

# ATTACHMENT D.4

## Leachate Management Plan

*For inspection purposes only.  
Consent of copyright owner required for any other use.*



# Corranure Landfill Waste Licence No. W0077-02

## DOCUMENT CONTROL SHEET

Client	Cavan County Council					
Project Title	Corranure Landfill Waste Licence Compliance					
Document Title	Leachate Management Plan 2008					
Document No.	MGE0068RP0017					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	9	1	-	-

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final	K.G.	S.G.	W.M.	Galway	September 2008

**Consulting Engineers**

## TABLE OF CONTENTS

1	INTRODUCTION	1
2	LEACHATE GENERATION	2
3	LEACHATE CONTROL SYSTEM	4
4	LEACHATE TREATMENT	6
5	MONITORING	8
6	MAINTENANCE	9

## LIST OF TABLES

Table 2.1: Leachate Generation Estimates based on Water Balance Calculation

Table 5.1: Leachate Monitoring Programme

## LIST OF DRAWINGS

- DG0058-01 Leachate Management Drawing
- DG0055-01 Emission and Monitoring Location Points

# 1 INTRODUCTION

Cavan County Council operate Corranure Landfill Waste Licence W0077-02. The facility is licenced to accept household waste, commercial waste, green waste, construction and demolition waste, street cleaning residues and hazardous household waste. This Leachate Management Plan has been prepared in order to comply with Conditions 3.13, 3.19.3, 5.11, 6.6 and 11.5 of Waste Licence W0077-02.

The landfill has been in operation at its current location since 1988. Initially, the site was operated on a "dilute-and-disperse" basis. In 2001, a major redevelopment of the site in compliance with the conditions of the Waste Licence was completed comprising the construction of a new 19,050 m<sup>2</sup> composite lined cell (known as Cell 1), leachate collection system and a new site entrance area consisting of an administration building, weighbridge, wheelwash and civic amenity facility. The original landfill was also capped as part of this contract.

Cell 1 ceased accepting waste in October 2005 and was permanently capped during 2006. Construction of Cell 2 commenced in 2004 and waste was accepted in this cell from October 2005 to April 2007. The installation of a permanent capping system on Cell 2 was completed in September 2007.

Cells 3 was constructed adjacent to Cell 2 in 2005. Waste is currently being accepted in Cell 3. In September 2007 Oxigen Environmental Ltd entered into an agreement with Cavan County Council to operate the active Cell 3 and the future Cell 4 which is licensed under Waste Licence W0077-02. It is estimated that there are 3.5 years filling remaining in Cell 3 and the future Cell 4. It is proposed that Cavan County Council will retain responsibility for leachate management in the remediated section of the landfill (Le. Cells 0, 1 and 2) while Oxigen Environmental Ltd. will be responsible for the active Cell 3 and future Cell 4.

Leachate produced in a landfill is a liquid which has percolated through the waste, picking up suspended and soluble materials that originate from or are products of the degradation of waste. Factors which affect the rate of generation of leachate include precipitation, surface water runoff, evapotranspiration, moisture released and absorbed in waste, moisture using during decomposition and vapour contained in gas. Of these, precipitation, surface water runoff and evapotranspiration are the major constituents.

## 2 LEACHATE GENERATION

A leachate generation calculation for Corranure Landfill was carried out in 2006 (as part of an exercise for sizing a new leachate storage tank, as discussed in Section 3).

The calculation was carried out in accordance with the Water Balance Calculation guidelines set out in the EPA Manual on Landfill Site Design. Factors used to determine leachate generation volumes were cell areas, precipitation, infiltration, evaporation, transpiration and capped areas. A number of conservative assumptions were factored into the calculation as follows:

- Annual precipitation is 928 mm/year,
- Annual evaporation is 0mm/year (conservative)
- Annual transpiration is 0mm/year (conservative)
- Percentage surface water run-off for a new cell is 0%, (conservative)
- Percentage surface water run-off for an open (advanced active stage) cell is 0%
- Percentage surface water run-off for a capped cell is 60%

Leachate generation is calculated on a monthly basis for each cell and is dependent on the life stage of the cell. For this calculation, five life stages were assumed as follows:

- A - new cell with no more than 2m of waste across the area of the cell base
- B - cells with a minimum of 2m of waste on the cell base
- C - filled cell without capping
- D - recently capped cell producing leachate at a decreasing rate over 12 months
- E - capped cell producing leachate at a constant rate

The leachate generation estimates based on the water balance calculation are shown on Table 2.1.

**Table 2.1 Leachate Generation Estimates based on Water Balance Calculation**

Year	Leachate Generated (m <sup>3</sup> /yr)							Total All Cells	Landfill Status
	Cavan County Council				Oxygen Environmental Ltd.				
	Cell 0	Cell 1	Cell 2	Total Cells 0, 1 & 2	Cell 3	Cell 4	Total Cells 3 & 4		
2006	16,234	8,734	17,624	42,592	0	0	0	42,592	Cell 0 capped, Cell 1 being capped, Cell 2 active, Cells 3 & 4 empty
2007	16,234	9,195	10,499	35,928	24,612	0	24,612	60,540	Cell 0 capped, Cell 1 capped, Cell 2 being capped, Cell 3 active, Cell 4 empty
2008	16,234	9,195	6,991	32,420	24,613	0	24,613	57,033	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 active, Cell 4 empty
2009	16,234	9,195	6,991	32,420	19,744	15,188	34,932	67,352	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 being capped, Cell 4 active
2010	16,234	9,195	6,991	32,420	9,845	24,613	34,458	66,878	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 capped, Cell 4 active
2011	16,234	9,195	6,991	32,420	9,845	24,613	34,458	66,878	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 capped, Cell 4 active
2012	16,234	9,195	6,991	32,420	9,845	14,786	24,631	57,051	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 active, Cell 4 being capped
2013	16,234	9,195	6,991	32,420	9,845	9,845	19,690	52,110	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 active, Cell 4 capped
2014	16,234	9,195	6,991	32,420	9,845	9,845	19,690	52,110	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 active, Cell 4 capped
2015	16,234	9,195	6,991	32,420	9,845	9,845	19,690	52,110	Cell 0 capped, Cell 1 capped, Cell 2 capped, Cell 3 active, Cell 4 capped

As stated in the EPA Manual on Landfill Site Design, "In an operational landfill or even a completed landfill with leachate data available, it may be difficult to estimate leachate volumes to better than a factor of two". In 2007 a total of 33,734 m<sup>3</sup> of leachate was pumped from the landfill to the existing sewer in the nearby "Rocklands" housing estate on the outskirts of Cavan Town. In addition, 12,369 m<sup>3</sup> of leachate was tankered by two contractors between 1<sup>st</sup> January 2007 and 13<sup>th</sup> April 2007, until the new rising main from the landfill to Cavan Town was commissioned. Therefore the total volume of leachate pumped/tankered from Corranure Landfill in 2007 was 46,103m<sup>3</sup> which shows a reasonable correlation with the 2007 leachate generation figure of 60,539m<sup>3</sup> estimated using the water balance calculation as shown in Table 2.1.

### 3 LEACHATE CONTROL SYSTEM

The objectives of the leachate control system are as follows:

- To reduce the potential for seepage out of the landfill through the sides or the base by exploiting weaknesses in the liner or by flow through its matrix,
- To maintain low leachate head to prevent leachate rising to such an extent that it can spill over and cause uncontrolled pollution to surface water, and
- To minimise the interaction between the leachate and the liner to prevent groundwater contamination.

Drawing **DG0058-01** provides details on the leachate management system at Corranure Landfill.

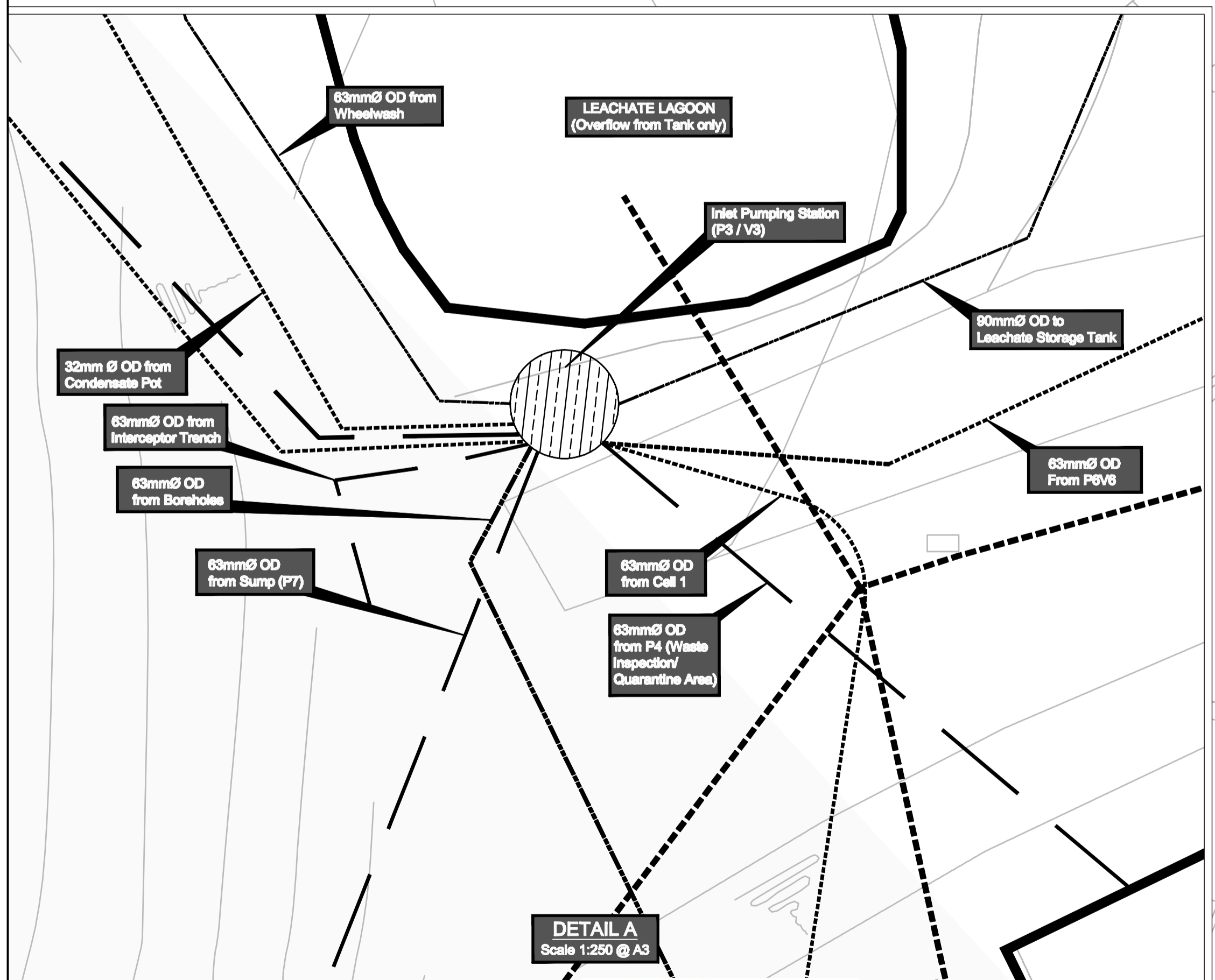
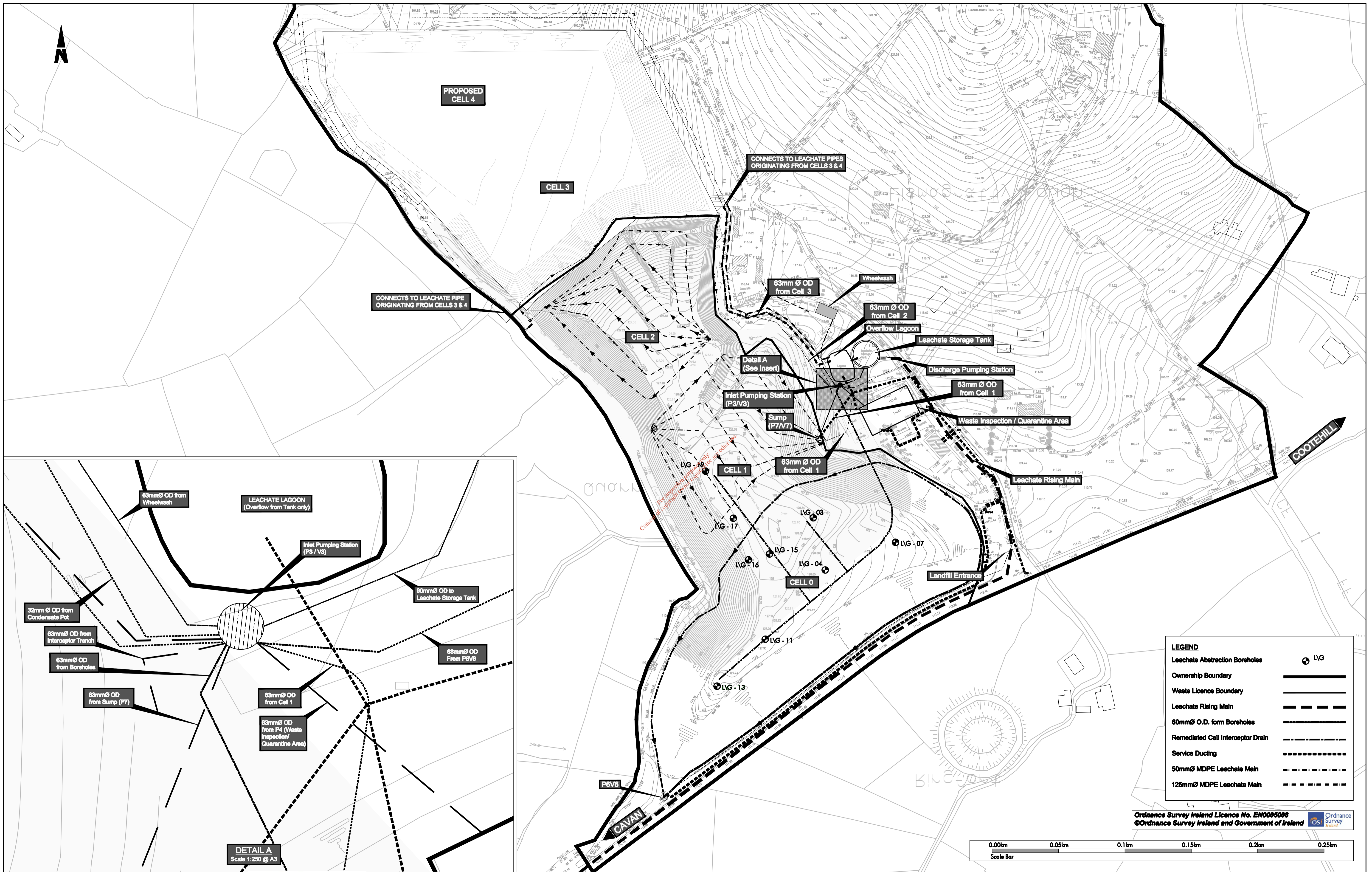
9 no. leachate abstraction wells are operational in the Cell 0 and Cell 1 and an interceptor drain also collects leachate from the perimeter of Cell 0.

In Cells 1, 2 and 3 and future Cell 4 leachate is collected in a network of slotted pipes laid in the base of each cell and draining to a leachate collection chamber constructed at the lowest point of each cell.

A glass-lined steel leachate tank was installed at the facility in 2006 with a capacity of 1,531 m<sup>3</sup> and replaces the leachate lagoon as the primary leachate storage unit at the facility. The original lagoon, with a capacity of approximately 270 m<sup>3</sup>, is now used as an emergency overflow to the tank. Therefore, the total available capacity for leachate storage at Corranure Landfill is 1,801 m<sup>3</sup> which exceeds the required storage capacity for 7 days of average leachate generation (Le. 220m<sup>3</sup>/day as calculated using the Water Balance Calculation).

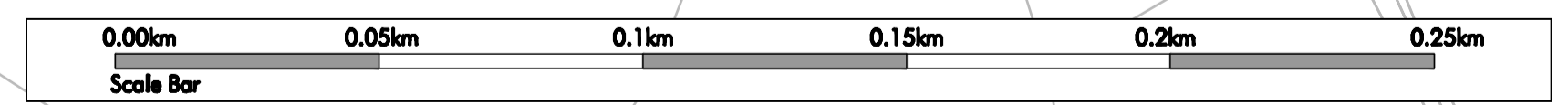
A 100mm MOPE leachate main runs from the landfill into Cavan town. This newly installed rising main runs from the leachate storage tank at the facility to the current discharge point at the entrance to the Rocklands Estate. The replacement of the main has increased leachate pumping capacity at the landfill and will enable the facility to deal with the expected increase in leachate generation rates from Cells 3 and 4.





LEGEND	
Leachate Abstraction Boreholes	⊕ LG
Ownership Boundary	—
Waste Licence Boundary	—
Leachate Rising Main	---
60mm Ø O.D. form Boreholes	----
Remediated Cell Interceptor Drain	-----
Service Ducting	.....
50mm Ø MDPE Leachate Main	-----
125mm Ø MDPE Leachate Main	-----

Ordnance Survey Ireland Licence No. EN0005008  
 © Ordnance Survey Ireland and Government of Ireland



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

No.	Date	By	App	Amendment / Issue
F01	08.09.08	J.McG.		Final Issue

Client  
**CAVAN COUNTY COUNCIL**  
 Drawn By: J.McG.  
 Checked By:  
 Approved By:  
 Date: Sept. '08

Project: **CORRANURE LANDFILL - WASTE LICENCE REVIEW APPLICATION**  
 Drawing Status: Final  
 Scale / Sheet Size: 1:1250 @ A1, 1:2500 @ A3

Drawing Number: **DG0058/01**  
 Rev: **F01**  
 Title: **LEACHATE MANAGEMENT SYSTEM**



**Cavan County Council**  
 Comhairle Contae an Chabháin  
 F. Gibbons  
 Director of Services,  
 Cavan County Council  
 Courthouse,  
 Cavan.  
 Tel: (049) 4331799 Fax: (049) 4361516





In addition the Jeachate pumping system at the facility itself has been improved in the following ways to allow the facility to better deal with future increases in leachate generation rates:

- All leachate generated on site is pumped into a leachate inlet pumping chamber adjacent to the existing lagoon. Leachate is pumped from this chamber into the leachate storage tank. A duty-standby pump system has been installed to ensure that sufficient pumping capacity will always be available to manage the leachate.

- A new leachate discharge pumping chamber and rising main were constructed to pump leachate from the collection tank into the Cavan town sewer system. This arrangement facilitates easier management of the system and improves ease of monitoring of the pumping system by landfill staff.

- The existing pumping station P6N6 has been reconfigured to pump leachate collected in the interceptor drain only. This leachate has been pumped back to the Jeachate collection chamber. This reduces capacity pressures on this pump and allows for better control of leachate volumes around the original landfill.

Surface water generated in the waste inspection/quarantine area and run off from the wheelwash is treated as leachate and is discharged to the leachate management system.

An odour suppression system of dosing with Sewage Conditioner Product Septiox (Ferric Nitrate) is carried out at the discharge pumping station.

## 4 LEACHATE TREATMENT

The leachate being generated at Corranure Landfill is being sent to Cavan WwTP for treatment via the rising main.

Significant upgrading works have been recently undertaken at the Cavan WwTP with a view to improving performance and achieving necessary effluent standards. The works are currently being commissioned and include improvements to the aeration stage which consists of 4 no. 545m<sup>3</sup> tanks. Before these works were undertaken only two of the four aeration tanks were in service. All four tanks have been recommissioned as part of the upgrade works.

In the assessment of the upgrade works to the WWTP account was taken of the leachate loading from Corranure Landfill and a comprehensive flow and load survey was undertaken at the WWTP.

The upgrade works at the WWTP provides the off site treatment capacity for leachate pumped from the landfill to the sewer system. The existing PE at the WWTP is 9,850 while the plant has a design capacity of 21,000 PE.

The new leachate rising main from the landfill has also been commissioned which will allow a continuous discharge of leachate into the WWTP and prevent high loadings at irregular intervals which previously occurred when tankering of leachate was being employed during the construction phase of the rising main.

The characteristics/quantity of leachate including for Cells 3 and 4 at peak leachate generation stage as outlined in the EIS which was submitted with the Waste Licence Review Application for Corranure Landfill (March 2003) will be as follows:

$$Q = 0.8 \text{ l/s} = 68 \text{ m}^3/\text{day}$$

$$\text{BOO} = 347 \text{ kg/d}$$

$$\text{COD} = 434 \text{ kg/d}$$

PE of leachate loading:	302 PE volume
	5,783 PE BOO

The WWTP is required to comply with the Urban Wastewater Treatment Regulations and the relevant water quality standards in the Cavan River.

There is potential to use Cootehil1 WWTP as an alternative facility for the treatment of leachate removed from Corranure Landfil1. Alternatively tankering of leachate can be accommodated in the event of the current pumping system via the rising main being in-operational. This is outlined in the Emergency Leachate Procedure contained in the Operations Plan.

*For inspection purposes only.  
Consent of copyright owner required for any other use.*



## 5 MONITORING

A Leachate Monitoring Programme is in place at Corranure Landfill in compliance with Schedule D of the Waste Licence. Drawing DG0055-01 shows the leachate monitoring locations. For leachate quality a sample is taken from the leachate storage tank on an annual basis.

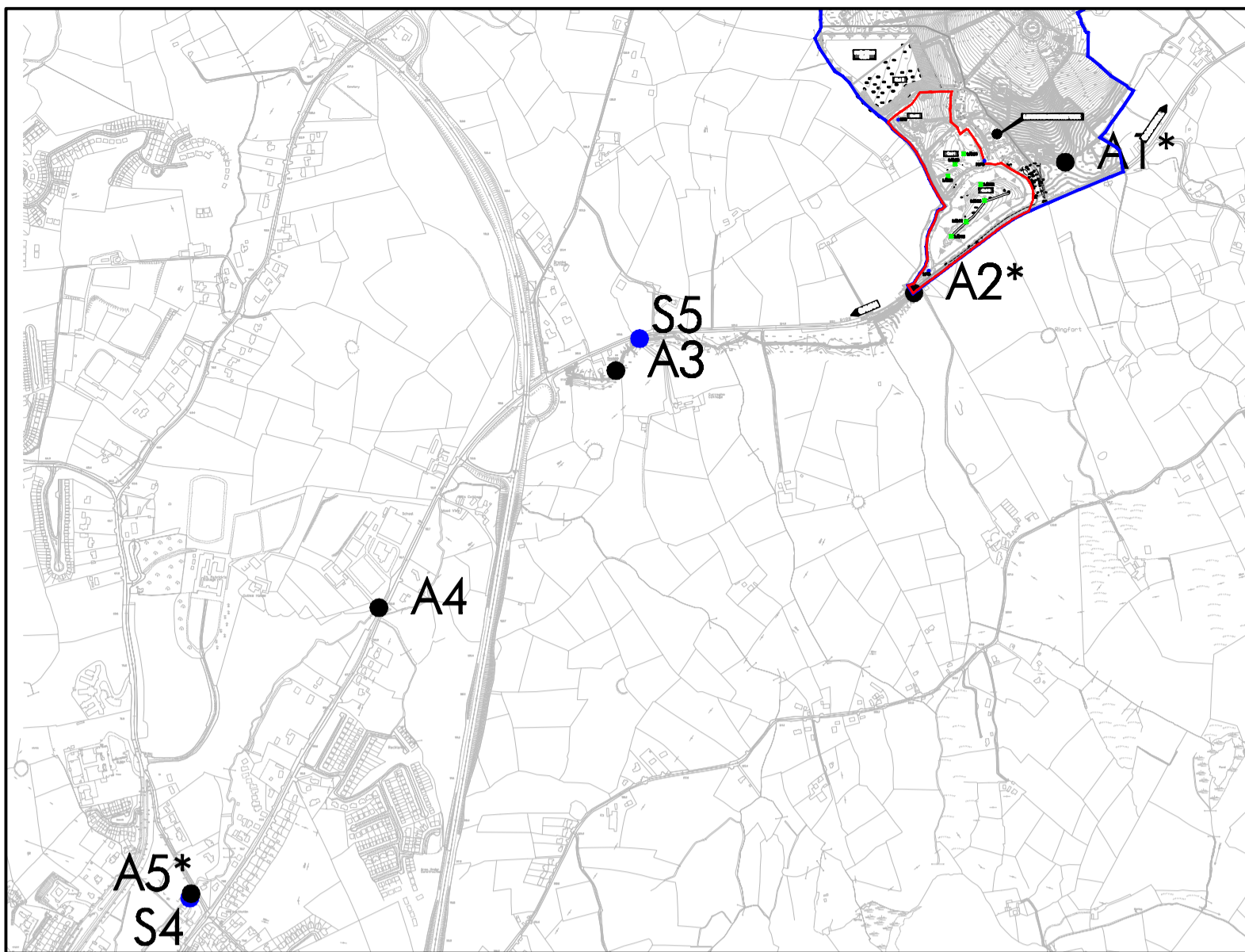
The leachate level has to be monitored continuously within the waste to monitor compliance with condition 5.11.1 of the Waste Licence which states: "that leachate levels in the waste shall not exceed a level of 1m over the top of the liner at the base of the landfill". The leachate level is measured continuously and leachate wells (LG03, LG04, LG11, LG13, LG20, LG21 and LG24) and leachate collection sumps (LP2, LPO and FLP3) are connected to the telemetry system in Cells 0, 1 and 2.

Table 5.1: Leachate Monitoring Programme

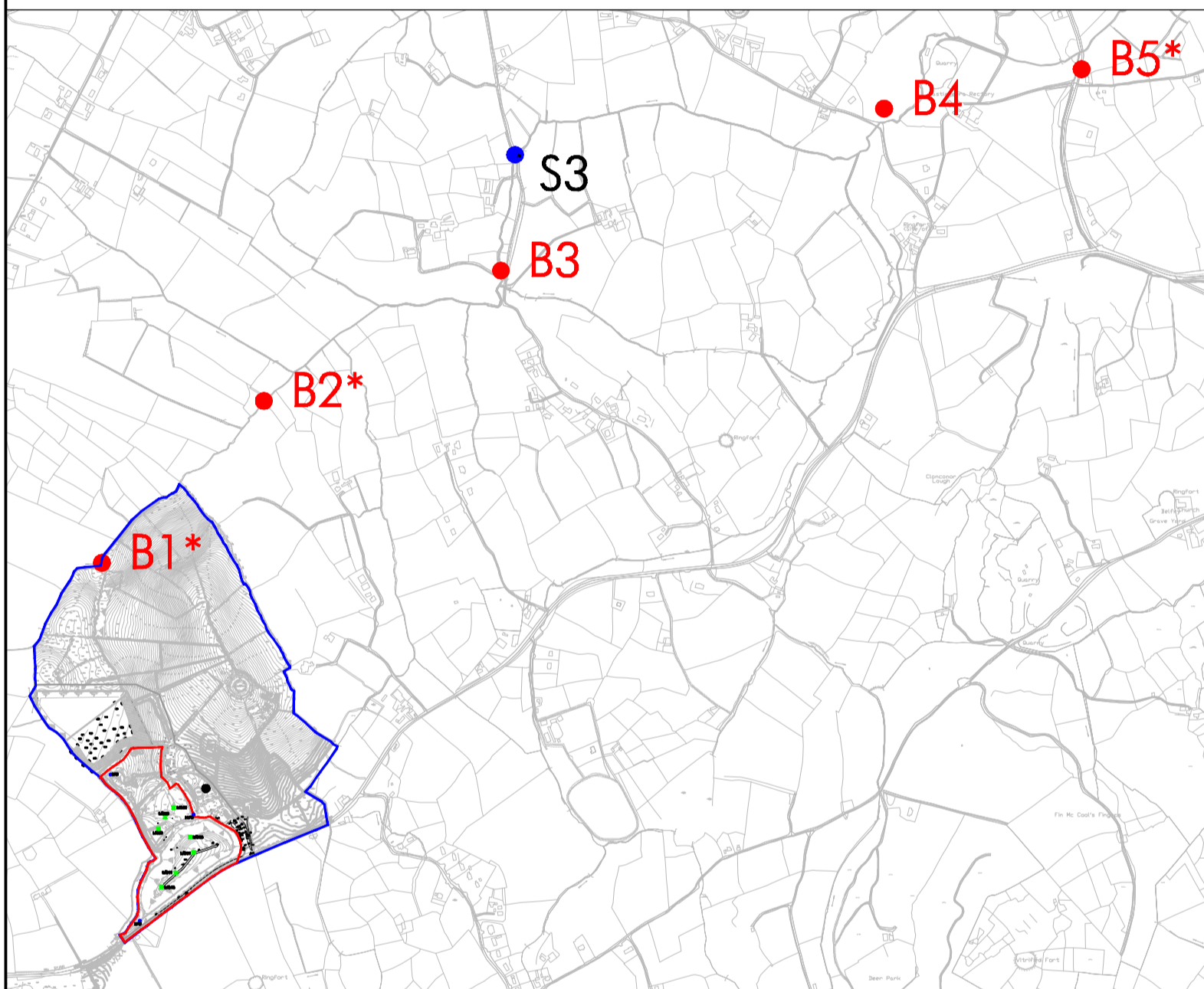
Parameter	Monitoring Frequency
Visual Inspection/Odour	Quarterly
Leachate level	Continuous
Ammoniacal Nitrogen	Annual!
BOD	Annual!
COD	Annual!
Chloride	Annual!
Electrical Conductivity	Annual!
pH	Annual!
Metals/non metals	Annual!
Cyanide (total)	Annual!
Flouride	Annual!
List I/II organics	Once off
Mercury	Annual!
Sulphate	Annual!
Total P/orthophosphate	Annual!
Total Oxidised Nitrogen	Annual!

there is evident gross contamination by leachate, additional samples will be required.

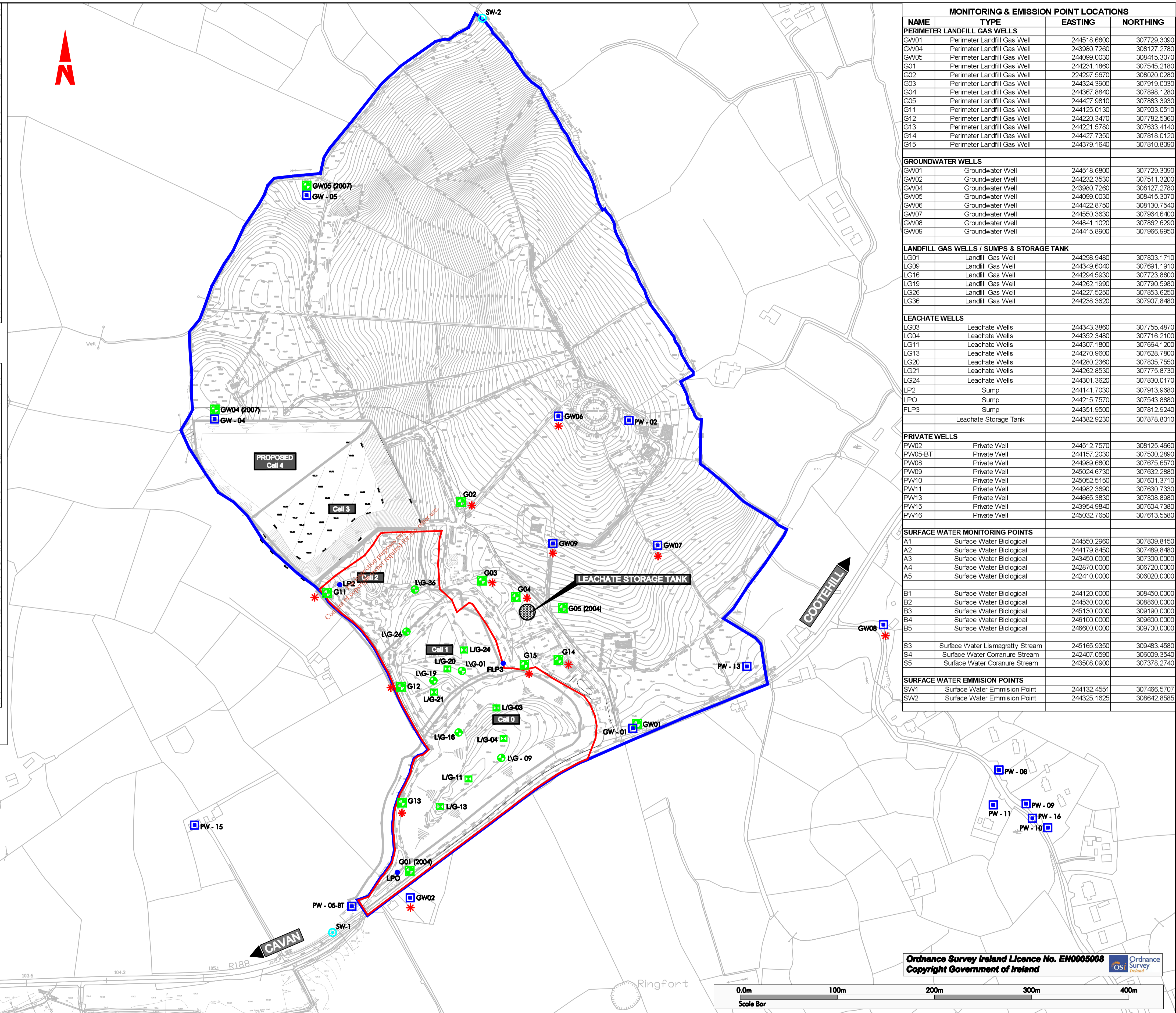




Surface Water Monitoring Points (Corranure Stream)  
Not to Scale



Surface Water Monitoring Points (Lismagraty Stream)  
Not to Scale



MONITORING & EMISSION POINT LOCATIONS			
NAME	TYPE	EASTING	NORTHING
<b>PERIMETER LANDFILL GAS WELLS</b>			
GW01	Perimeter Landfill Gas Well	244518.6800	307729.3090
GW04	Perimeter Landfill Gas Well	243980.7260	308127.2780
GW05	Perimeter Landfill Gas Well	244099.0030	308415.3070
G01	Perimeter Landfill Gas Well	244231.1860	307545.2180
G02	Perimeter Landfill Gas Well	224297.5670	308020.0280
G03	Perimeter Landfill Gas Well	244324.3900	307919.0030
G04	Perimeter Landfill Gas Well	244367.8840	307898.1280
G05	Perimeter Landfill Gas Well	244427.9810	307883.3930
G11	Perimeter Landfill Gas Well	244125.0130	307903.0510
G12	Perimeter Landfill Gas Well	244220.3470	307822.6360
G13	Perimeter Landfill Gas Well	244221.5780	307633.4140
G14	Perimeter Landfill Gas Well	244427.7350	307818.0120
G15	Perimeter Landfill Gas Well	244379.1640	307810.8000
<b>GROUNDWATER WELLS</b>			
GW01	Groundwater Well	244518.6800	307729.3090
GW02	Groundwater Well	244232.3530	307511.3200
GW04	Groundwater Well	243980.7260	308127.2780
GW05	Groundwater Well	244099.0030	308415.3070
GW06	Groundwater Well	244422.8750	308130.7540
GW07	Groundwater Well	244550.3630	307964.6400
GW08	Groundwater Well	244841.1020	307852.6280
GW09	Groundwater Well	244415.6800	307966.9650
<b>LANDFILL GAS WELLS / SUMPS &amp; STORAGE TANK</b>			
LG01	Landfill Gas Well	244298.9480	307803.1710
LG09	Landfill Gas Well	244349.6040	307891.1910
LG16	Landfill Gas Well	244294.5930	307723.8600
LG19	Landfill Gas Well	244262.1990	307790.5960
LG26	Landfill Gas Well	244227.5250	307853.6250
LG36	Landfill Gas Well	244238.3620	307907.8480
<b>LEACHATE WELLS</b>			
LG03	Leachate Wells	244343.3860	307755.4870
LG04	Leachate Wells	244352.3480	307716.2100
LG11	Leachate Wells	244307.1800	307664.1200
LG13	Leachate Wells	244270.9600	307628.7800
LG20	Leachate Wells	244280.2360	307805.7550
LG21	Leachate Wells	244262.8530	307775.8730
LG24	Leachate Wells	244301.3620	307830.0170
LP2	Sump	244141.7030	307913.9680
LPO	Sump	244215.7570	307543.8860
FLP3	Sump	244351.9500	307812.9240
	Leachate Storage Tank	244382.9230	307878.8010
<b>PRIVATE WELLS</b>			
PW02	Private Well	244512.7570	308125.4660
PW05-BT	Private Well	244157.2030	307500.2890
PW08	Private Well	244969.6800	307675.6570
PW09	Private Well	245024.6730	307632.2880
PW10	Private Well	245052.5150	307801.3710
PW11	Private Well	244982.3690	307630.7330
PW13	Private Well	244665.3830	307808.6980
PW15	Private Well	243954.9840	307804.7380
PW16	Private Well	245032.7650	307813.5580
<b>SURFACE WATER MONITORING POINTS</b>			
A1	Surface Water Biological	244560.2690	307809.8150
A2	Surface Water Biological	244179.8450	307489.8480
A3	Surface Water Biological	243450.0000	307300.0000
A4	Surface Water Biological	242870.0000	306720.0000
A5	Surface Water Biological	242410.0000	306020.0000
B1	Surface Water Biological	244120.0000	308450.0000
B2	Surface Water Biological	244530.0000	308860.0000
B3	Surface Water Biological	245130.0000	309190.0000
B4	Surface Water Biological	246100.0000	309600.0000
B5	Surface Water Biological	246600.0000	309700.0000
S3	Surface Water Lismagraty Stream	245165.9350	309483.4580
S4	Surface Water Corranure Stream	242407.0590	306009.3540
S5	Surface Water Corranure Stream	243508.0900	307378.2740
<b>SURFACE WATER EMISSION POINTS</b>			
SV1	Surface Water Emission Point	244132.4551	307486.5707
SV2	Surface Water Emission Point	244325.1625	308842.8585

**LEGEND:**

Landowner Boundary	Surface Water Emission Point
Waste Licence Boundary	Ground Water Well / Private Well
Perimeter Landfill Gas Well	Landfill Gas Well within Waste Licence Boundary
Leachate Well	Surface Water Monitoring Point
Proposed	

**NOTES**

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

No.	Date	By	App	Amendment / Issue
F01	09.09.08	JMcG		Final Issue

Client  
**CAVAN COUNTY COUNCIL**

Drawn By: J.McG.  
Checked By:  
Approved By:  
Date: Sept. '08

**RPS** Lymm Building, IDA Business & Technology Park, Mervue, Galway  
T: +353 91 534100  
F: +353 91 534199  
W: www.rpsgroup.com/ireland  
E: ireland@rpsgroup.com

Project: **CORRANURE LANDFILL - WASTE LICENCE REVIEW APPLICATION**

Drawing Status: Final  
Scale / Sheet Size: 1:2500 @ A1, 1:5000 @ A3

Drawing Number: **DG0055/01**  
Rev: **F01**

Title: **EMISSION & MONITORING POINT LOCATIONS**

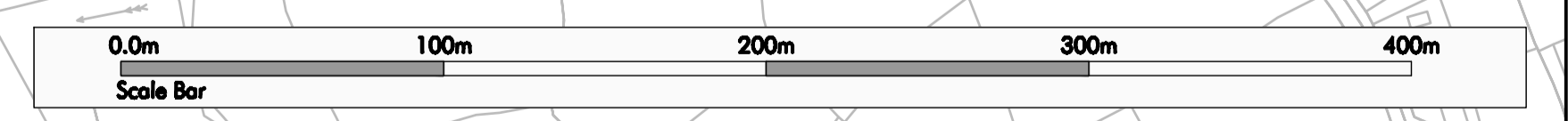


**Cavan County Council**  
Comhairle Chontae an Chabháin

F. Gibbons  
Director of Services,  
Cavan County Council  
Courthouse,  
Cavan.  
Tel: (049) 4331799 Fax: (049) 4361516



Ordnance Survey Ireland Licence No. EN0005008  
Copyright Government of Ireland





## 6 MAINTENANCE

Regular inspection of the leachate abstraction system is required including a weekly checking of boreholes and a visual inspection for damage or blockage. Regular maintenance of pumps and checking of control systems is also required. The Operations and Maintenance Manuals for the leachate pumping system should be consulted for further details.

*For inspection purposes only.  
Consent of copyright owner required for any other use.*