ATTACHMENT 4.7 BAT

1.1 Describe how best available techniques (BAT) that will be used to prevent or eliminate or, where that is not practicable, to limit, abate or reduce an emission from the activity concerned

1.1.1 Best available techniques for landfill activities

Donegal County Council employ BAT to limit, abate or reduce an emission from the activity concerned where applicable. As previously stated, the site is closed. The site is unlined but has been restored with a cap and leachate treatment system (Willow and ICW). Specified Engineering Work (SEW) for these restoration works was submitted and agreed with the Agency in 2014 with works completed in 2016. For those processes and emissions as per current waste licence are as follows:

1.1.1.1 Process Gas Emissions

In accordance with BAT Guidance Notes for the Waste Sector: Landfill Activities BAT for emissions to air is to:

- *Pre-treat waste to remove/reduce biodegradables.*
- *Selection of appropriate cell sizes.*
- *Maintenance of negative air pressure in the landfill gas extraction wells.*
- *Use of horizontal and vertical gas extraction wells.*
- *Use of appropriate materials for temporary cover, interim and final capping.*
- *Regular monitoring of landfill extraction well field, balancing of wells and elimination of non-design condensate traps.*
- *Use of horizontal landfill gas collection pipework at the top of the side wall riser (beneath cap).*
- *Provide landfill gas management systems,*
- *Control the combustion conditions of enclosed flares, in terms of the carbon monoxide concentration, temperature and retention time by ensuring that combustion occurs at 1,000°C with a product retention time of 0.3 seconds within the combustion zone.*

The existing landfill was capped with a permanent low permeability clay liner in conjunction with a willow and reed plantation and constructed wetland installed in 2014-2015. A 0.15 to 0.45 metre thick topsoil and 0.5 m clay cap with a permeability of 1x10-8 m/s was installed at the facility. The willow plantation in situated in the centre and above the capped waste (Zones 1 to 4) with a series of constructed wetlands along western and eastern side of willow plantation (Drawing IBR1455/103). The site has been capped and landfill gas is managed on site through 18 passive landfill gas vents which are shown on Drawing IBR1455/105 as agreed with OEE.

1.1.1.2 Discharges To Water

1.1.1.2.1 Discharges to Surface Water

In accordance with BAT Guidance Notes for the Waste Sector: Landfill Activities BAT for discharges to surface water is :

- *Only roof-water and water from undisturbed unpaved areas (not in landfill footprint and not used for the handling or storage of waste) are appropriate for direct discharge to surface waters.*
- *No untreated trade effluent shall be discharged direct to surface water.*

- *Other surface water discharges must as a minimum be passed through an interceptor (I.S. EN 858-2:2003 Part 2), or in the case of construction areas where solids can build up in storm water runoff, they may be discharged through settlement lagoons or reed bed systems.*
- *The provision of infrastructure to allow for isolation and monitoring of surface water discharges.*
- *The management and control techniques listed in Section 4.4.4.*

All storm water from the on top of the site is collected as part of the willow/ICW treatment system. Two existing field drains run along the eastern and western boundaries of the site. Collected runoff effluent meeting the required parameters from the willow bed and two separate ICWs is discharged to adjacent surface water drains as shown on the Drawing No IBR1455/104.

1.1.1.2.2 Discharges to Sewer

In accordance with BAT Guidance Notes for the Waste Sector: Landfill Activities BAT for discharges to sewer is :

- *Final effluent quality must meet standards set by the receiving Water Services Authority, to adequately treat the wastewaters it receives, or the Agency. The Agency may apply more stringent ELVs than those suggested by the Water Services Authority if it so considers. The Urban Wastewater Treatment Regulations specify discharge quality parameters to prevent significant discharges of harmful substances.*

There are no discharge points to sewer in the current waste licence.

1.1.1.2.1 Leachate Effluent

Discharge from leachate treatment plants may enter either surface watercourses or sewers or be recirculated in lined cells at the landfill. BAT is to control leachate effluent using the management and control techniques as outlined below.

In accordance with BAT Guidance Notes for the Waste Sector: Landfill Activities BAT for management of leachate is as follows;

Management Techniques

- *The active fill area should be kept as small as practicable, with maximum of 25 metres x 25 metres (width x length) and slope of 1:3, unless where specifically agreed by the Agency.*
- *The use of good compaction, and daily and intermediate cover to reduce the level of water infiltration and hence the quantity/quality of leachate produced.*
- *The applicant should put in place procedures to ensure that the capping system is not damaged by the placement of the soil restoration layers or the construction of environmental control systems, e.g., landfill gas or leachate pipework and associated manholes.*
- *Leachate Recirculation. This engineering practice reduces the volume of effluent for treatment and assists in accelerating the degradation/stabilisation of the waste in the landfill however leachate recirculation may only be considered in engineered, lined cells where suitable leachate collection systems, leachate level monitoring is in place and the lined cell is capped to the satisfaction of the Agency.*
- *The applicant should develop procedures to ensure that the capping system is not damaged by long-term settlement. A comprehensive monitoring and repair programme should be initiated to ensure the integrity of the capping layers.*
- *Adherence to the waste acceptance procedures and inspection of waste procedures.*

Control Techniques

The following control techniques are used at landfills for the minimisation of leachate emissions:

- *Using soil, recovered or recycled materials or artificial cover materials to reduce infiltration of rainfall into the deposited waste, whilst operating restricted active area.*
- *Provide extraction system to enable removal of leachate for treatment and/or disposal.*
- *Monitoring of the depth and composition of leachate accumulating within the fill.*
- *Capping and restoring any completed area of the landfill as soon as possible.*
- *Leachate that has been removed from the landfill must be managed and shall undergo an appropriate level of treatment before it can be discharged to the environment.*
- *Adequate leachate storage facilities (appropriately sized).*
- *Covering of leachate storage facilities.*
- *Any on-site leachate treatment facility should be constructed and operated to appropriate design standards. Any aeration in leachate lagoon should be subsurface aeration.*
- *Diversion and collection of uncontaminated storm water for discharge or appropriate use from lined areas awaiting waste placement.*

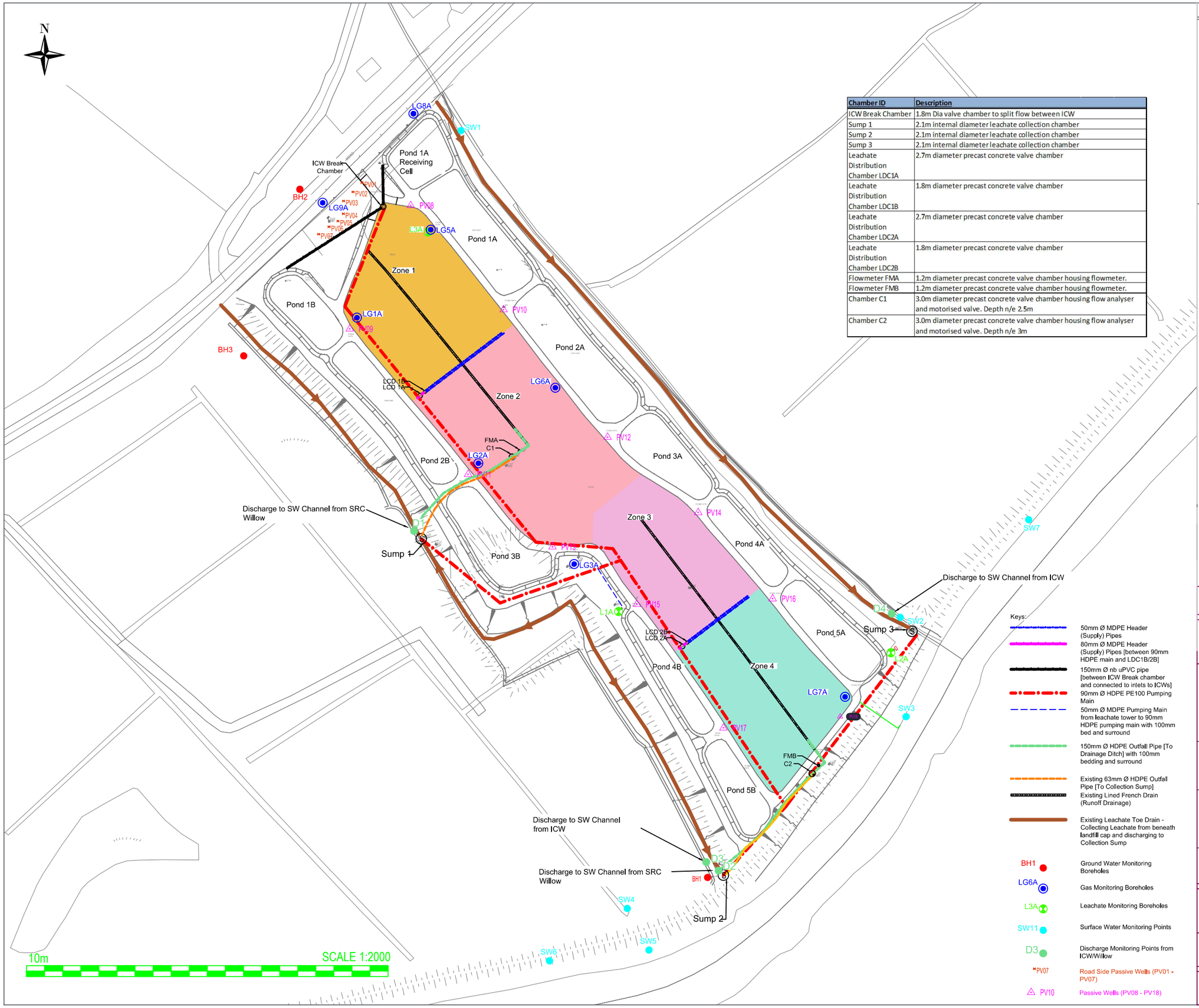
Leachate is extracted from 3 No. Pumping stations (Sump 1, 2 and 3) on site. A common 90mm HDPE leachate pumping main has been laid through the full length of the site within an existing site access road as shown on Drawing No IBR1455-103. Sumps 1, 2 and 3 are connected to the 90mm pumping main adjacent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

The Willow Plantation (area is approximately drawing 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 above a 0.5m clay cap and is bunded using imported subsoil material that provides containment and processing of the influent contaminated waters. Each pond is planted with native species such as Carex riparia, Typha latifolia, Typha angustafolia, Glyceria maxima and Iris pseudacorus and a shallow water depth of 100-200mm is maintained. 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. 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 housed within 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. 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.

Appendix A
Drawing



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

1. Verifying Dimensions.
   The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
2. 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.
3. Issue of Drawings.
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4. Datum.

rev	amendments	check	date

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Client

Comhairle Contae Dhún na nGall
Donegal County Council

Project
Churchtown Waste Licence Review

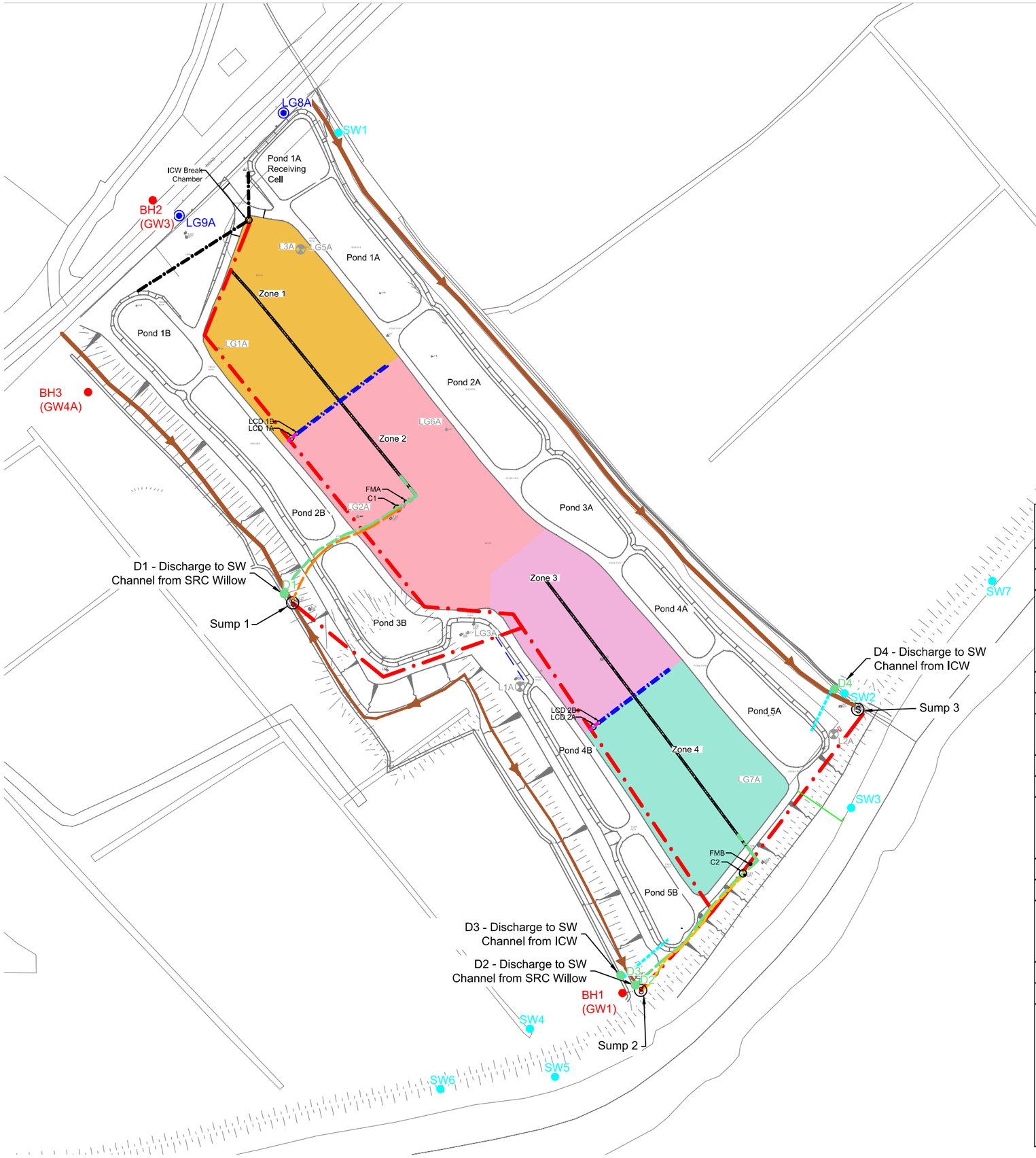
Title
Churchtown Landfill Site
Leachate System

Project Number	Sheet Size	Drawing Scale
IBR1455	A3	1:2000

Drawing Number
IBR1455/103

Drawn By	Status	Revision
JC	Prelim	-

Checked By	Approved By	Date
AMcG	DD	25-08-23



Summary of Monitoring Points as per Waste Licence (W0062-02)

Emissions to Water
- D1
- D2
- D3
- D4

Monitoring of Landfill Gas Emissions
- LG8A
- LG9A

Leachate Monitoring
- Sump 1
- Sump 2
- Sump 3

Groundwater Monitoring
- BH1 (GW1)
- BH2 (GW3)
- BH3 (GW4A)

Receiving Water Monitoring
- SW1
- SW2
- SW3
- SW4
- SW5
- SW6
- SW7

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5. Key:

- GW4A — Ground Water Monitoring Boreholes
- LG9A — Gas Monitoring Boreholes
- SW11 — Surface Water Monitoring Points
- D1 — Discharge Points from Willow/ICW
- (S) — Leachate Sumps (Leachate Monitoring Points
- 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]
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- 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
- Indicative location of 150mm Ø PVC Outfall Pipe from Ponds

rev	amendments	drawn	date

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Client

Project
Churchtown Waste Licence Review

Title
Churchtown Landfill Site Monitoring Locations

Drawing Status	Sheet Size	Drawing Scale
Preliminary	A3	1:2000

Drawing Number	Rev
IBR1455 /104	-

Project Leader	Drawn By	Date	Initial Review
DD	JC	25-08-23	AMcG

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Project
Churchtown Waste Licence Review

Title
Churchtown Landfill Site
Passive Gas Vents

Project Number	Sheet Size	Drawing Scale
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