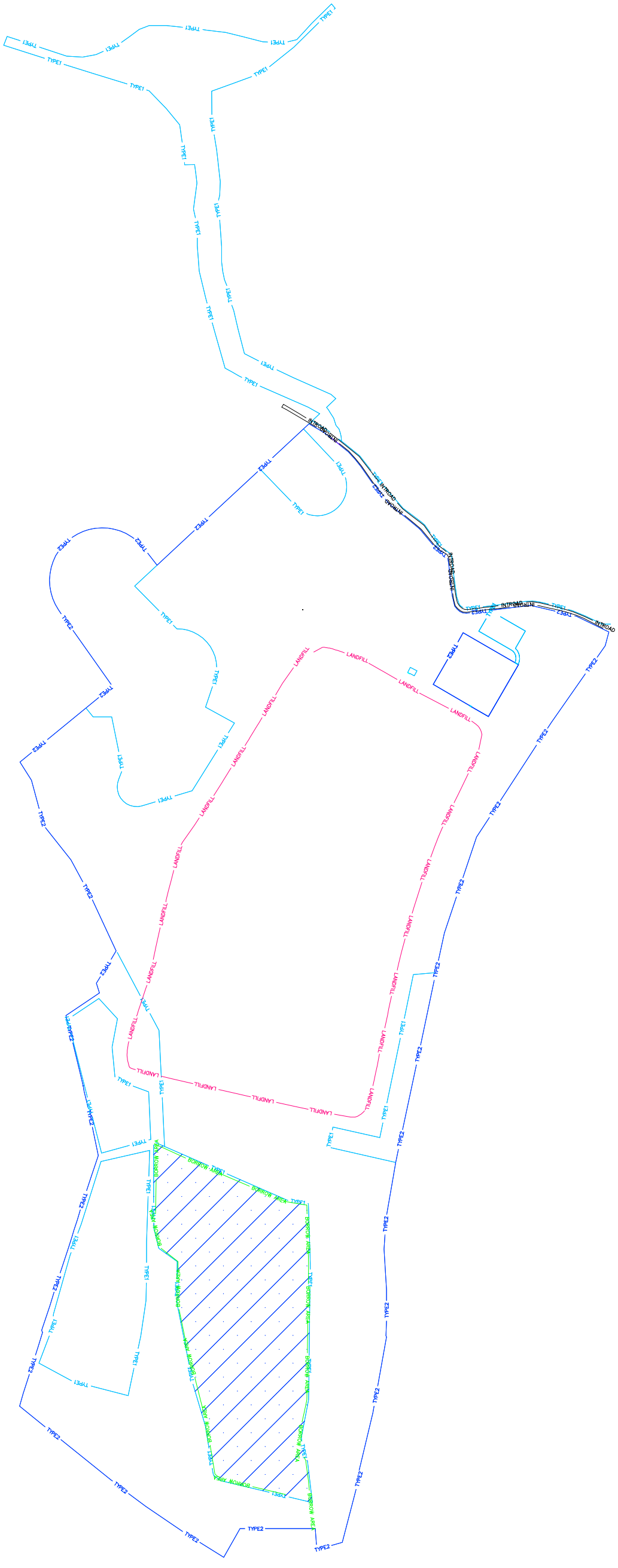
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No. 2228-2608

Revision 1



GENERAL LEGEND

EXTENTS OF LANDFILL

EXTENTS OF BORROW AREA

EXISTING CONTOUR 110

ROAD CENTRELINE

EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES

EXTENTS OF INTERNAL ROAD LAYOUT

FENCING LEGEND

TYPE 1 FENCING - STOCKPROOF TYPE FENCE

TYPE 2 FENCING - CHAINLINK TYPE FENCE

TYPE 3 FENCING - SECURITY TYPE FENCE

SYMBOLS LEGEND

3 / 6062 SECTION LABEL / DRAWING No. REFERENCE

0.00 SPOT HEIGHTS PROPOSED GROUND

0.00 SPOT HEIGHTS ON DRAINAGE STONE

0.00 SPOT HEIGHTS ON LANDFILL FORMATION

0.00 SPOT HEIGHTS ON TOP OF BANK

Sc.V SCOUR VALVE

SV SLUICE VALVE

H HYDRANT

AJ ARMSTRONG JUNCTION

AV AIR VALVE

RG ROAD GULLEY

FOUL MANHOLE

SURFACE WATER MANHOLE

LC LIGHTING COLUMN

DUCT CHAMBER

EMBANKMENT

EXISTING TREE

TP 3 114.54 TRIALPIT

BH 1 114.66 BOREHOLE

CP 13 114.41 COBRA PROBE

DE-WATERING BOREHOLE

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
SITE FENCING PLAN

Scale 1 : 4000 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

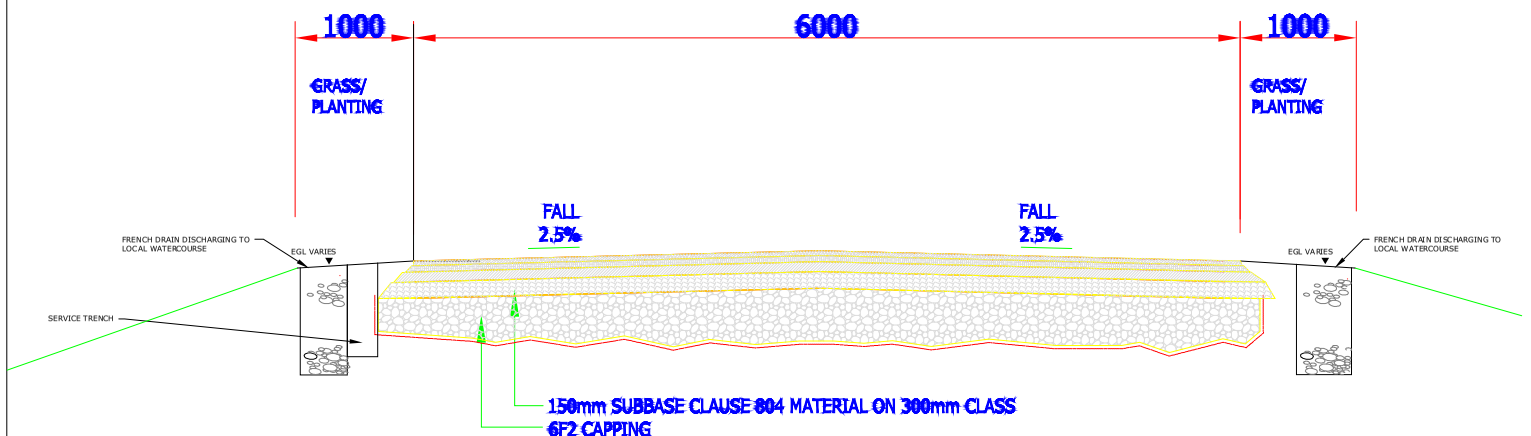
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax: +353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

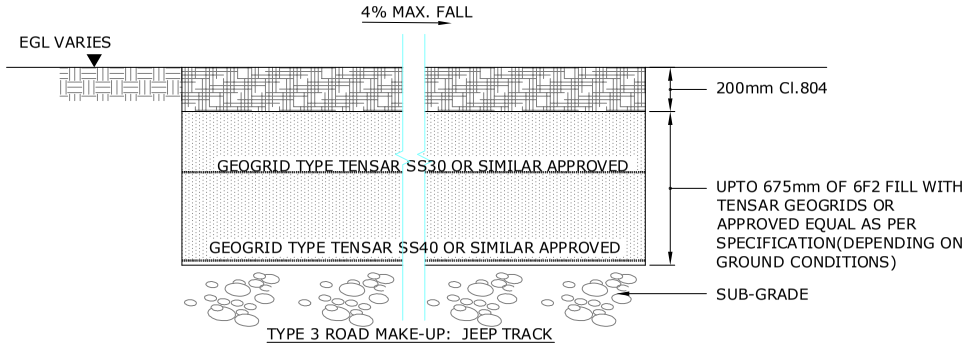
Drawing No. 2228-2609

Revision 1



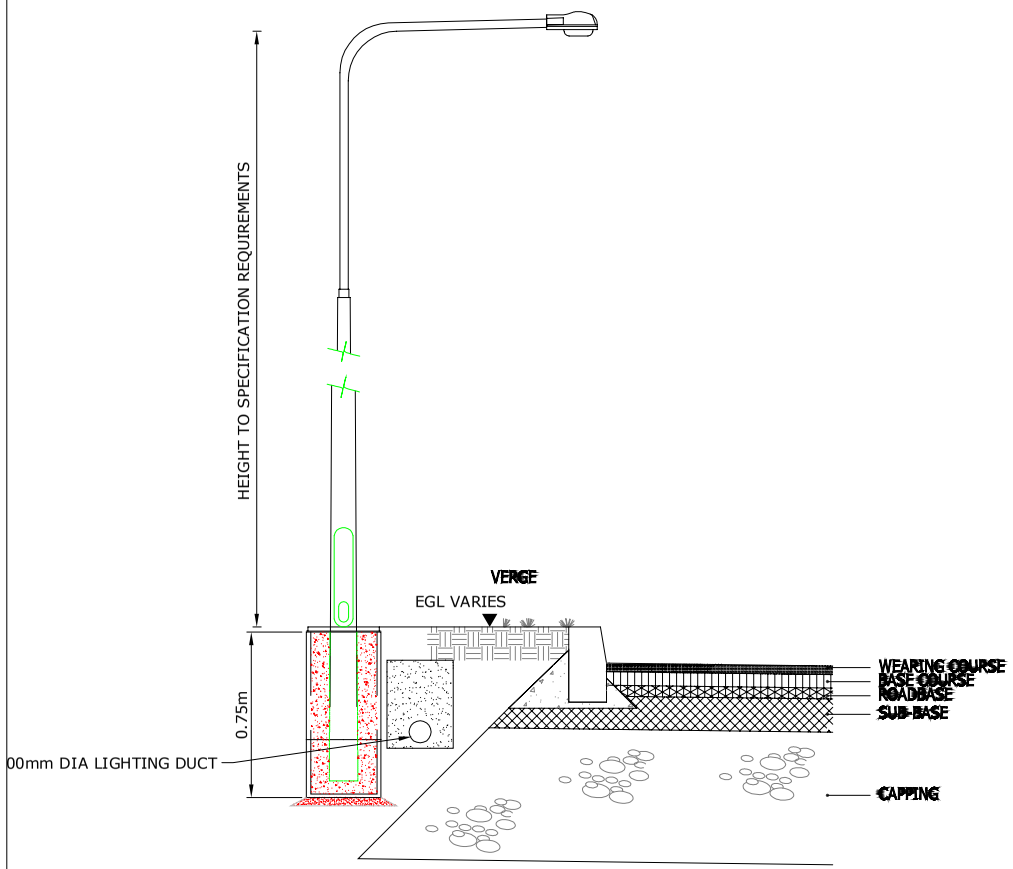
TYPE 1 ROAD MAKE-UP: ACCESS ROAD FROM REGIONAL ROAD.
40mm STONE MASTIC ASPHALT WEARING COURSE ON
60mm DENSE BITUMEN MACADAM BASE COURSE ON
150mm DENSE BITUMEN MACADAM ROAD BASE ON
150mm SUBBASE TO CLAUSE 804 ON
CAPPING LAYER AS SPECIFIED ON
SUITABLE GRANULAR FILL MATERIAL TO CLAUSE 6A (WHERE REQUIRED)

TYPE 1 – ACCESS ROAD FROM REGIONAL ROAD(TYPICAL DETAIL)

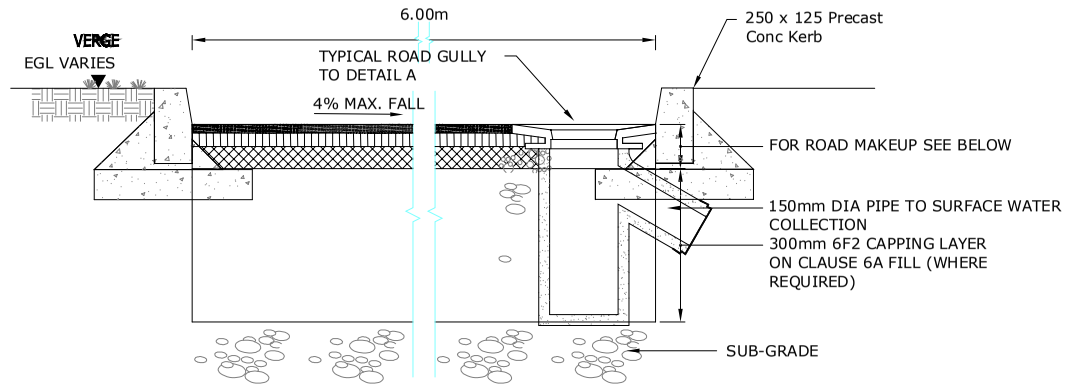


TYPE 3 ROAD MAKE-UP: JEEP TRACK
200mm SUBBASE TO CLAUSE 804 ON
CAPPING LAYER INCORPORATING GEOGRIDS AS SPECIFIED

TYPE 3 – JEEP TRACK (TYPICAL DETAIL)

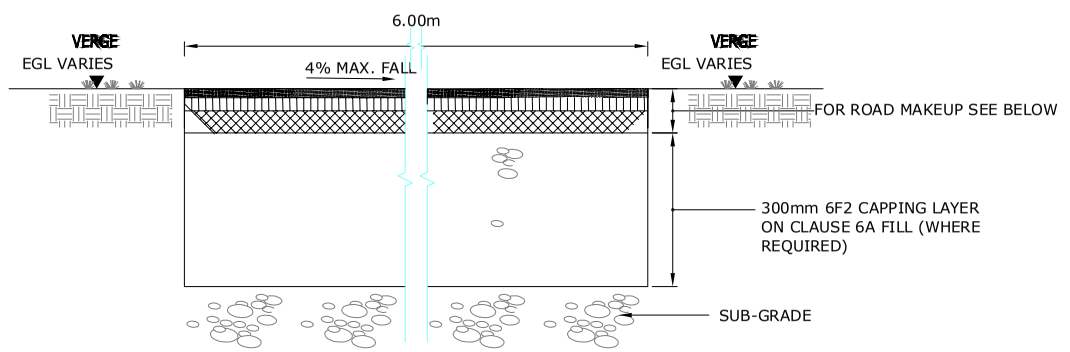


LAMP STANDARD BASE(TYPICAL DETAIL)



TYPE 2 ROAD MAKE-UP: ADMINISTRATION AREA, PARKING AREAS ETC.
40mm STONE MASTIC ASPHALT WEARING COURSE ON
60mm DENSE BITUMEN MACADAM BASE COURSE ON
150mm DENSE BITUMEN MACADAM ROAD BASE ON
150mm SUBBASE TO CLAUSE 804 ON
CAPPING LAYER AS SPECIFIED ON
SUITABLE GRANULAR FILL MATERIAL (WHERE REQUIRED)

TYPE 2 – ADMINISTRATION AREA & PARKING AREA(TYPICAL DETAIL)



TYPE 4 ROAD MAKE-UP: INTERNAL ROAD AROUND LANDFILL
40mm STONE MASTIC ASPHALT WEARING COURSE ON
60mm DENSE BITUMEN MACADAM BASE COURSE ON
100mm DENSE BITUMEN MACADAM ROAD BASE ON
150mm SUBBASE TO CLAUSE 804 ON
CAPPING LAYER AS SPECIFIED ON
SUITABLE GRANULAR FILL MATERIAL (WHERE REQUIRED)

TYPE 4 – INTERNAL ROAD AROUND LANDFILL(TYPICAL DETAIL)

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.
2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
ROAD CONSTRUCTION
TYPICAL DETAILS

Scale 1 : 25 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

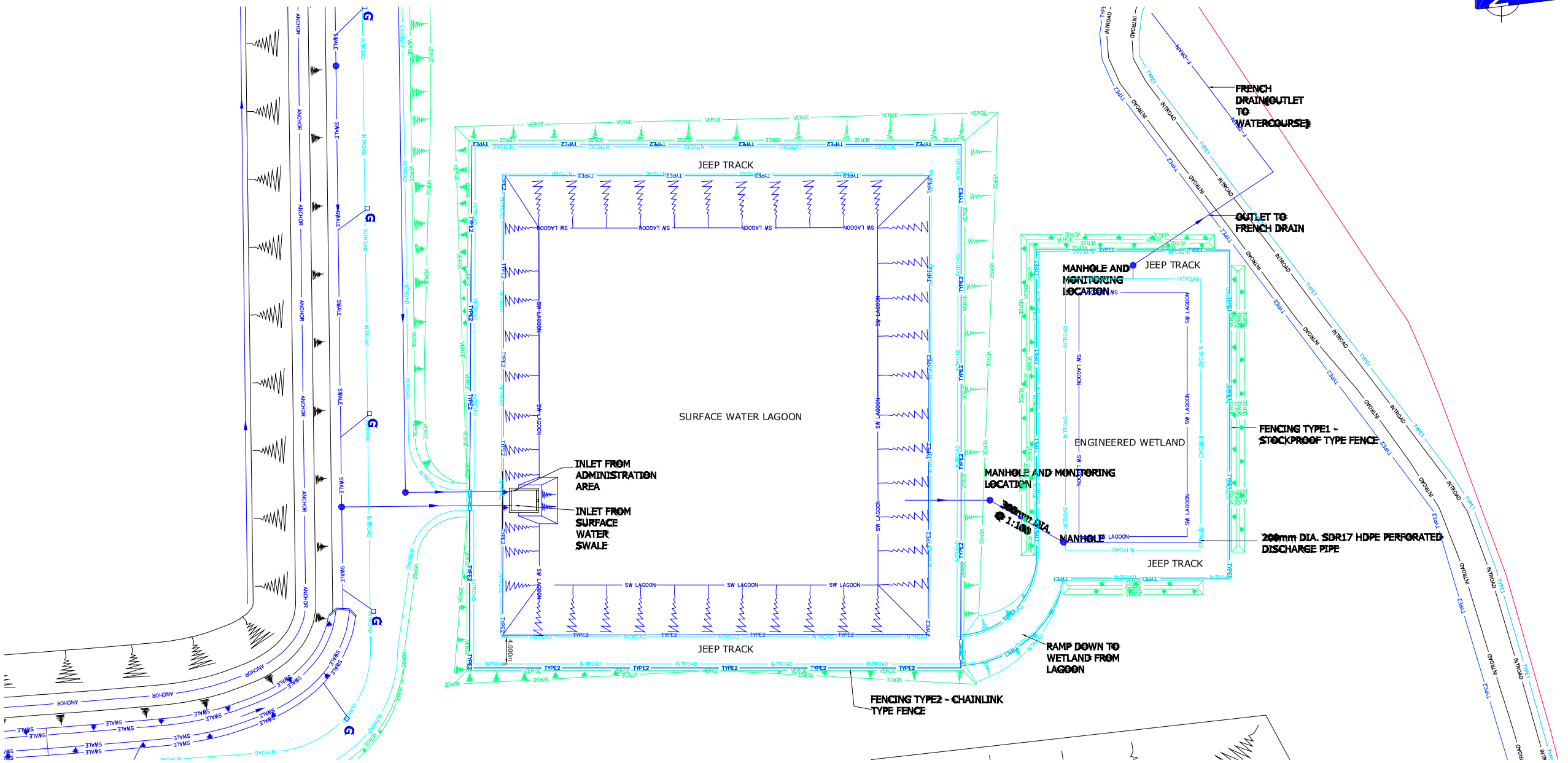
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtiebin.ie
www.pjtiebin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. save only for the purpose for which it was originally issued.

Drawing No. 2228-2612

Revision 1



PLAN ON LAGOON AND ENGINEERED WETLAND

GENERAL LEGEND

EXTENTS OF LANDFILL
EXTENTS OF BORROW AREA
EXISTING CONTOUR 110

ROAD CENTRELINE
EXTENTS OF EMBANKMENTS AND ROADSIDE VERGES
EXTENTS OF INTERNAL ROAD LAYOUT

DUCTING LEGEND
2 No. 150mm DIA. DUCTS
3 No. 150mm DIA. DUCTS
4 No. 150mm DIA. DUCTS
8 No. 150mm DIA. DUCTS
12 No. 150mm DIA. DUCTS
16 No. 150mm DIA. DUCTS
20 No. 150mm DIA. DUCTS
100mm HDPE WATER SUPPLY MAIN

DRAINAGE LEGEND
EXTENTS OF SURFACE WATER LAGOON AND ENGINEERED WETLAND
FOUL DRAINAGE AND LEACHATE COLLECTION PIPEWORK
FRENCH DRAIN
SURFACE WATER DRAINAGE
EXTENTS OF SWALE AND PERFORATED PIPE
PERFORATED LEACHATE COLLECTION PIPEWORK

FENCING LEGEND
TYPE 1 FENCING - STOCKPROOF TYPE FENCE
TYPE 2 FENCING - CHAINLINK TYPE FENCE
TYPE 3 FENCING - SECURITY TYPE FENCE

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
SURFACE WATER LAGOON
AND ENGINEERED WETLAND
LAYOUT PLAN

Scale 1 : 500 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

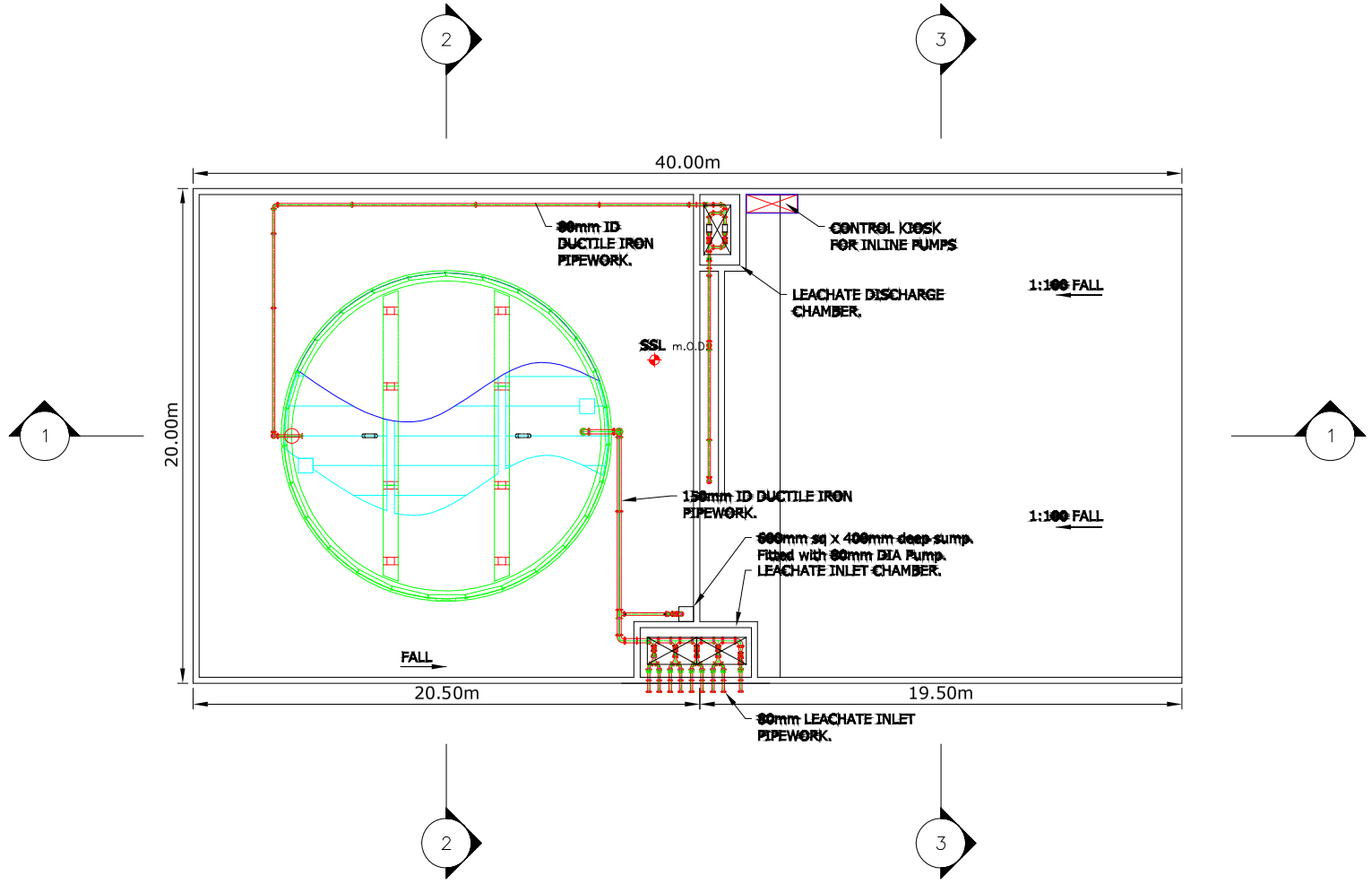
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjhebin.ie
www.pjhebin.ie

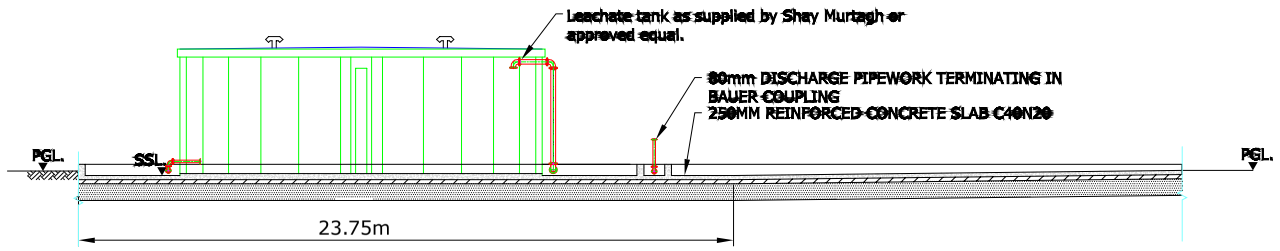
No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Hebin & Co. Ltd. and copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No. 2228-2614

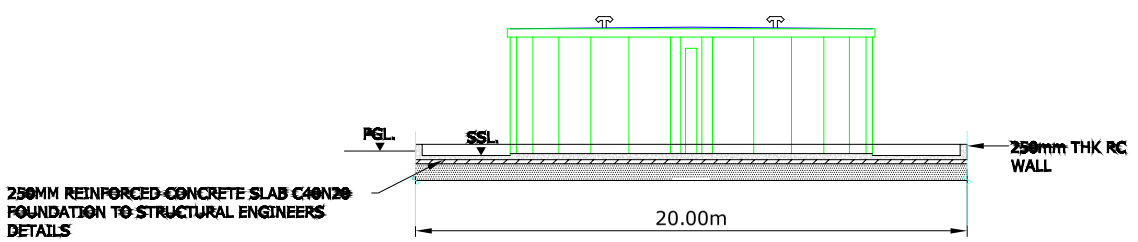
Revision 1



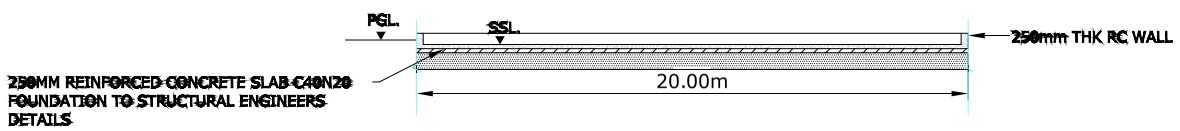
PLAN ON LEACHATE COLLECTION



SECTIONAL ELEVATION 1-1



SECTIONAL ELEVATION 2-2



SECTIONAL ELEVATION 3-3

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
LEACHATE COLLECTION TANK
ELEVATION AND SECTION

Scale 1 : 200 @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

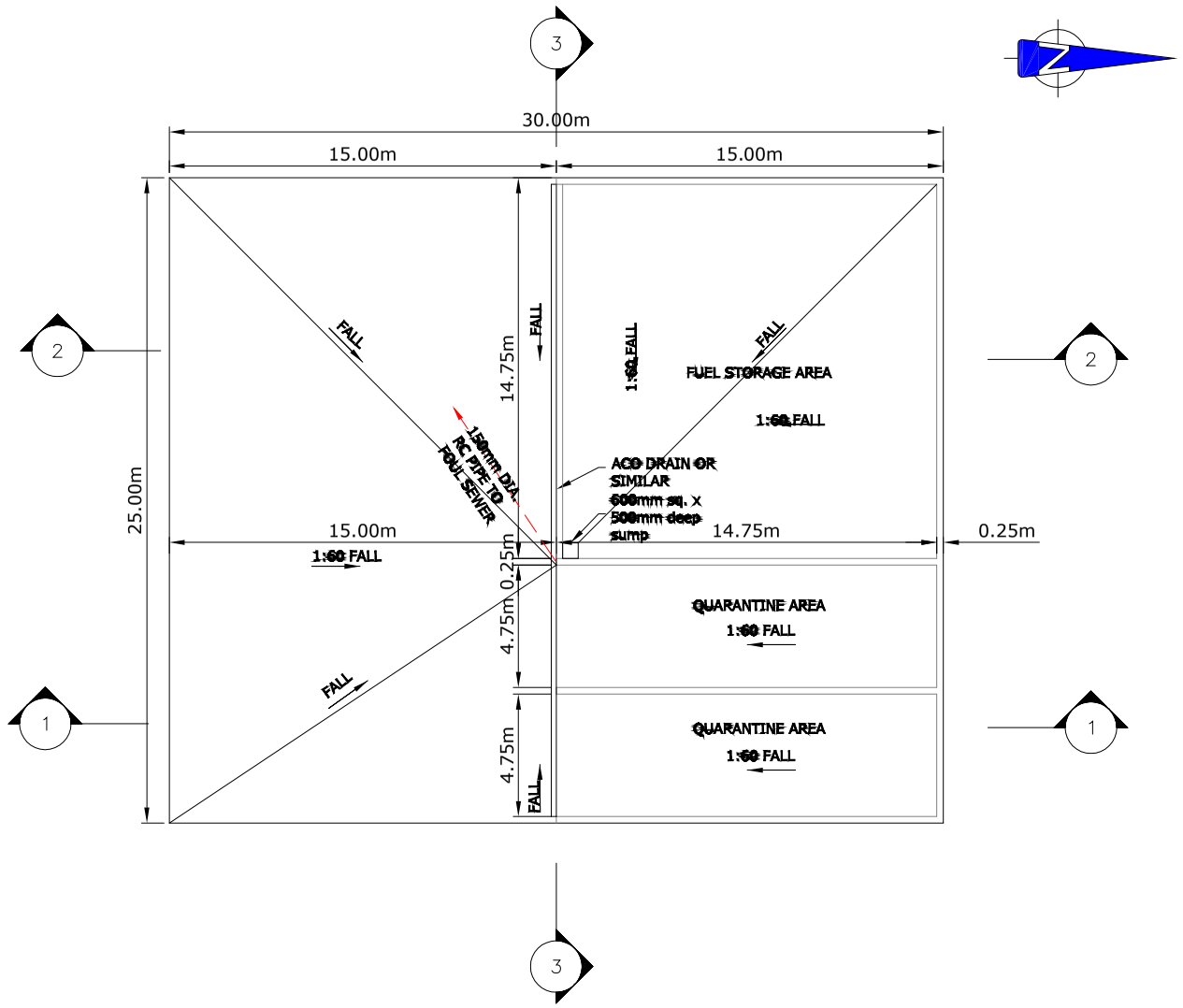
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. Any copyright holder owned as agreed for use on the project for which the document was originally issued.

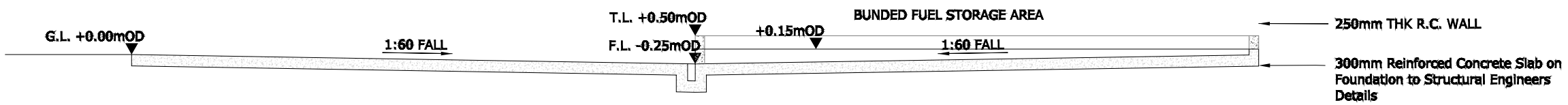
Drawing No. 2228-2615

Revision 1

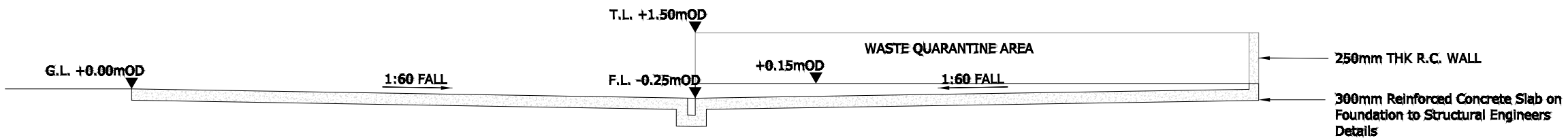


PLAN ON WASTE QUARANTINE AREA

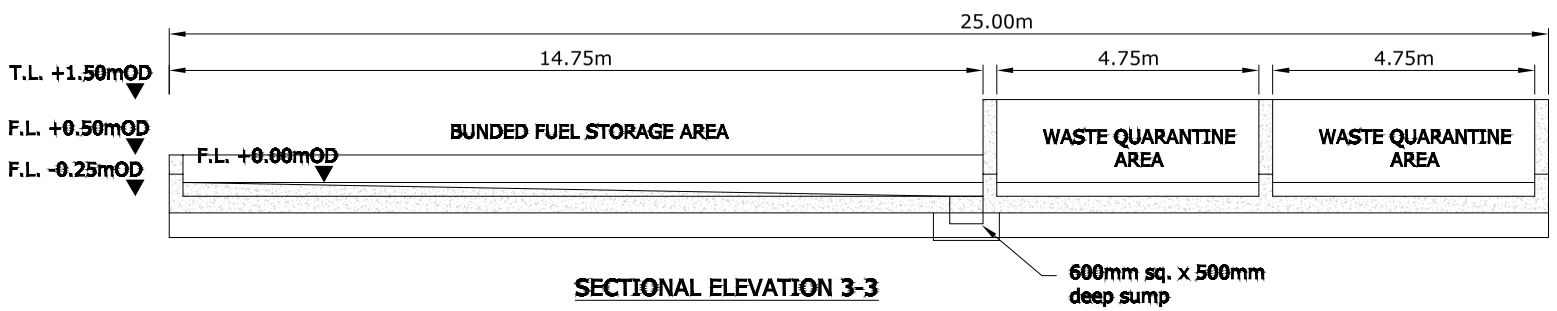
SCALE 1:200



SECTIONAL ELEVATION 1-1



SECTIONAL ELEVATION 2-2



SECTIONAL ELEVATION 3-3

NOTES

1. FIGURED DIMENSIONS ONLY TO TAKEN FROM THIS DRAWING.

2. ALL LEVELS SHOWN RELATIVE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev.	Date	Description	By	Chkd.

Client

Project
EAST GALWAY LANDFILL SITE

Title
SPECIFIED ENGINEERING WORKS
WASTE QUARANTINE AREA
GENERAL ARRANGEMENT

Scale 1 : 100 OR AS SHOWN @ A2

Prepared by:	Checked	Date
Colin Peacock		December 2004

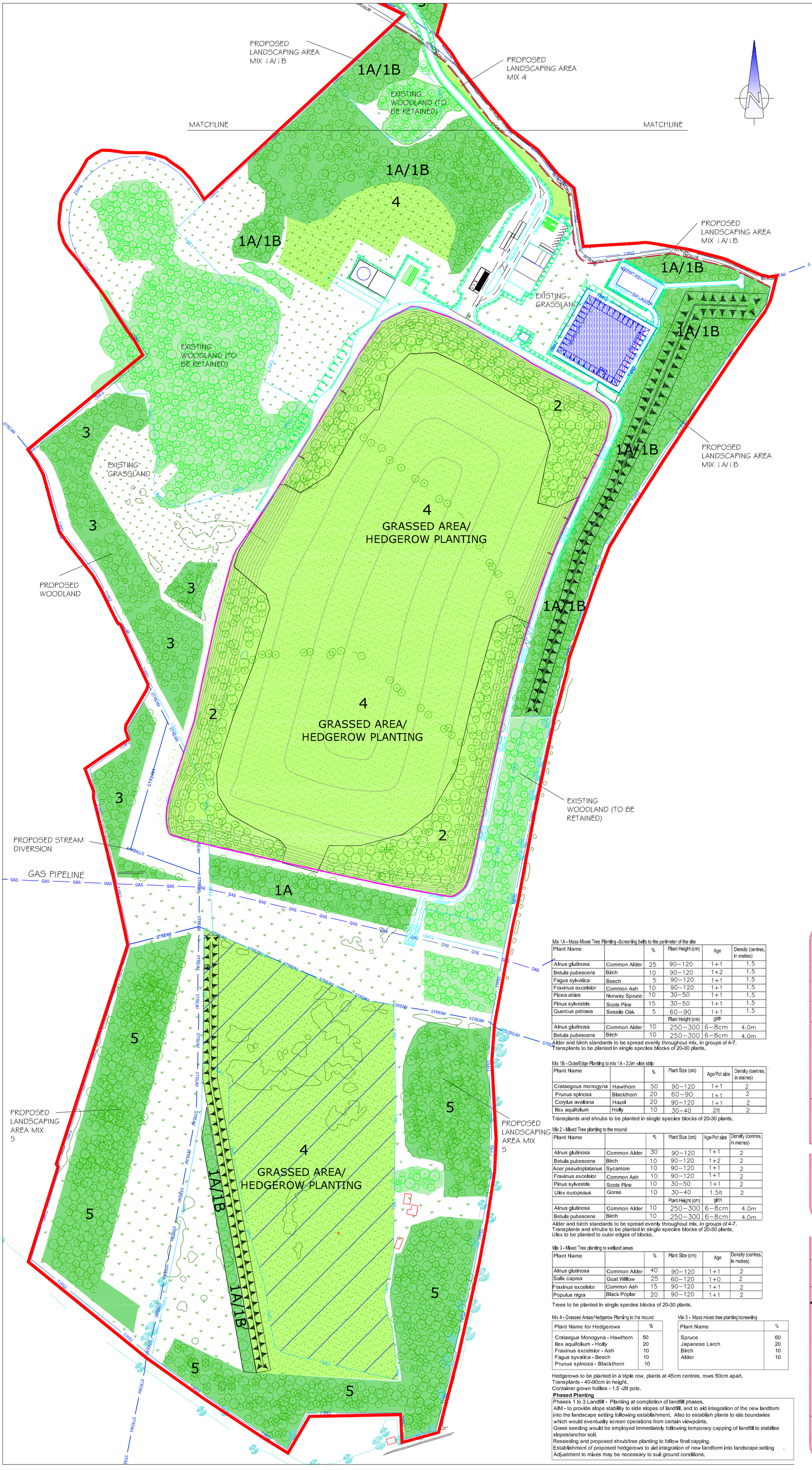
Project Director Eamonn Waldron

Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtabin.ie
www.pjtabin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. the copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No. 2228-2618

Revision 1



Mix 1A - Mass Mixed Tree Planting -Screening belts to the perimeter of the site

Plant Name		%	Plant Height (cm)	Age	Density (centres, in metres)
Alnus glutinosa	Common Alder	25	90–120	1+1	1.5
Betula pubescens	Birch	10	90–120	1+2	1.5
Fagus sylvatica	Beech	5	90–120	1+1	1.5
Fraxinus excelsior	Common Ash	10	90–120	1+1	1.5
Picea abies	Norway Spruce	10	30–50	1+1	1.5
Pinus sylvestris	Scots Pine	15	30–50	1+1	1.5
Quercus petraea	Sessile Oak	5	60–90	1+1	1.5
			Plant Height (cm)	girth	
Alnus glutinosa	Common Alder	10	250–300	6–8cm	4.0m
Betula pubescens	Birch	10	250–300	6–8cm	4.0m

Alder and birch standards to be spread evenly throughout mix, in groups of 4-7.
Transplants to be planted in single species blocks of 20-30 plants.

Mix 1B - OuterEdge Planting to mix 1A - 2.5m wide strip

Plant Name		%	Plant Size (cm)	Age/Pot size	Density (centres, in metres)
Crataegous monogyna	Hawthorn	50	90–120	1+1	2
Prunus spinosa	Blackthorn	20	60–90	1+1	2
Corylus avellana	Hazel	20	90–120	1+1	2
Ilex aquifolium	Holly	10	30–40	2lt	2

Transplants and shrubs to be planted in single species blocks of 20-30 plants.

Mix 2 - Mixed Tree planting to the mound

Plant Name		%	Plant Size (cm)	Age/Pot size	Density (centres, in metres)
Alnus glutinosa	Common Alder	30	90–120	1+1	2
Betula pubescens	Birch	10	90–120	1+2	2
Acer pseudoplatanus	Sycamore	10	90–120	1+1	2
Fraxinus excelsior	Common Ash	10	90–120	1+1	2
Pinus sylvestris	Scots Pine	10	30–50	1+1	2
Ulex europeaus	Gorse	10	30–40	1.5lt	2
			Plant Height (cm)	girth	
Alnus glutinosa	Common Alder	10	250–300	6–8cm	4.0m
Betula pubescens	Birch	10	250–300	6–8cm	4.0m

Alder and birch standards to be spread evenly throughout mix, in groups of 4-7.
Transplants and shrubs to be planted in single species blocks of 20-30 plants.
Ulex to be planted to outer edges of blocks.

Mix 3 - Mixed Tree planting to wetland areas

Plant Name		%	Plant Size (cm)	Age	Density (centres, in metres)
Alnus glutinosa	Common Alder	40	90–120	1+1	2
Salix caprea	Goat Willow	25	60–120	1+0	2
Fraxinus excelsior	Common Ash	15	90–120	1+1	2
Populus nigra	Black Poplar	20	90–120	1+1	2

Trees to be planted in single species blocks of 20-30 plants.

Mix 4 - Grassed Areas/Hedgerow Planting to the mound

Plant Name for Hedgerows	%
Crataegus Monogyna - Hawthorn	50
Ilex aquifolium - Holly	20
Fraxinus excelsior - Ash	10
Fagus syvatica - Beech	10
Prunus spinosa - Blackthorn	10

Mix 5 - Mass mixed tree planting/screening

Plant Name	%
Spruce	60
Japanese Larch	20
Birch	10
Alder	10

Hedgerows to be planted in a triple row, plants at 45cm centres, rows 50cm apart.
Transplants - 40-90cm in height.
Container grown hollies - 1.5 -2lt pots.

Phased Planting

Phases 1 to 3 Landfill - Planting at completion of landfill phases.
AIM - to provide slope stability to side slopes of landfill, and to aid integration of the new landform into the landscape setting following establishment. Also to establish plants to site boundaries which would eventually screen operations from certain viewpoints.
Grass seeding would be employed immediately following temporary capping of landfill to stabilise slopes/anchor soil.
Reseeding and proposed shrub/tree planting to follow final capping.
Establishment of proposed hedgerows to aid integration of new landform into landscape setting .
Adjustment to mixes may be necessary to suit ground conditions.

NOTES

1. LANDSCAPING MEASURES AND PLANTING SCHEDULES FOR THE FACILITY ARE BASED ON DRAWING NO. 1501072/01/336 (REV B) OF THE EIS PREPARED BY FERGUSON MCILVEEN (LANDSCAPE AND ENVIRONMENTAL CONSULTANTS).

Rev.	Date	Description	By	Chkd.

Client: greenstar — setting the standard

Project: EAST GALWAY LANDFILL SITE

Title: SUBMISSION TO THE EPA LANDSCAPING IMPLEMENTATION PLAN

SHEET 1 OF 2

Scale 1 : 2500 @ A2

Prepared by:	Checked	Date
Mark Murray	Damien Grehan	March 2005

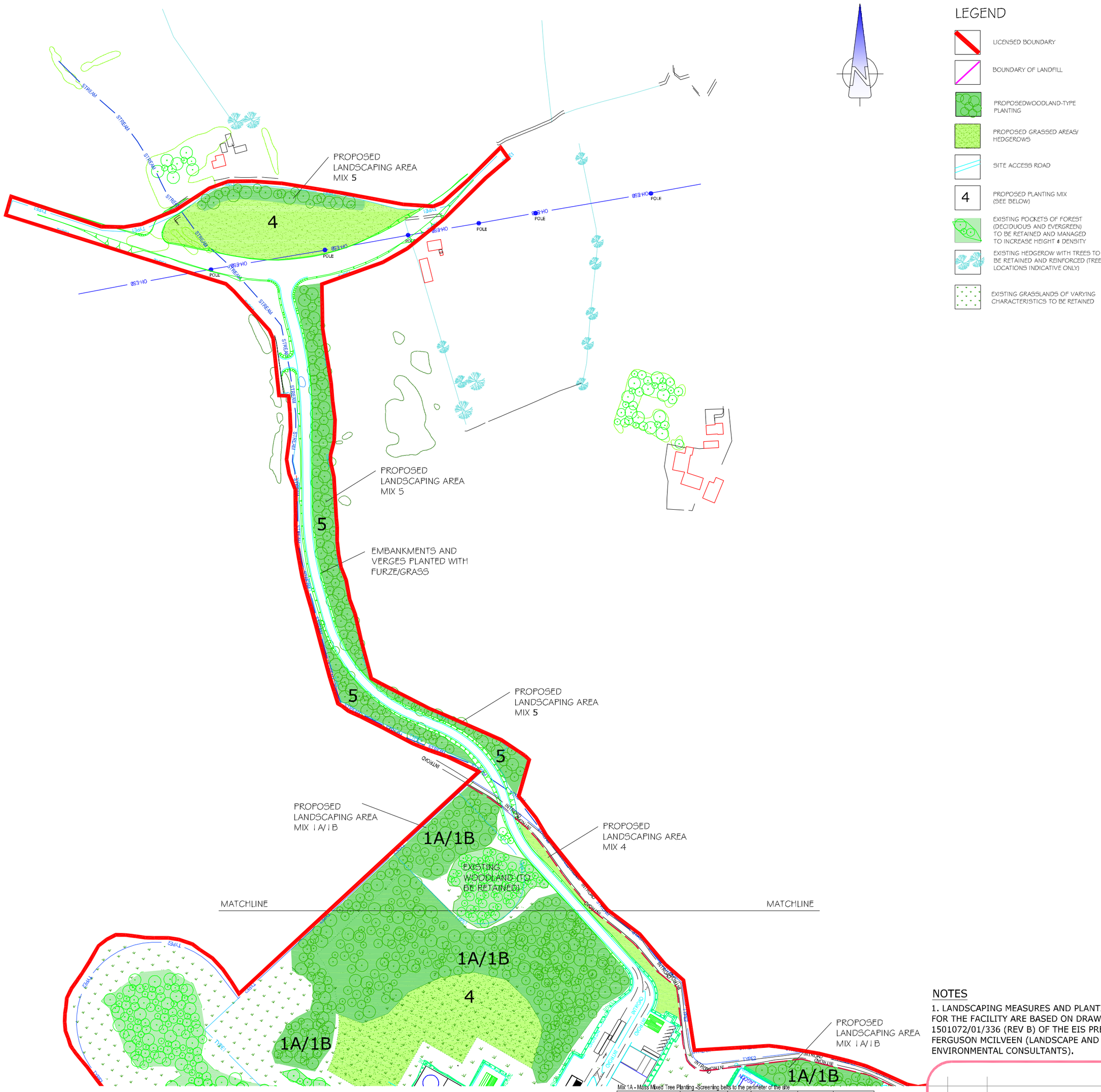
Project Director Eamonn Waldron

TOBIN Patrick J. Tobin & Co. Ltd. TES CONSULTING ENGINEERS
Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No. 2228-2623

Revision



LEGEND

- LICENSED BOUNDARY
- BOUNDARY OF LANDFILL
- PROPOSEDWOODLAND-TYPE PLANTING
- PROPOSED GRASSED AREAS/ HEDGEROWS
- SITE ACCESS ROAD
- 4 — PROPOSED PLANTING MIX (SEE BELOW)
- EXISTING POCKETS OF FOREST (DECIDUOUS AND EVERGREEN) TO BE RETAINED AND MANAGED TO INCREASE HEIGHT & DENSITY
- EXISTING HEDGEROW WITH TREES TO BE RETAINED AND REINFORCED (TREE LOCATIONS INDICATIVE ONLY)
- EXISTING GRASSLANDS OF VARYING CHARACTERISTICS TO BE RETAINED

NOTES

1. LANDSCAPING MEASURES AND PLANTING SCHEDULES FOR THE FACILITY ARE BASED ON DRAWING NO. 1501072/01/336 (REV B) OF THE EIS PREPARED BY FERGUSON MCILVEEN (LANDSCAPE AND ENVIRONMENTAL CONSULTANTS).

Mix 1A - Mass Mixed Tree Planting -Screening belts to the perimeter of the site

Plant Name		%	Plant Height (cm)	Age	Density (centres, in metres)
Alnus glutinosa	Common Alder	25	90–120	1+1	1.5
Betula pubescens	Birch	10	90–120	1+2	1.5
Fagus sylvatica	Beech	5	90–120	1+1	1.5
Fraxinus excelsior	Common Ash	10	90–120	1+1	1.5
Picea abies	Norway Spruce	10	30–50	1+1	1.5
Pinus sylvestris	Scots Pine	15	30–50	1+1	1.5
Quercus petraea	Sessile Oak	5	60–90	1+1	1.5
			Plant Height (cm)	girth	
Alnus glutinosa	Common Alder	10	250–300	6–8cm	4.0m
Betula pubescens	Birch	10	250–300	6–8cm	4.0m

Alder and birch standards to be spread evenly throughout mix, in groups of 4-7.
Transplants to be planted in single species blocks of 20-30 plants.

Mix 1B - OuterEdge Planting to mix 1A - 2.5m wide strip

Plant Name		%	Plant Size (cm)	Age/Pot size	Density (centres, in metres)
Crataegous monogyna	Hawthorn	50	90–120	1+1	2
Prunus spinosa	Blackthorn	20	60–90	1+1	2
Corylus avellana	Hazel	20	90–120	1+1	2
Ilex aquifolium	Holly	10	30–40	2lt	2

Transplants and shrubs to be planted in single species blocks of 20-30 plants.

Mix 2 - Mixed Tree planting to the mound

Plant Name		%	Plant Size (cm)	Age/Pot size	Density (centres, in metres)
Alnus glutinosa	Common Alder	30	90–120	1+1	2
Betula pubescens	Birch	10	90–120	1+2	2
Acer pseudoplatanus	Sycamore	10	90–120	1+1	2
Fraxinus excelsior	Common Ash	10	90–120	1+1	2
Pinus sylvestris	Scots Pine	10	30–50	1+1	2
Ulex europeaus	Gorse	10	30–40	1.5lt	2
			Plant Height (cm)	girth	
Alnus glutinosa	Common Alder	10	250–300	6–8cm	4.0m
Betula pubescens	Birch	10	250–300	6–8cm	4.0m

Alder and birch standards to be spread evenly throughout mix, in groups of 4-7.
Transplants and shrubs to be planted in single species blocks of 20-30 plants.
Ulex to be planted to outer edges of blocks.

Mix 3 - Mixed Tree planting to wetland areas

Plant Name		%	Plant Size (cm)	Age	Density (centres, in metres)
Alnus glutinosa	Common Alder	40	90–120	1+1	2
Salix caprea	Goat Willow	25	60–120	1+0	2
Fraxinus excelsior	Common Ash	15	90–120	1+1	2
Populus nigra	Black Poplar	20	90–120	1+1	2

Trees to be planted in single species blocks of 20-30 plants.

Mix 4 - Grassed Areas/Hedgerow Planting to the mound

Plant Name for Hedgerows	%
Crataegus Monogyna - Hawthorn	50
Ilex aquifolium - Holly	20
Fraxinus excelsior - Ash	10
Fagus syvatica - Beech	10
Prunus spinosa - Blackthorn	10

Mix 5 - Mass mixed tree planting/screening

Plant Name	%
Spruce	60
Japanese Larch	20
Birch	10
Alder	10

Hedgerows to be planted in a triple row, plants at 45cm centres, rows 50cm apart.
Transplants - 40-90cm in height.
Container grown hollies - 1.5 -2lt pots.

Phased Planting

Phases 1 to 3 Landfill - Planting at completion of landfill phases.
AIM - to provide slope stability to side slopes of landfill, and to aid integration of the new landform into the landscape setting following establishment. Also to establish plants to site boundaries which would eventually screen operations from certain viewpoints.
Grass seeding would be employed immediately following temporary capping of landfill to stabilise slopes/anchor soil.
Reseeding and proposed shrub/tree planting to follow final capping.
Establishment of proposed hedgerows to aid integration of new landform into landscape setting .
Adjustment to mixes may be necessary to suit ground conditions.

Rev.	Date	Description	By	Chkd.

Client: greenstar — setting the standard

Project: EAST GALWAY LANDFILL SITE

Title: SUBMISSION TO THE EPA LANDSCAPING IMPLEMENTATION PLAN

SHEET 2 OF 2

Scale 1 : 2500 @ A2

Prepared by:	Checked	Date
Mark Murray	Damien Grehan	March 2005

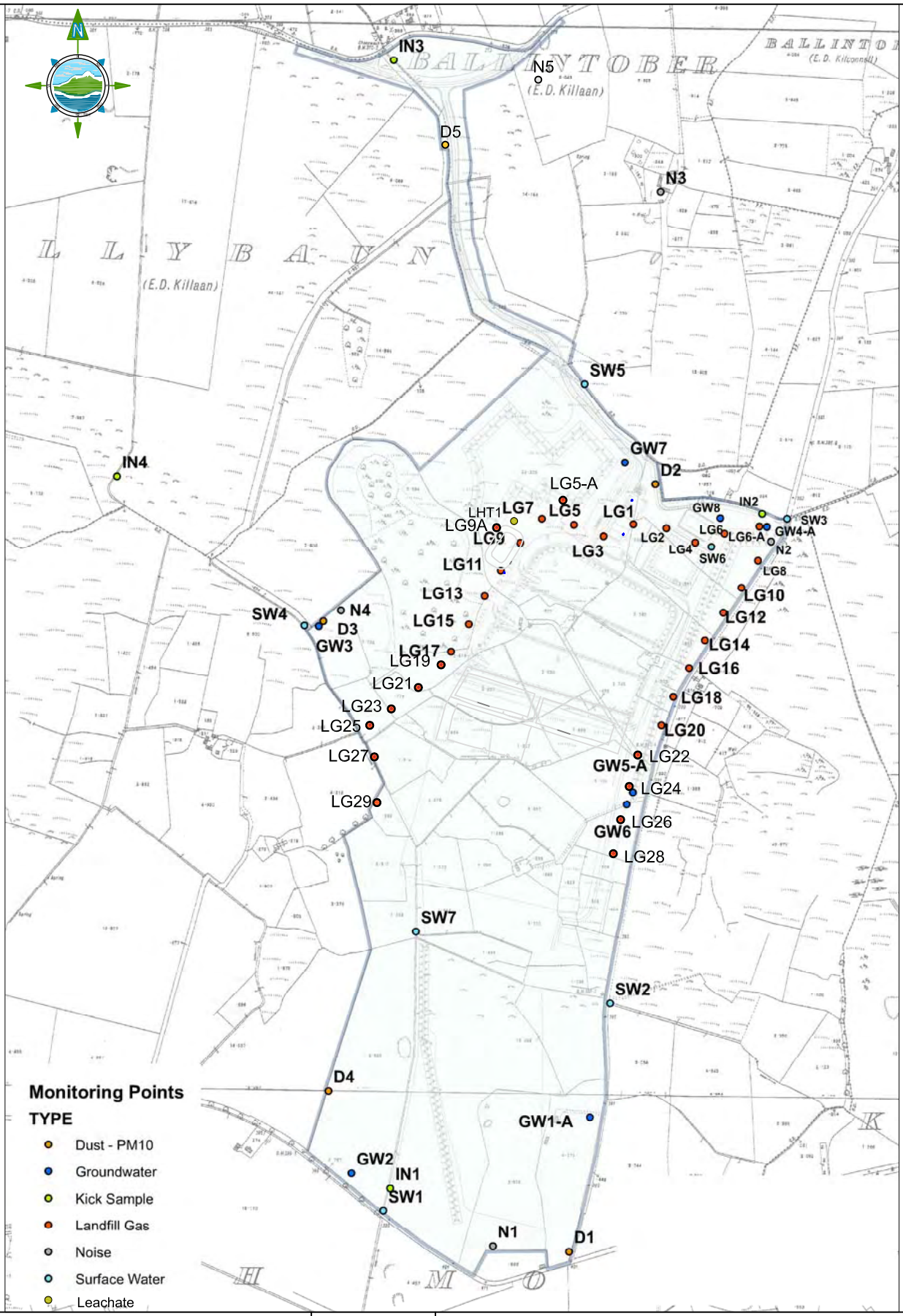
Project Director Eamonn Waldron

TOBIN — Patrick J. Tobin & Co. Ltd. — TES CONSULTING ENGINEERS
Consulting, Civil and Structural Engineers,
Hynes Building, St. Augustine Street,
Galway, Ireland.
tel: +353-(0)91-565211
fax:+353-(0)91-565398
e-mail: info@pjtobin.ie
www.pjtobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was orginally issued.

Drawing No. 2228-2624

Revision



Client: GREENSTAR LTD	Prepared by: R.K.	TOBIN Consulting Engineers, Market Square, Castlebar, Co. Mayo, Ireland. tel: +353-(0)94-9021401 fax:+353-(0)94-9021534 e-mail: castlebar@tobin.ie www.tobin.ie
Project: CONNAUGHT REGIONAL RESIDUAL LANDFILL	Checked: D.O'S.	Patrick J. Tobin & Co. Ltd.
Title: LANDFILL ENVIRONMENTAL MONITORING LOCATIONS	Date: 24.09.09	
	Project DIrector: M.F.G.	
	Drawing Status: LG29 ADDED	
	Scale @ A4: N.T.S.	

TOBIN Consulting Engineers will not be liable for any use of this document for any purpose other than that for which it was originally prepared and provided. Except where specifically and explicitly agreed in writing by TOBIN Consulting Engineers, as copyright holder, no part of this document may be reproduced or transmitted in any form and this document shall not be relied upon by any third party for any purpose.

Drawing No. 3588-1604

Revision: A

Ordnance Survey Ireland Licence number EN 0016009. ©

J:\Projects\3588 East Galway Landfill\Drawings\Preliminary\3588-1604 A - Environ Mon Locations.dwg, 3588-1604, 10/02/2010 10:18:36, ray kelly

APPENDIX 2

Corrective Action Procedures

CORRECTIVE ACTION PROCEDURES

Scope

Greenstar has prepared Corrective Action Procedures (CAP) to ensure that corrective action is taken should specified requirements of the EMS not be fulfilled. This Procedure describes the content and applicability of the CAPs and assigns responsibility for their implementation, maintenance and update.

Content

The Procedure set out the approach to be taken to identify a non-compliance with the EMS, investigate the root cause, implement corrective actions and report on the non-compliance. They also identify the need to amend Operating Procedures and provide training or retraining to avoid the recurrence of the non compliance. The CAPs deal with: -

Facility Operation	:	CAP-2
Environmental Monitoring	:	CAP-3
Reports	:	CAP-4

Application

This CAP apply to the Galway Landfill operated under Waste Licence Registration No. W0178-01.

Applicable Documents

The following documents constitute part of the CAP to the extent specified in each Procedure. Unless otherwise specified the latest issue of each document applies.

- Waste Licence Registration No. W0178-01,
- Operating Procedures,
- Site Inspection Reports,
- Environmental Management Plan (EMP),

- Emergency Response Procedures (ERP),
- Awareness & Training Procedure,
- Document Control Procedure.

Responsibilities

It shall be the responsibility of Greenstar to ensure that the CAPs are implemented.

It shall be the responsibility of the Facility Manager to revise and amend the CAP in response to findings of the root cause of a non-compliance.

It shall be the responsibility of the Facility Manager to maintain copies of the most recent CAPs at the facility, ensure that they are available to all relevant site operatives, including Greenstar sub-contractors, and ensure that all site operatives have a thorough understanding of the CAPs relevant to their roles and areas of responsibilities.

FACILITY OPERATION

Scope

This Procedure addresses the day to day operation of the facility to ensure that corrective action is taken should the specified requirements of the Environmental Management Plan (EMP) and/or the Waste Licence not be fulfilled.

Application

The procedure applies to all site operations covered and includes: -

- Waste acceptance,
- Waste placement,
- Cover material stockpile,
- Condition of landfill cells,
- Condition of site entrance and access roads,
- Litter screens and control,
- Nuisance control, including, dusts, odours, birds, litter and vermin,
- Leachate and Landfill gas management,
- Surface water management,
- Wheel wash,
- Site security and environs,
- Complaints,
- Fires,
- Fuel storage,
- Record keeping.

Responsibility

greenstar is responsible for ensuring the facility is operated in accordance with the EMP, the Waste Licence and facility Operating Procedures or any other procedures and plans and reports prepared in compliance with licence conditions.

It is the responsibility of the Facility Manager or nominated Deputy Manager to ensure that all site operatives, including *greenstar* sub-contractors, have a thorough understanding of the EMP, the Waste Licence and the relevant Operating Procedures.

It is the responsibility of all staff, including *greenstar* sub-contractors, to immediately notify the Facility Manager or the nominated Deputy Manager of any actual or potential non-compliance with the EMP and/or Waste Licence conditions.

The Facility Manager or nominated Deputy Manager shall be responsible for implementing corrective action where site operations are identified as not meeting the objectives of the EMP or the Waste Licence Conditions. In implementing the corrective actions the Facility Manger or nominated Deputy Manager shall have regard to the facility Emergency Response Procedures to ensure that the proposed actions do not present a risk to Health and Safety.

Corrective Action

Where a non-compliance is identified, either by site personnel during daily operations, routine inspections by the facility personnel or in the investigation of a complaint by a member of the public, the Facility Manager or nominated Deputy Manager will immediately initiate action to bring operations into compliance.

The scope and extent of the corrective actions will be based on the nature and scale of the non-compliance, the objectives of the EMP and relevant Licence Conditions. The corrective actions will, at a minimum, be sufficient either to immediately rectify the non-compliance or minimise environmental risk pending completion of required works.

If the non-compliance constitutes an incident which might result in environmental pollution the Facility Manager or nominated Deputy Manager shall initiate any environmental monitoring considered necessary to evaluate environmental pollution.

If the non-compliance constitutes an incident requiring notification to the Agency or other regulatory bodies, the Facility Manager or nominated Deputy Manager shall notify the Agency and regulatory bodies in accordance with the Reporting Procedure and the Waste Licence Conditions

The Facility Manager or nominated Deputy Manager shall monitor implementation of the corrective action to ensure that actions are carried out and are effective.

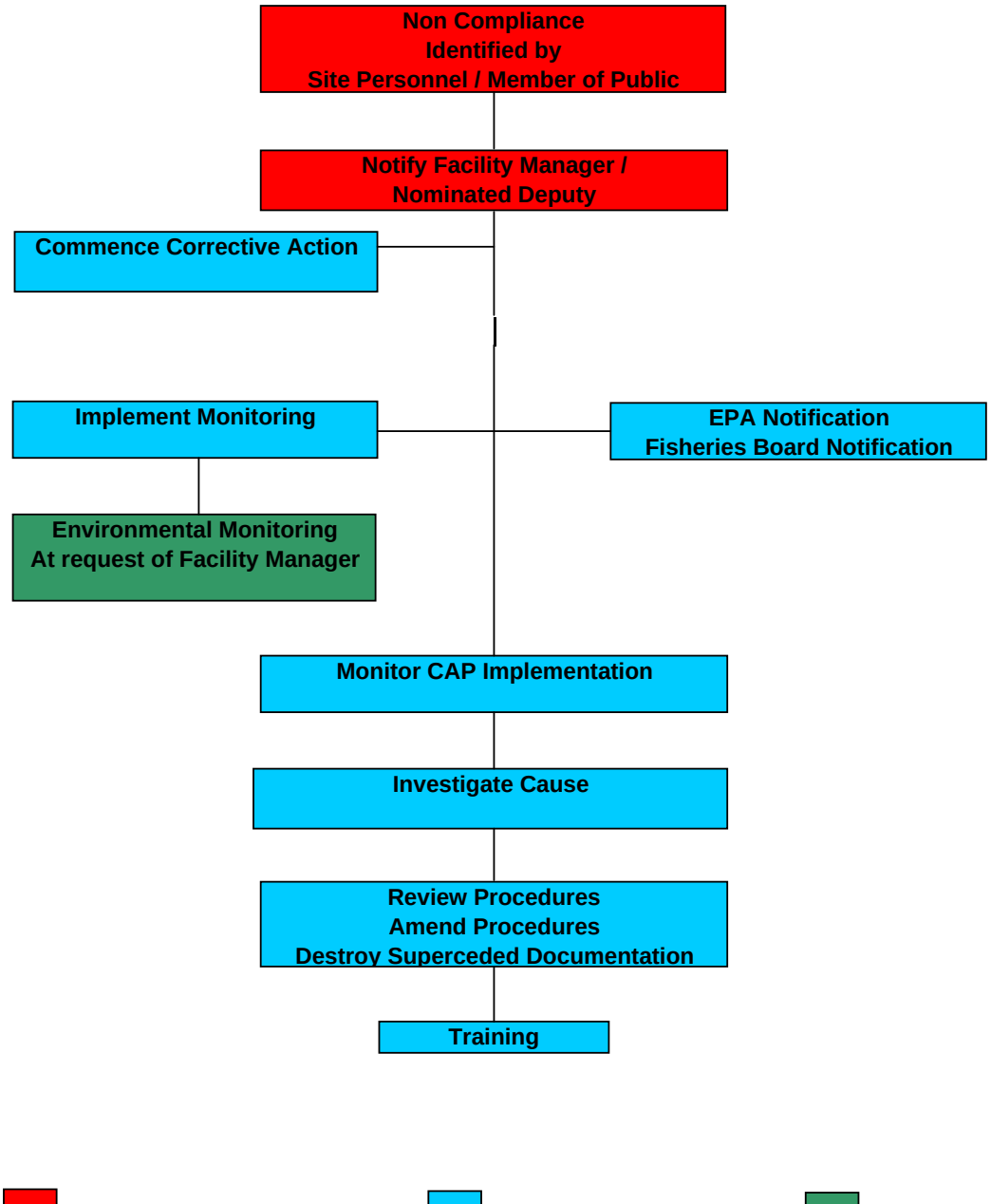
Following the completion of the corrective action the Facility Manager or nominated Deputy Manager will carry out an investigation to identify the root cause of the non-compliance. Where the cause is the result of inadequate or improperly applied procedures or site practices, the Facility Manager or nominated Deputy Manager will review and amend the procedures and practices to avoid a reoccurrence of the non-compliance. If documented procedures or operational practice sheets are amended the Facility Manager shall ensure that the superseded documents are destroyed.

If the cause of the non compliance is due to a lack of understanding of operational practices, the EMP, or licence conditions the Facility Manager or nominated Deputy Manager shall ensure that the site staff, including greenstar sub-contractors, receive the necessary instruction or training to ensure future avoidance of a recurrence of the non compliance.

Key Elements

A flow diagram that summarises the key elements of the CAP is attached.

CAP-2 Site Operation



ENVIRONMENTAL MONITORING

Scope

This Procedure addresses the environmental monitoring programme at the facility to ensure that corrective action is taken should specified requirements of the EMP and or the Waste Licence not be fulfilled.

Application

The Procedure applies to all emissions, environmental impacts and monitoring of emissions and environmental media covered under the EMP and Waste Licence Conditions, subject to any written agreements with the Agency and includes: -

- Surface water,
- Groundwater,
- Noise,
- Dust,
- PM_{10},
- VOC, and
- Odours.

Responsibility

greenstar shall be responsible for providing the necessary resources to ensure the environmental monitoring programme is carried out in accordance with the EMP and the Waste Licence conditions.

It is the responsibility of the Facility Manager or nominated Deputy Manager to have a thorough understanding of the requirements of the EMP, Waste Licence, and Operating Procedures in relation to environmental monitoring.

The Facility Manager or nominated Deputy Manager will be responsible for arranging for the implementation of the specified environmental monitoring programme.

The Facility Manager or nominated Deputy Manager will be responsible for implementing corrective actions in the event that monitoring identifies an emission that exceeds emission limit/trigger level or where operations are identified as impacting on the receiving environment.

Corrective Action

Where in-situ monitoring identifies an impact on the receiving environment, the Facility Manager or nominated Deputy Manager will be immediately informed. The Facility Manager or nominated Deputy will carry out an inspection of the area surrounding the monitoring location to identify the source of the impact.

If the source of the impact is identified as an emission from the waste activities, the Facility Manager or nominated Deputy Manager shall be responsible for taking corrective action to isolate the source and identify and execute measures to minimise the effects of the emission.

The Facility Manager or nominated Deputy Manager may, depending on the nature of the impact, instruct the amendment of the routine monitoring programme to include additional monitoring to determine the extent of the impact. The number and location of these monitoring points will be established in consultation with the monitoring personnel.

The Facility Manager or nominated Deputy Manager will notify the Agency and, in the case of surface water or groundwater impacts, the Western Regional Fisheries Board in accordance with the Waste Licence notification requirements.

Where the in-situ monitoring indicates satisfactory conditions, but subsequent laboratory test results indicate an impact by an emission from site activities e.g. surface water or groundwater quality, the Facility Manager or nominated Deputy Manager will carry out a visual inspection of the monitoring points to identify a possible source. If a source cannot be identified the Facility Manager or nominated Deputy Manager may, depending on the nature of the results, either immediately initiate further monitoring or await the following scheduled sampling event to obtain more information on the cause of the impact.

The Facility Manager or nominated Deputy Manager will monitor implementation of the corrective action to ensure that actions are carried out and are effective.

Following the completion of the corrective action the Facility Manager or nominated Deputy Manager will investigate and document the cause of the emission. The Facility Manager or nominated Deputy Manager will submit a report on the investigation to the Agency in accordance with the Waste Licence notification and reporting requirements.

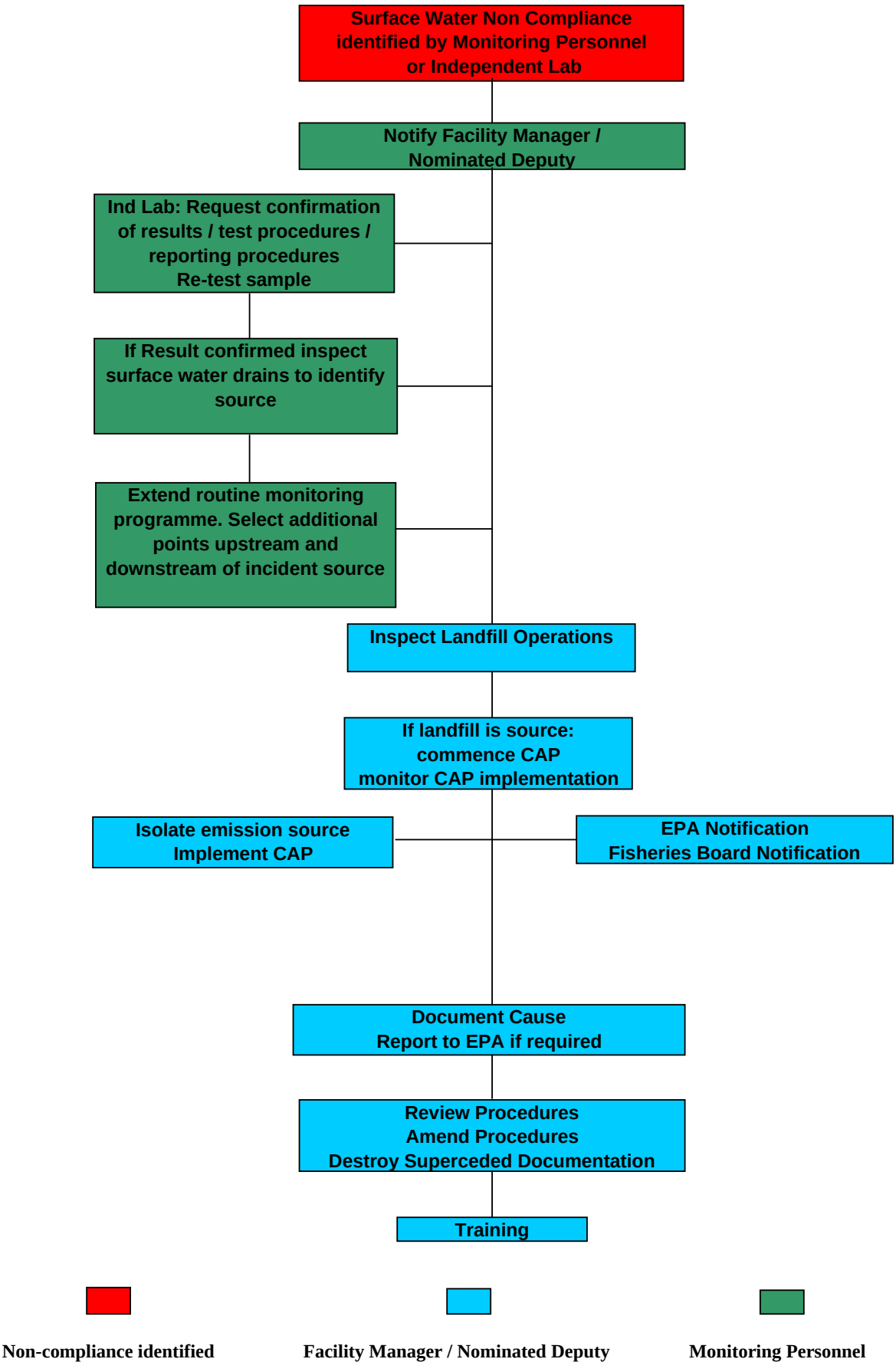
Where the cause is the result of failure or inadequacy of the design or implementation of specified engineering works, *greenstar* shall ensure that the design or construction deficiencies are rectified to avoid a reoccurrence of the non-compliance.

Where the cause is the result of inadequate or improperly applied procedures or site practices the Facility Manager shall review and amend the procedures and practices to avoid a reoccurrence of the non-compliance. If documented procedures or work instructions are amended the Facility Manager shall ensure that the superseded documents are destroyed.

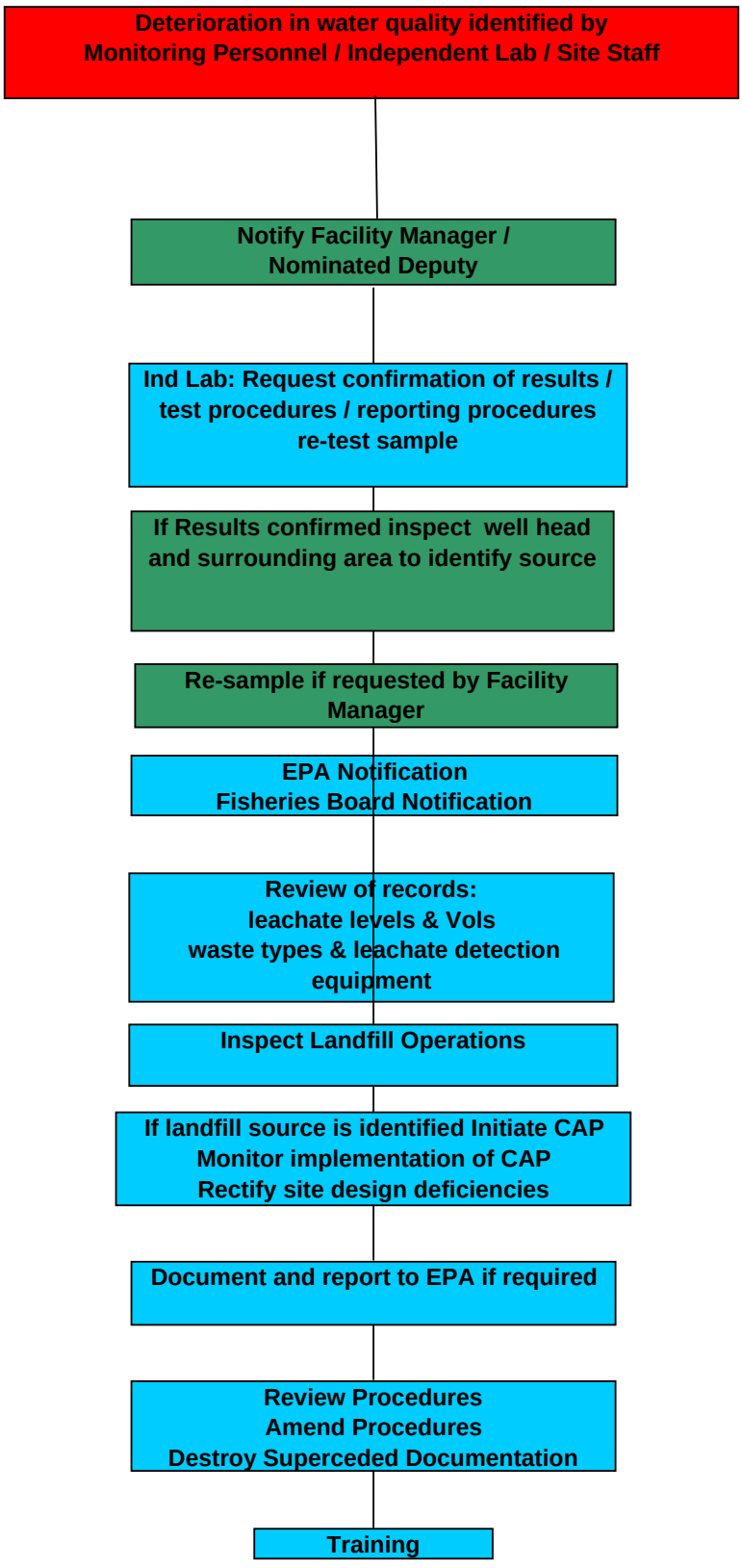
If the cause of the non compliance is due to a lack of understanding of operational practices or licence conditions the Facility Manager or nominated Deputy Manager shall ensure that the site operatives, including *greenstar* sub-contractors, receive the necessary instruction or training to ensure future avoidance of a recurrence of the non compliance.

Flow diagrams showing the actions to be taken in the event of non-compliance identified during the environmental monitoring programme are attached.

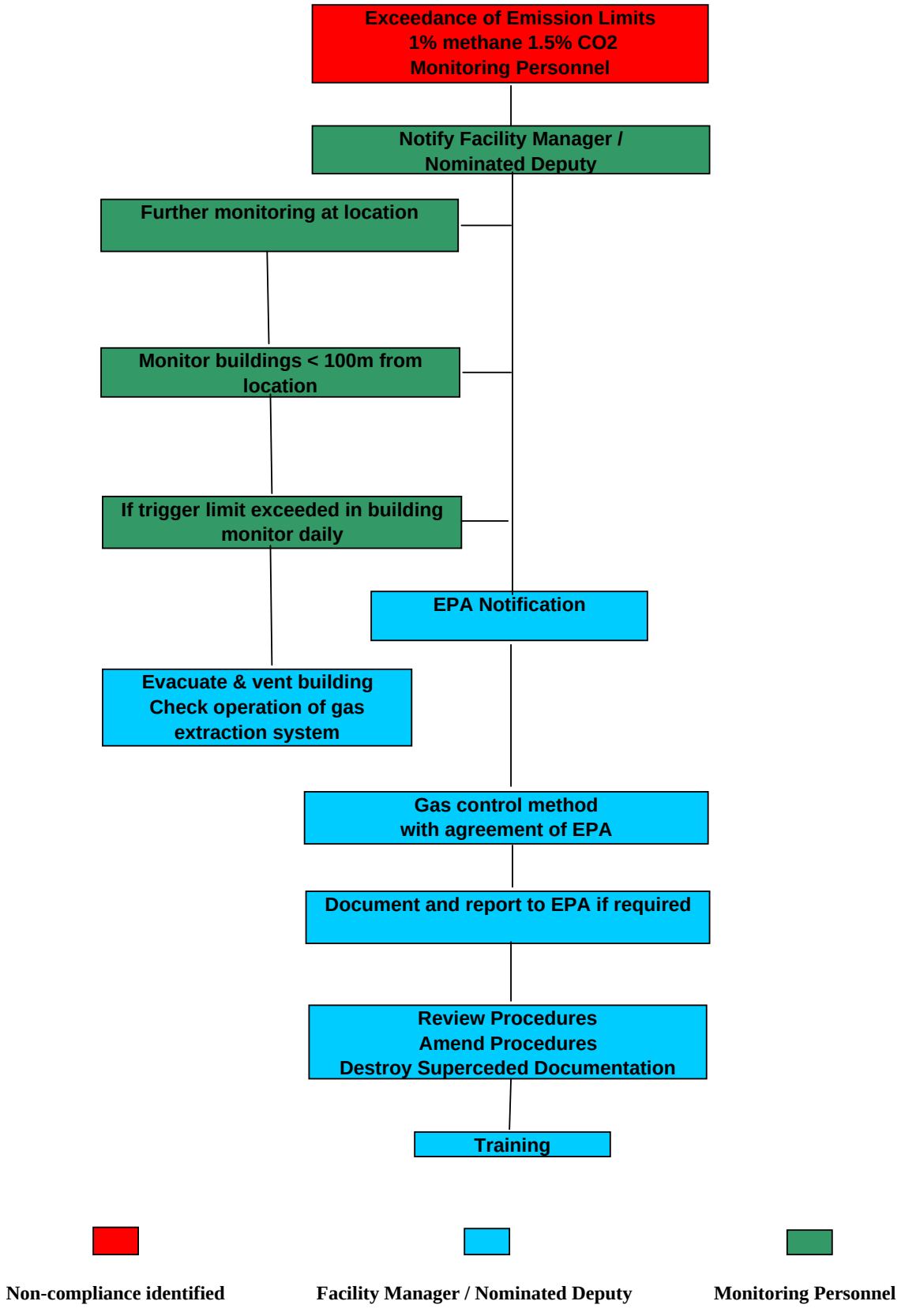
CAP-3 Surface Water



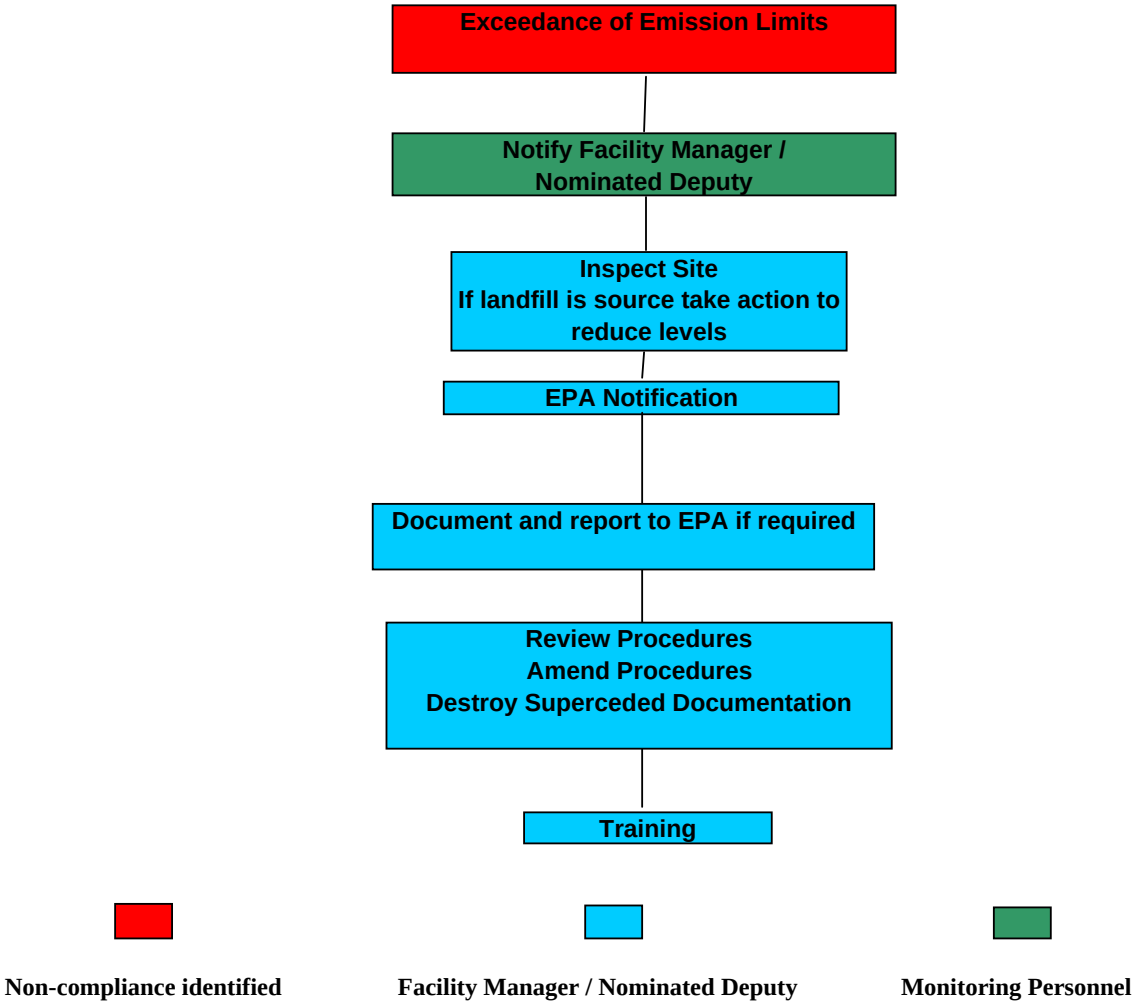
CAP- 3 Groundwater



CAP-3 Landfill Gas



CAP-3 Noise


Exceedance of Emission Limits
Notify Facility Manager / Nominated Deputy
Inspect Site
If landfill is source take action to reduce levels
EPA Notification
Document and report to EPA if required
Review Procedures
Amend Procedures
Destroy Superceded Documentation
Training
Non-compliance identified
Facility Manager / Nominated Deputy
Monitoring Personnel

REPORTS

Scope

This Procedure addresses reporting to ensure that corrective action is taken should specified requirements of the Waste Licence not be fulfilled.

Application

The Procedure applies to all reports and notifications required under the EMP and the Waste Licence, subject to any written agreements with the Agency.

Responsibility

greenstar shall be responsible for ensuring the resources are provided to complete the required reports in accordance with the schedules specified in the EMP and set in the individual conditions and *Schedule E* of the Waste Licence.

It is the responsibility of the Facility Manager or nominated Deputy Manager to have a thorough understanding of the EMP and Waste Licence Conditions in relation to reporting requirements.

The Facility Manager or nominated Deputy Manager shall be responsible for arranging the completion of the stipulated reports and submission to the Agency within the timeframe set in the EMP and the Waste Licence.

The Facility Manager or nominated Deputy shall be responsible for implementing corrective actions in the event that reports will not be prepared or submitted to the Agency within the specified timeframe.

Corrective Action

If the Facility Manager or nominated Deputy Manager identifies that a report will not be prepared and submitted to the Agency by the scheduled date he (she) shall identify the cause of the delay.

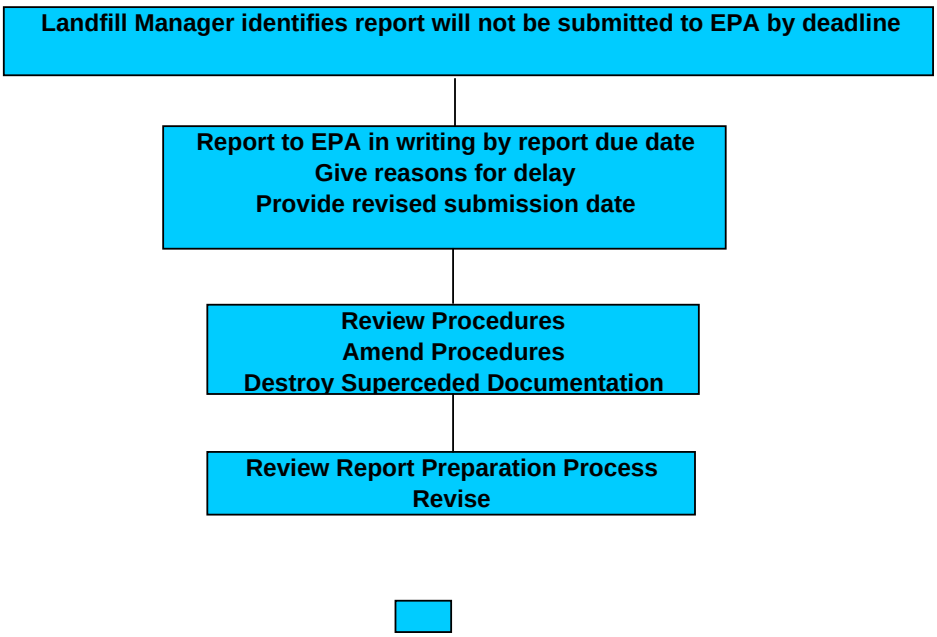
The Facility Manager or nominated Deputy Manager will inform the Agency in writing that the report will not be submitted by the due date. This notification will be submitted to the Agency preferably before, but at a minimum no later than the report due date.

The Facility Manager or nominated Deputy Manager will include in the written notification the reason(s) for the failure to submit the report on time and provide a revised submission date for the Agency's agreement.

Following the submission of the report the Facility Manager or nominated Deputy Manager shall review that particular report preparation process to identify the root cause of failure to meet the deadline. Based on the review the Facility Manager or nominated Deputy shall if necessary revise the report preparation process to avoid a recurrence of the non-compliance.

A flow diagram showing the actions to be taken in the event of non-compliance with the reporting programme is attached.

CAP-4 Reports



APPENDIX 3

Awareness & Training Procedures

AWARENESS AND TRAINING PROCEDURE

Scope

Greenstar has prepared this Awareness and Training Procedure (Procedure) to ensure that the awareness and training needs of all relevant facility personnel are identified and the required training provided.

Application

This Procedure applies to all personnel whose work is related to the Galway Landfill, including Greenstar staff and any subcontractors working at the facility on behalf of the Greenstar.

Applicable Documents

The following documents constitute part of the Procedure to the extent specified. Unless otherwise specified the latest issue of each document applies: -

- Waste Licence Registration No. 178-1,
- Operating Procedures,
- Site Inspection Reports,
- Environmental Management Plan (EMP),
- Emergency Response Procedures,
- Management Structure,
- Corrective Action Procedures.

Responsibilities

It shall be the responsibility of Greenstar to ensure that this Procedure is implemented.

It shall be the responsibility of the Facility Manager and/or nominated Deputy Manager(s) to identify training needs and arrange for the provision of the appropriate awareness and training programmes to all relevant personnel.

It shall be the responsibility of the Facility Manager and/or nominated Deputy Manager(s) to maintain written records of all awareness and training programmes received by site personnel.

Programmes

The Facility Manager shall identify the awareness and training needs of all personnel by means of Management Structure documents and the Training Evaluation Matrix. The Management Structure document assigns responsibilities to site personnel. The Matrix sets out positions, training needs and a programme delivery timeframe.

The Facility Manager or nominated Deputy Manager(s) will arrange for the delivery of the awareness and training programmes. The programme may include internal training provided by Greenstar personnel who have the necessary skills and experience to deliver the programmes, and external training provided by appropriately experienced and recognised training organisations.

The programmes shall include education and instruction on: -

- Compliance with Waste Licence conditions, Operating Procedures and EMP objectives and targets relating to site operation,
- Awareness of the implications of non compliance with EMP objectives and Licence conditions,
- Environmental Monitoring Programmes,
- Dealing with Complaints,
- Corrective Action Procedures,
- Health & Safety,
- Emergency Response Procedures.

The Facility Manager or Nominated Deputy Manager(s) shall ensure that all personnel receive the required training and shall maintain records of training provided. The records shall include the names of the trainees, the date of the training and the topics covered.

The Facility Manager shall review and amend the awareness and training programmes based on the corrective action investigation of non-compliances.

Awareness & Training Matrix

Date:

Programme	Scope	
	Person Affected	**Frequency**
Operations	All personnel.	Annual.
Environmental Awareness (EMS, ISO 14001 etc)	All personnel	Annual
Environmental Monitoring	Facility Manager, Nominated Deputy.	Initial and following licence review.
Complaints	Facility Manager, Nominated Deputy.	Initial and following licence review.
Corrective Action Procedures	Facility Manager, Nominated Deputy.	Initial and following any licence amendments.
Health & Safety	All personnel.	Initial and following any licence amendments.
Emergency Response Procedures	All personnel.	Initially & following any procedure amendments but at least annually.