

# CHURCHTOWN WASTE LICENCE REVIEW

## Operational Report

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Final  
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## REPORT

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Donal Doyle

14 February 2024

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# 1 INTRODUCTION

This Operational Report has been prepared as part of the licence review application. Donegal County Council holds Waste Licence ref. W0062-02 for Churchtown Landfill Site. The site closed on 31st August 2000. The landfill facility at Churchtown occupies an area of approximately 9.7 hectares in the townland of Churchtown, near Lifford, Co. Donegal. The site is located approximately 3km south west of Lifford and bordered to the northwest by the N15, the main Lifford to Ballybofey Road. The ground to the northeast and southwest of the site is the low lying and gently undulating flood plain of the River Finn both areas being used for grazing. The southeastern boundary is formed by the River Finn. Site Location and Layout are shown on Drawings IBR1455/100 and IBR1455/103.

A willow bed and an Integrated Constructed Wetland (ICW) has been installed on top of the landfill. There are two separate ICW systems; ICW Area A and ICW Area B (denoted Ponds 1A-5A and Ponds 1B-5B in the drawings respectively). Due to the layout and location of the willow bed the volume of leachate is split between the two ICW areas. The volume of leachate to be treated through each ICW is relative to the treatment area within each ICW system.

## 1.1 Waste Activities Carried Out At The Facility

The classes of activity concerned are specified in the Third Schedule of the Waste Management Act, 1996, as amended:-

Third schedule of waste management acts 1996 to 2011 disposal operations

D 1 Deposit into or on to land (e.g. landfill, etc.)

D 4 Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)

D 15 Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection,

## 2 ON THE SITE WHERE THE WASTE IS PRODUCED.PROCESS DESCRIPTION (ICW)

Leachate is pumped from the site to the ICW for treatment prior to discharge to the River Finn.

### 2.1 Leachate Management

#### 2.1.1 Leachate Extraction

Leachate is extracted from 3 No. Pumping stations (Sump 1, 2 and 3) on site. A common 90mm HDPE leachate pumping main has been laid through the full length of the site within an existing site access road as shown on Drawing IBR1455/103. Sumps 1, 2 and 3 are connected to the 90mm pumping main adjacent to each extraction point.

### 2.2 Integrated Constructed Wetland Treatment (ICW's)

Wetlands both natural and constructed have an innate ability to cleanse water through physical, chemical and biological processes. The main treatment processes include;

- Uptake and transformation of contaminants/nutrients by micro-organisms and plants,
- Breakdown and transformation of contaminants/pollutants by micro-organisms and plants,
- Filtration and chemical precipitation through contact with substrate and plant litter,
- Settling of suspended particular matter,
- Chemical transformation of pollutants,
- Absorption and ion exchange on the surface of plants, sediment, and litter (of particular relevance to the capture and storage of phosphorous),
- Predation and natural die-off of pathogens (e.g. E. coli and Cryptosporidium).

#### 2.2.1 Treatment System

The Willow Plantation (area is approx. 400m long with widths varying from 50m – 70m) is divided into four zones with two main irrigation feed points each located centrally between Zone 1 and 2 and Zone 3 and 4. The connection to willow plantations is via 80mm leachate pumping main via an isolating valve, a strainer and a Flowmeter. The Willows are planted in double rows. Each ICW pond is bunded using imported subsoil material that provides containment and processing of the influent contaminated waters. Each pond is comprised of a dense vegetation cover and shallow water depth (100-200mm). The base area of each pond is level, with a level difference occurring from one pond to the next. Gravity flow is provided through the system from Pond 1 to the outlet of Pond 5. Each pond is connected by means of 150mm diameter inter-connecting pipes. The pipes are placed at the bottom of the pond floor and water levels can be managed within each pond by adjusting bends on the outlet pipe of each pond. The irrigation distribution system, flowmeters, flow analyser and motorised valves are contained within 3.0m diameter precast concrete chambers. The primary treatment option for the extracted leachate is to the willow plantation. Leachate is pumped to the willow plantation before discharge to surface water. If treated leachate levels are unacceptably elevated, the leachate is treated further by circulating via the ICW's before discharging to surface water.

##### 2.2.1.1 Willow Plantation Treatment Process

The Willow plantation is supplied with leachate on a timed basis (Currently applied 5am and 5pm daily to Zone 1 and 2 and Zone 3 and 4). A number of factors dictate leachate treatment and application rates within Willow Plantation and are as follows:

1. Precipitation.
2. Temperature
3. Visual inspection manual intervention.

A rainfall meter and temperature probe have been installed to enact the controls required of the leachate dosing system to the Willow Plantation zones and ICW's. Temperature, precipitation and trigger levels have been set to allow for activation and deactivation of leachate pumping and dosing to Willow Irrigation zones and ICW's accordingly. The max daily flow to date to the willow is 15m<sup>3</sup> to Zone 1 and 2 and 15 m<sup>3</sup> to Zone 3 and 4. A system main pressure is maintained to allow for sufficient treatment via the irrigation laterals installation. The two outlets from the Willow plantation are being monitored by Ammonia analysers and flowmeters and recorded on the SCADA system. When any sample reaches a limit of 3 mg/l ammonia, a motorised valve will shut and divert flow via gravity into the nearest pumping station chamber (No1 or 2 ) for recirculation in the willow plantation. This scenario shall continue until sample has reached acceptable limits. Collected runoff effluent meeting the required parameters is discharged to adjacent surface water drains as shown on the drawings. All values are recorded, alarmed and trended on the SCADA system. Discharge flow from each monitoring chamber is recorded and monitored including leachate applied to the treatment zones, treated flows to surface water drains and flows redirected back to the system for re-distribution and additional treatment.

### 2.2.1.2 ICW Treatment Process

Flow of leachate to ICW's is controlled on the pumping main with an actuated valve within a precast concrete chamber along with flow measurements via flow meter. Flow of leachate to ICW's is via a weir chamber and flow split on a 60 / 40 percentage basis relative to their areas (60% to A series pond and remaining 40% to B series ponds).

The max volume of leachate pumped from below the Churchtown landfill to ICW's is c. 50m<sup>3</sup>/day. The leachate flows is split between ICW area A and ICW area B with ICW Area A receiving 2/3 of the flow (c. 33m<sup>3</sup>/day) and ICW Area B receiving 1/3 of the flows (c.17m<sup>3</sup>/day).

Where leachate is available over and above the treatment capacity of the willow plantation (either through seasonal increases in leachate generation, wet/frosty weather conditions or manual operator intervention) leachate can be diverted to the ICWs as a secondary alternative. The system also allow the site operator to intervene and permit periodic irrigation of the ICWs when sufficient leachate is available during dry weather which would ordinarily be applied to the willow plantation in order to maintain the ICWs.

Should the treatment capacity of both the willow plantation and ICWs be reached in any given 24 hour period leachate abstraction and circulation within the site is stopped until conditions allow treatments to recommence.

The SCADA system monitors all site equipment and run the entire plant automatically. The leachate pumping main is controlled at different pressures depending what it is supplying, either ICW's or Willow Plantation irrigation system. Table 2.1 provides the control of emission to water (existing and proposed).

**Table 2-1 Control of emission to Water (existing and proposed)**

Control Parameter	Monitoring	Key Equipment	Proposed Monitoring
<b>As per licence W0062-02</b>			
Flow and flow patterns	Continuous for discharge flow and flow between ponds and in the willow bed. Daily visual inspection for flow and flow patterns in the ponds and willow bed	Flow Regulators , flow meters , shut off valve at discharge. Pond isolation valves	Site is unmanned and inspection are undertaken during routine monitoring (at least quarterly)
Bank inspections , water depth , turbidity in final segments	Discharge to SW Channel from ICW	Visual Inspection and appropriate measuring	No Change

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Control Parameter	Monitoring	Key Equipment	Proposed Monitoring
Sediment depth, vegetation and invertebrate monitoring	Quarterly	Visual Inspection and appropriate measuring/monitoring equipment	No Change Visual Inspection. Invertebrate monitoring annually
Sediment composition : heavy metals	Biannually for two years and once every three years thereafter . prior to sediment removal	Appropriate sampling equipment	Annually then three years Thereafter. As agreed with OEE LR063072 (13/12/2021)

### 2.2.1.2.1 Discharge rates

Discharge rates from the ICW systems will be variable depending on the volumes to be treated and on climatic conditions. With higher rates of discharge during the winter months and reduce or no discharges during the summer months.

### 2.2.1.2.2 Wetland planting

The plant species used in the ICW ponds is that similar to other ICW systems and which are native to the region, these include *Carex riparia*, *Typha latifolia*, *Typha angustifolia*, *Glyceria maxima* and *Iris pseudacorus*. Other plant species were used to enhance the biodiversity and habitat potential of the site, both on within the ponds and along the embankments. Planting on embankments was done so as not to restrict access. The wetland planting density is as follows:

- Pond 1A and 1B: 3 plants per 2m<sup>2</sup>,
- Pond 2A-5A & 2B-5B: 1 plant per m<sup>2</sup>.

### 3 OPERATION AND MAINTENANCE

ICWs are designed to be as self-maintaining and as self-operable as possible. The main maintenance procedures are as follows:

1. Water level management and flow maintenance – Maintain an operational water level of ~100-200mm. Overtime there will be a build up of vegetation and sediment in the cells, which will require the outlet pipes to be adjusted to maintain appropriate water depths.
2. Vegetation monitoring and maintenance – The vegetation in the wetland cells should be assessed regularly to ensure they are well. Vegetation, especially grassed areas, around the wetland cells should be maintained to provide for easy and safe access for monitoring and maintenance.
3. Maintenance of access – fences, gates and access routes should be maintained to ensure safe and easy access is maintained, while also restricting access for livestock.
4. Maintenance of inlet and outlet pipes – The area around the inlet and outlet pipes should be kept clear so that flows between cells are maintained and that vegetation or sediments do not build up in or around the pipework.
5. Sediment/sludge management – Overtime there will be a build up of sediment in the wetland cells, which will need to be cleaned out to maintain the proper functionality of the ICW.

Desludging is dependent on the cell No, cell area, and influent loading. The initial wet-land cell will require cleaning out first, however this is not expected for at least 5-10 years. Sediment build up in the wetland will include metals accumulated. Sediment will be removed from the ponds as required when the pool volume has become reduced significantly or the ponds have become eutrophic. The management of sludge will depend on the contamination concentrations and the proposed reuse or disposal.



## 4 EMISSIONS FROM ICW

### 4.1.1 Emission to Water

Treated leachate from the SRC Willow and ICW discharges to the River Finn. Emissions to water are monitored at 4 locations as per Schedule C.2.2 Monitoring of emissions to water of the waste licence and provided in Table 4.1 below. The monitoring frequency for control parameters for emissions to water as per Schedule C.2.2 has been reduced and is now quarterly and annually for metals and organic compounds as agreed with OEE (Table 4.2). Samples are taken using standard method (Grab sample).

**Table 4-1 Monitoring Of Emissions To Water Grid Co Ordinates**

Station Purpose	Station Name	Description	Easting	Northing
Emission to Water	D1	Discharge to SW Channel from SRC Willow	230908.08	395942.73
Emission to Water	D2	Discharge to SW Channel from ICW	231076.62	231076.62
Emission to Water	D3	Discharge to SW Channel from SRC Willow	231069.70	395759.63
Emission to Water	D4	Discharge to SW Channel from ICW	231172.31	395897.03

**Table 4-2 Monitoring Of Emissions To Water**

Monitoring Of Emissions To Water	As per licence W0062-02	As agreed with OEE LR063072
Control Parameter	Monitoring Frequency	Frequencies as amended
Flow	Continuous	Quarterly
Temperature	Continuous	Quarterly
Visual Inspection/Odour	Daily	Weekly
Electrical Conductivity	Continuous	Quarterly
pH	Continuous	Quarterly
TOC	Continuous	Quarterly
Ammonia (as N)	Continuous	Quarterly
COD	Weekly	Quarterly
BOD	Weekly	Quarterly
Suspended Solids	Weekly	Quarterly
Total Dissolved Solids	Weekly	Quarterly
Dissolved Oxygen	Weekly	Quarterly
Orthophosphate (as P)	Weekly	Quarterly
Total Phosphorous	Weekly	Quarterly
Nitrates (as N)	Weekly	Quarterly
Nitrites	Weekly	Quarterly
Metals	Weekly	Annual
Ammoniacal Nitrogen	Monthly	Annual
Chloride	Monthly	Annual
Sulphate	Monthly	Annual
Phenols	Monthly	Annual
Organic Compounds	Monthly	Annual

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Monitoring Of Emissions To Water	As per licence W0062-02	As agreed with OEE LR063072
Total Alkalinity	Monthly	Annual
Toxicity	As may be required	As may be required

The maximum volume to be emitted in any one day is 136 m<sup>3</sup>(combined volume from D1 to D4) as per Schedule B.2.

The current Emission Limit Values(ELV) for D1 to D4 as per Schedule B.2 are provided in Table 4-3. The proposed ELV are subject to waste licence review.

**Table 4-3 Existing and Proposed Emission Limit Values**

Parameter	Emission Limit Value	Proposed Emission Limit Value
	Existing	Proposed
Temperature	25 °C (Max)	25 °C (Max)
pH	6-9	6-9
BOD	25 mg/l	25 mg/l
COD	125 mg/l	125 mg/l
Suspended Solids	25 mg/l	25 mg/l
Ammonia (as N)	3 mg/l	3 mg/l
Orthophosphate (as P)	2 mg/l	2 mg/l
Phenols	46 µg/l	46 µg/l
Cadmium	0.08 µg/l	2.4 µg/l
Chromium	50 µg/l	100 µg/l
Copper	5 µg/l	125 µg/l
Lead	1.2 µg/l	30 µg/l
Zinc	8 µg/l	200 µg/l
Nickel	4 µg/l	100 µg/l
Mercury	0.07 µg/l	2 µg/l

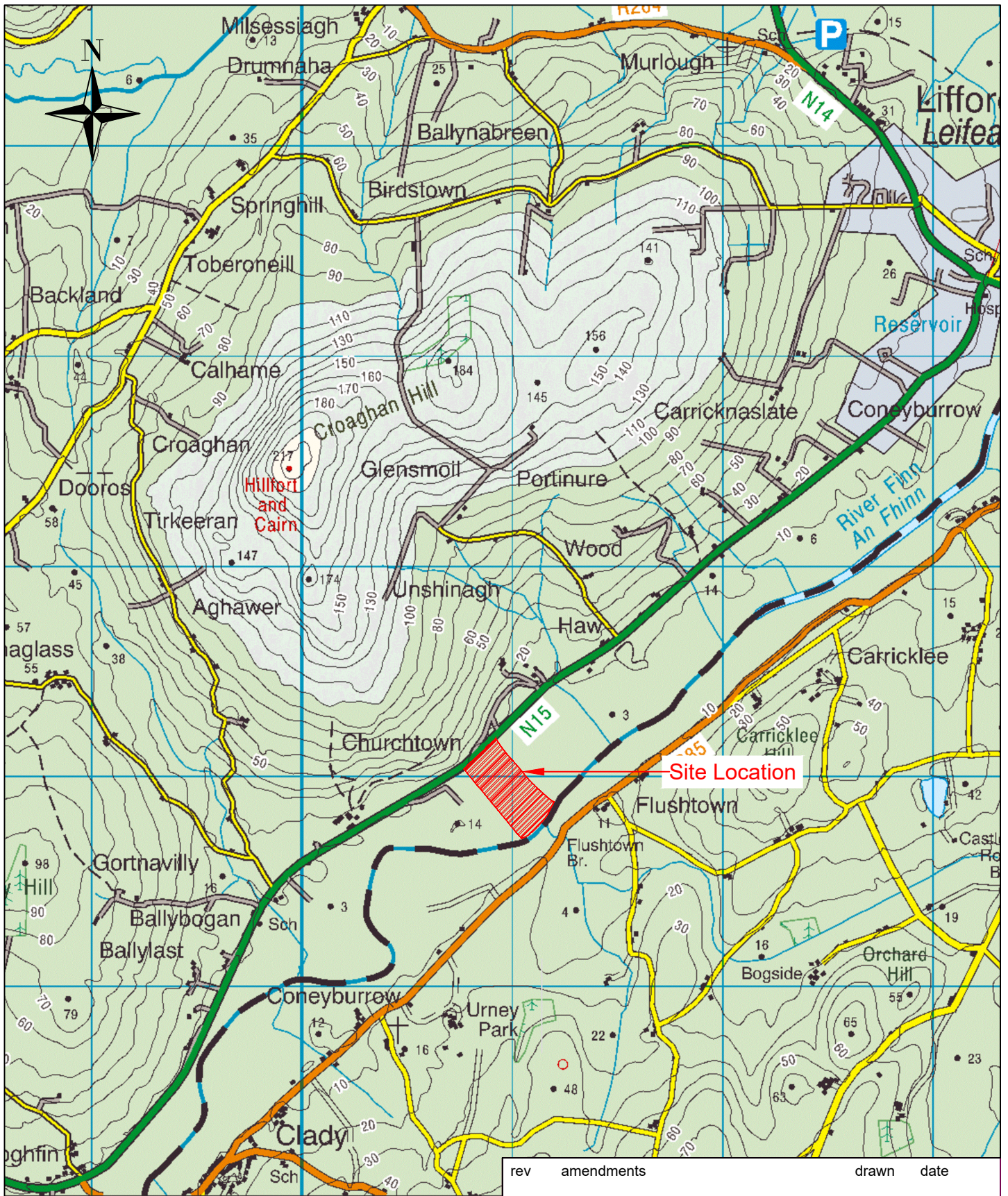
## 5 EMERGENCY RESPONSE PROCEDURES

Emergency situations are identified as follows;

- Fire,
- Landfill Gas Migration,
- Plant breakdown,
- Significant spillages,
- Accident or injury.

Emergency response procedures have been developed on site and are contained in the Environmental Manual. These include emergency telephone numbers.

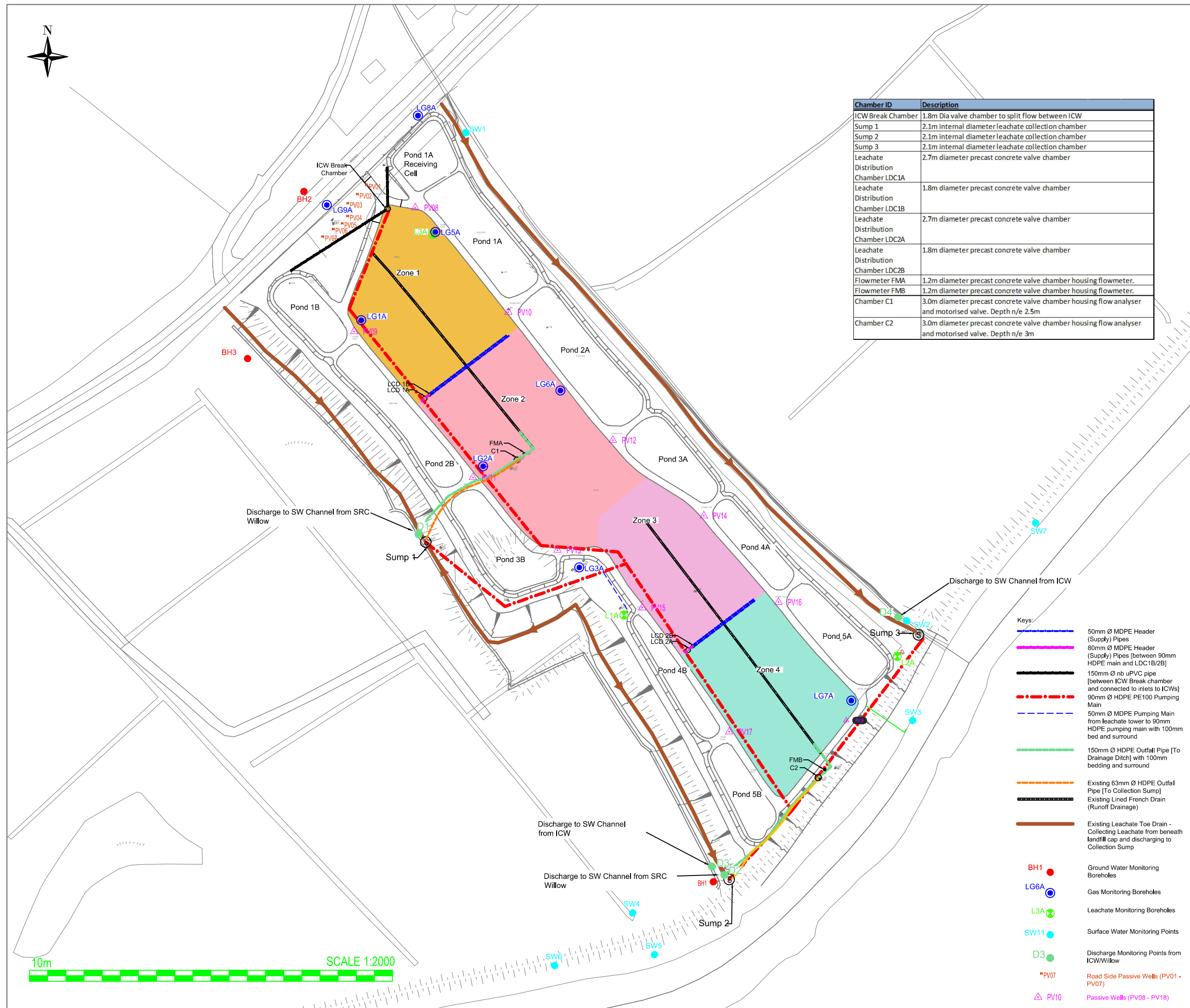
# Appendix A Drawings



rev	amendments	drawn	date

 <p><b>rps</b> A TETRA TECH COMPANY</p>	<p>Elmwood House T +44 (0) 28 90 667914          74 Boucher Road F +44 (0) 28 90 668286          Belfast W <a href="http://www.rpsgroup.com/ireland">www.rpsgroup.com/ireland</a>          BT12 6RZ E <a href="mailto:ireland@rpsgroup.com">ireland@rpsgroup.com</a></p>		<p>Drawing Number</p> <p style="text-align: center;"><b>IBR1455/100</b></p>		<p>Rev</p> <p style="text-align: center;">-</p>		
	<p>Client</p> <p style="text-align: center;"><b>Donegal County Council</b></p>		<p>Title</p> <p style="text-align: center;"><b>Churchtown Landfill Site Site Location Plan</b></p>		<p>Project</p> <p style="text-align: center;"><b>Churchtown Waste Licence Review</b></p>		
Project No.	Sheet Size	Drawing Scale	Drawing Status	Drawn By	Checked By	Approved By	Date
IBR1455	A4	1-50,000	Prelim	JC	AMcG	DD	22-08-23





Chamber ID	Description
ICW Break Chamber	1.8m Dia valve chamber to split flow between ICW
Sump 1	2.1m internal diameter leachate collection chamber
Sump 2	2.1m internal diameter leachate collection chamber
Sump 3	2.1m internal diameter leachate collection chamber
Leachate Distribution Chamber LDC1A	2.7m diameter precast concrete valve chamber
Leachate Distribution Chamber LDC1B	1.8m diameter precast concrete valve chamber
Leachate Distribution Chamber LDC2A	2.7m diameter precast concrete valve chamber
Leachate Distribution Chamber LDC2B	1.8m diameter precast concrete valve chamber
Flowmeter FMA	1.2m diameter precast concrete valve chamber housing flowmeter.
Flowmeter FMB	1.2m diameter precast concrete valve chamber housing flowmeter.
Chamber C1	3.0m diameter precast concrete valve chamber housing flow analyser and motorised valve. Depth n/e 2.5m
Chamber C2	3.0m diameter precast concrete valve chamber housing flow analyser and motorised valve. Depth n/e 3m

- Keys:**
- 50mm Ø MDPE Header (Supply) Pipes
  - 80mm Ø MDPE Header (Supply) Pipes (between 90mm HDPE main and LDC1B/2B)
  - 150mm Ø nb uPVC pipe (between ICW Break chamber and connected to inlets to ICWs)
  - 90mm Ø HDPE PE100 Pumping Main
  - 50mm Ø MDPE Pumping Main from leachate tower to 90mm HDPE pumping main with 100mm bed and surround
  - 150mm Ø HDPE Outfall Pipe [To Drainage Ditch] with 100mm bedding and surround
  - Existing 63mm Ø HDPE Outfall Pipe [To Collection Sump]
  - Existing Lined French Drain (Runoff Drainage)
  - Existing Leachate Toe Drain - Collecting Leachate from beneath landfill cap and discharging to Collection Sump
- BH1 Ground Water Monitoring Boreholes
  - LG6A Gas Monitoring Boreholes
  - L3A Leachate Monitoring Boreholes
  - SW11 Surface Water Monitoring Points
  - D3 Discharge Monitoring Points from ICW/Willow
  - \*PV07 Road Side Passive Wells (PV01 - PV07)
  - PV10 Passive Wells (PV08 - PV18)

**NOTES**

- Verifying Dimensions.  
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
- Existing Services.  
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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**Project**  
 Churchtown Waste Licence Review

**Title**  
 Churchtown Landfill Site  
 Leachate System

Project Number	Sheet Size	Drawing Scale
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**Drawing Number**  
 IBR1455/103

Drawn By	Status	Revision
JC	Prelim	-

Checked By	Approved By	Date
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