

## Appendix A4.4 Leachate Management Plan

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# **Kerdiffstown Landfill Remediation Project (KLRP)**

Kildare County Council (KCC)

## **Leachate Management Plan**

32EW5604/DOC/0041 | 2

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**Kerdiffstown Landfill Remediation Project (KLRP)**

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**Document history and status**

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2	30/06/2017	Final EIAR Issue	UD	SS	RR

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## Appendix A. Relevant Guidance Documents

# 1. Introduction

## 1.1 Background

The site of the proposed Project, is located in County Kildare, approximately 3km north-east of central Naas, approximately 400m north-west of Johnstown village and in close proximity to the strategically important M7/N7 corridor. The site is located in close proximity to a number of residential and commercial receptors as well as being a short distance away from the larger settlements of Johnstown and Naas. In addition to the above, the site neighbours a number of recreational land uses, specifically Palmerstown House Estate and Naas Golf Course to the north-east and north-west respectively.

Kerdiffstown Landfill occupies approximately 30 hectares near Johnstown Village and is a former sand and gravel quarry which was progressively backfilled by a number of operators from the 1950s onwards. In January 2011 a major fire developed in a mound of waste material in the northern part of the site. This required intervention of a number of state agencies including Kildare County Council and the Environmental Protection Agency (EPA). The site was under the control of Kildare Fire Service until late February 2011, when it was handed over to the care of the EPA. Since 2011, measures have been taken to secure the site and limit environmental impact.

In April 2015 the Minister for the Environment, Community and Local Government, Alan Kelly TD, announced that funding would be made available for the remediation of the landfill site, and that Kildare County Council would take control of the site and commence remediation.

The objective in remediating the site in terms of leachate management is to:

- Take all necessary and reasonable measures to prevent and limit future leachate impact upon groundwater and surface water receptors and reduce/control the future production of leachate from the site; and
- Reduce contaminant loads discharging to groundwater.

Linked to the overarching objectives of the project is the aim to provide a future landform and end use appropriate for the site and of potential benefit to the local community. To that end, the intended end-use for the site is public access parkland and recreational use.

## 1.2 Aims and Objectives

This Leachate Management Plan has been prepared in support of a planning application and industrial emissions licence for the remediation and operational (end-use) phases, outlined as follows:

- *Development / Remediation* – The works required to re-profile the site including excavation of waste and other materials for deposition on site to achieve the proposed final landform. The works will also include the installation of landfill infrastructure such as capping, landfill gas, leachate and surface water management. A second stage of remediation will comprise the works required to restore the site to the proposed park end use, including planting and landscaping, installation of sports pitches, changing rooms, car parks and associated services.
- *Operational / Aftercare* – The life cycle stage of the site following the remediation works when the site will be used for public access parkland and recreation. The responsibility for the management of the site and the landfill infrastructure systems as well as park operation and maintenance will be retained by Kildare County Council (KCC).

At all stages the aim of the management plan is to:

- Ensure the site is compliant with relevant regulations and best practice at all stages (during development / remediation and operation / aftercare);
- Ensure that the management plan is based on the current site operations and development, data arising from the site and foreseen future proposals for changes to the site;

- Ensure safety of site operatives and contractors working on site;
- Limit future leachate impact on groundwater and surface water receptors;
- Be sufficiently flexible to control leachate throughout different phases of the remediation works;
- Integrate with landfill gas management and other environmental control systems;
- Be compatible with final restoration and after-use of the site; and
- Reduce potential environmental impact of the site throughout its whole life.

Section 2 of Annex 1 of the 1999 EU Landfill Directive outlines leachate control requirements which are applicable for all classes of landfill sites. The specific requirements with regards to leachate management are:

- Control water from precipitations entering into the landfill body;
- Collect contaminated water and leachate; and
- Treat contaminated water and leachate collected from the landfill to the appropriate standard required for discharge.

This Directive was transposed into Irish law by the Waste Management Licensing Regulations 2004 (S.I. 395 of 2004) and the Waste Management Act 1996 (as amended). The development of the site, comprising remediation works, takes cognisance of the Directive as far as reasonably practicable, whilst applying Best Available Techniques (BAT) where appropriate.

Relevant guidance and best practice documents referred to in the development of this management plan are provided in Appendix A.

### 1.3 Roles and Responsibilities

This management plan is a live document where site use and operations, monitoring and performance data informs regular updates to the proposals and procedures within the document in order to mitigate the risks posed by leachate. The following provides definition of some of the terms used within the management plan:

- *Operator* – Kildare County Council, who hold responsibility and liability for the operation and maintenance of the leachate management system;
- *Site Manager* – the individual representing the Operator on site during the remediation works and operation of the park/ aftercare of the site; and
- *Designated Representative* – the entity or individual appointed by the Operator to undertake management of the leachate system for a defined phase of its lifecycle.

The Operator will have full responsibility to ensure that leachate is properly managed on site in accordance with relevant regulations, guidance and best practice at all times and that all activities are fully documented in the Site File.

## 2. Leachate Properties

### 2.1 General

Landfill leachate is a liquid which forms when water passes through degrading waste dissolving environmentally harmful substances which may then enter the environment, migrating away from the waste mass into groundwater or surface water courses, in doing so causing pollution to water resources.

The main components of concern with respect to water contamination are ammonia (directly toxic to fish and other aquatic life), dissolved organic material (mainly organic acids) which give rise to high demands for oxygen (chemical oxygen demand (COD) and biological oxygen demand (BOD)) which can deoxygenate waters (leading to fish kills) and chloride (which increases salinity of water and changes ecological make-up). Leachate also contains other components such as dissolved metals including iron, which causes the characteristic brown colour associated with leachate seepages.

Given these potential impacts on water quality and ecology leachate must be managed. Preferably, it should be prevented from entering water. Where prevention of leachate ingress is not possible, pollution impacts must be reduced to an acceptable level; this level of acceptance being determined through risk assessment and modelling of the site for agreement with the environmental regulator.

### 2.2 Leachate Parameters

#### 2.2.1 Leachate Volumes

It is difficult to conduct an accurate estimation of future leachate generation from the site since many of the waste deposits have been placed, excavated, processed and the non-recyclable fraction replaced within the landfill, and there were few records of what wastes were placed during operation and how they were placed. In some areas non-processed aged wastes are present.

Ground investigation data shows localised pockets of free leachate are present but much of the waste is not yet saturated. Without any remedial intervention, rainfall will continue to infiltrate wastes. Wastes will absorb rainfall and free leachate will be produced more extensively once the absorptive capacity of the waste mass has been reached.

The bulk of the wastes in uncapped and unlined areas of the site are present in Zone 1 in the north western corner of the site and it is likely that absorptive capacity will be reached across much of this area of the site in a similar time frame, giving rise to a sudden increase in leachate production and migration from the site if no control measures are put in place.

Further assessment of water balance calculations is discussed in Section 3.

#### 2.2.2 Leachate Quality

The leachate from Zone 3 (lined cell) has been subject to weekly monitoring since 2012 as a quality control measure in connection with permit conditions at Ringsend WwTW. These data give a very good representation of the component concentrations, although the cell was open to rainwater infiltration hence the leachate is dilute.

Leachate generated following capping of the lined cell is expected to be typical of municipal waste landfill leachate. Monitoring of leachate will continue during the remediation works and aftercare phase as outlined in Section 4.

### 3. Risk Assessment

The effect of leachate generation on groundwater has been assessed as part of Detailed Quantitative Risk Assessments (DQRAs) undertaken for each zone at the site.

Model input data used in the development of the DQRA is outlined in Table 3.1 below for the unlined and uncapped zones (1, 2A, 2B and 4). Modelled areas take account of remediated waste extents and allowance for hardstanding areas, though being retained in the remediation works.

Zone	Modelled area (m <sup>2</sup> )	Estimated recharge rate (mm/a)		Estimated leachate generation (m <sup>3</sup> /year)	
		Uncapped	Capped	Uncapped	Capped
1	90,000	350	41	31,500	3,690
2A	36,000	350	59	6,300	1,062
2B	30,000	350	59	10,500	1,770
4	60,000	350	59	21,000	3,540

**Table 3.1 : Estimate of Leachate Generation Rates**

Zone 3 has a temporary cap installed presently, thus rainfall is already separated from the waste mass. Only temporary 'opening' of the waste mass will be undertaken to permit emplacement of materials from other zones. A fully engineered capping system will be installed following completion of waste infilling. Presently Zone 3 (lined cell) has a leachate drainage, collection and management system installed as outlined in Section 4.1. The DQRA and estimated leachate generation rates indicate that continuation and expansion of the leachate management system is required in order to control leachate generated within the site.



## 4. Leachate Generation

### 4.1 Current Control and Management Measures

#### 4.1.1 Zone Characteristics

Leachate will be generated at Kerdiffstown Landfill, although various characteristics allow some distinctions to be drawn between zones of the site, as outlined in Table 4.1 below.

Zone	Estimated (plan) Area	Estimated Waste Volume	Basal & Side Lining	Cap Status	Other
1	100,000m <sup>2</sup>	2,023,000m <sup>3</sup> (66%)	Unlined	None	-
2A & 2B	83,000m <sup>2</sup>	660,000m <sup>3</sup> (21%)	Unlined	25,000m <sup>2</sup> uncapped	58,000m <sup>2</sup> concrete hardstanding
3	24,000m <sup>2</sup>	179,000m <sup>3</sup> (6%)	Lined	Temporary cap	-
4	45,000m <sup>2</sup>	227,000m <sup>3</sup> (7%)	Unlined	33,000m <sup>2</sup> uncapped	12,000m <sup>2</sup> concrete hardstanding

**Table 4.1 : Zone Characteristics**

There is no formal capping of waste in Zones 1, 2 and 4 at present although much of the waste is partially covered by a dressing of daily cover, used by the former operator to suppress odours, which largely comprises woodchips that have composted to a rudimentary soil which has formed a thin crust and which supports self-sown vegetation. This vegetative cover currently provides some interception and evapo-transpiration of rainfall.

Zone 3 comprises a lined cell constructed with a composite lining system designed in accordance with the EPA Landfill Site Design Manual. The lining system is an effective low permeability barrier to prevent the downward migration of leachate into groundwater. The cell also has a temporary, geomembrane cap applied over the waste mass to reduce leachate generation.

#### 4.1.2 Infrastructure

Leachate is collected in Zone 3 via a granular drainage layer overlying the basal liner. Leachate is directed through the granular drainage layer to two inclined risers in the cell; one in the north-west corner and one in the south-west corner. These risers are used to monitor leachate levels and extract leachate to two tanks located adjacent to the lined cell, for collection by road tanker. Leachate is currently removed from the site for disposal to Ringsend WWTP. A target pad has also been constructed within the lined cell to assist retro-drilling in the future should this be required due to failure of an inclined riser.

A leachate monitoring well (BH39B) was installed in Zone 1 during August 2012. This well extends to around 15m depth within the existing waste mass. Leachate was detected during installation, however, monitoring data recorded since has shown this well to be dry.

As can be seen in Table 4.1 the majority of wastes are located in the north-western area of the site (Zone 1), which has generally remained open to rainwater infiltration. As the site was developed for waste processing and related activities other areas of the site (Zones 2 and 4) were progressively surfaced by concrete hardstandings. The hardstandings divert rainwater from the underlying wastes thus reducing the potential for leachate generation.

#### 4.1.3 Risk to Groundwater

Leachate from all areas of the site, other than the lined cell in Zone 3, currently continues to infiltrate into the ground and groundwater, hence current and long term groundwater quality is considered to be at risk from wastes at the site due to the following factors:

- The majority of the landfill is unlined and therefore there is no engineered barrier across much of the site to prevent discharge of leachate to groundwater;
- The unsaturated zone (where it exists) between the base of the wastes and the local water table is relatively thin and there is therefore little attenuation capacity; and
- The landfill is currently not capped, which will mean that in its current state leachate will continue to be generated, especially after the main waste mass reaches full saturation (referred to as field capacity).

As identified in Section 1 the current leachate management measures do not meet the current project objectives. Remediation works will be undertaken to prevent and limit future leachate impact upon groundwater and surface water receptors and reduce/control the future production of leachate from the site.

## 4.2 Future Control and Management Measures

### 4.2.1 Remediation Works

Remediation works are to be undertaken at the site in phases, over a period likely to be in the order of four years duration. During this period, there will be excavation and movement of some wastes to achieve the agreed planning landform. At this stage high level construction phasing plans have been developed for achieving the remediation of the site and as such only outline leachate management proposals have been developed for this, as the scope and the phasing may change.

To instigate capping works site clearance would be required involving the removal of existing vegetation. Earthmoving will remove the crust of cover material that promotes some degree of surface run-off and will disturb the underlying waste. Rainfall during the construction period may infiltrate and be absorbed by the waste unless the waste has already reached saturation, in which case seepages of leachate would be expected and would require on site management. The responsibility for remediating leachate outbreaks, via stone collection trenches, would be assigned to the contractor undertaking the remediation works.

Depending on the sequence of earthmoving, the geometry of cut faces and the methods used by the contractor there could potentially be a stream of relatively high volume, slightly contaminated, surface water and leachate break-outs to be impounded and treated. The volumes and quality of this source cannot be determined at this stage. As is normal practice for construction works the contract for the remediation works will include on-site management pollution control measures to be implemented by the contractor, for agreement by the Operator as key stakeholder in determining the options for site management and disposal routes. Discharge of run-off will not be permitted from the site during construction works, with ponds lined with geomembrane liner to offer additional protection to groundwater during this period.

Each phase and stage of remedial works will require the contractor appointed to undertake the remediation works to produce a detailed method statement of working which will include assessment of potential environmental, health and safety risks and details of measures to mitigate risks from leachate. Mitigation measures will need to fulfil the following interconnected objectives:

- Reduce likelihood of increased lateral off-site migration of landfill gas;
- Control gas emissions to air (and hence odours);
- Minimise dust emissions from the site;
- Reduce potential to contaminate surface water run-off with leachate and suspended solids; and
- Minimise attraction of insects such as flies and scavenging birds to the site.

The generation of leachate will be managed during the remediation stage through a number of on-site management operations, including:

- Operation in discrete areas to minimise the area of exposed waste;
- Interception of leachate outbreaks, identified during waste excavation and reprofiling activities;
- Provide daily cover to exposed wastes, occurring as part of the remediation works; and
- Progressively restore the site with a landfill cap.

In broad terms the remediation works sequence and associated outline leachate management approach will be:

Phase of Works	Leachate Management Proposals
Prior to remediation works.	<ul style="list-style-type: none"> <li>• Target pad constructed within Zone 3 to allow future retro-drilling should inclined riser fail.</li> <li>• On-going leachate monitoring of Zone 3 and Zone 1. Perimeter groundwater monitoring data to be collated and used as baseline for detection of migration and increased risk e.g. determination of trends.</li> <li>• Continued extraction of leachate from Zone 3.</li> </ul>
Works to site entrance and access area, including construction of new landfill infrastructure compound.	<ul style="list-style-type: none"> <li>• On-going leachate monitoring of Zone 3 and Zone 1.</li> <li>• Continue perimeter monitoring of groundwater boreholes at agreed frequency to identify any changes in groundwater quality.</li> <li>• Inclined risers within Zone 3 to be maintained in operation during filling of Zone 3, and leachate discharged through existing process.</li> <li>• Building to house new leachate pumps, treatment system and control panels, storage tank and containment system constructed within new landfill infrastructure compound.</li> <li>• Leachate rising main and connection to public sewer network, via Johnstown Pumping Station, constructed.</li> </ul>
Remediation of slopes in Zone 4, including the removal of wastes. Clean materials to be stockpiled on Zones 2A and 2B for re-use within Zone 4 or elsewhere on site. Waste materials to be disposed of within Zone 3 or Zone 1.	<ul style="list-style-type: none"> <li>• Reprofiling of slopes to safe profile, including removal of identified wastes as far as reasonably practicable.</li> <li>• Regrading of existing wastes in Zones 1 and 3 to achieve a domed restoration profile.</li> <li>• Inspection of reprofiling works to identify any indications of leachate presence.</li> <li>• Placement of low permeability soils to Zone 4.</li> <li>• Remedial works to inclined riser pump chambers.</li> <li>• Inclined risers within Zone 3 to be maintained in operation during filling of Zone 3, and leachate discharged through new system to Johnstown Wastewater Pumping Station (WwPS).</li> </ul>
Capping of Zone 3.	<ul style="list-style-type: none"> <li>• Inclined risers within Zone 3 to be maintained in operation during filling of Zone 3, and leachate discharged through new system to Johnstown Pumping Station.</li> <li>• Construct leachate recirculation system in lined cell.</li> <li>• Install permanent capping system (geosynthetic) in Zone 3.</li> <li>• Place cover soils and vegetation over capping system.</li> </ul>

Phase of Works	Leachate Management Proposals
Progressive capping of Zones 2A and 2B beyond extents of concrete slabs.	<ul style="list-style-type: none"> <li>Retention of the concrete yard slabs.</li> <li>Inspection of reprofiling works to identify any indications of leachate presence.</li> <li>Placement of low permeability capping layer (soils) on areas outwith concrete slabs.</li> <li>Place cover soils and vegetation over capping system.</li> <li>Locate drainage systems from concrete slabs and direct to surface water system (with intermediate controls, e.g. silt trap).</li> </ul>
Re-grading wastes in Zone 1 to achieve proposed landform.	<ul style="list-style-type: none"> <li>Inspection of reprofiling works to identify any indications of leachate presence.</li> <li>Increased monitoring frequency for all boreholes along western perimeter, increase monitoring of boreholes to the northern border in the direction of Kerdiffstown House.</li> <li>Capping system (geosynthetic) to be installed in phases, requiring the corresponding phased decommissioning of currently installed leachate well to permit cap system installation.</li> <li>Place cover soils and vegetation over capping system.</li> <li>Adoption of leachate monitoring wells to follow as soon as practicable in phases.</li> <li>Leachate level monitoring to be commenced in new wells.</li> <li>Install leachate extraction pumps and pipework to connect to landfill infrastructure compound.</li> <li>Where leachate presence is confirmed, removal to leachate management system to be enacted.</li> </ul>
Final site works – installation of park infrastructure and planting.	<ul style="list-style-type: none"> <li>Site enters Aftercare Phase for leachate management and monitoring.</li> </ul>

Table 4.2 : Leachate Management Proposals

#### 4.2.2 Post Completion

The proposed strategy for leachate management at Kerdiffstown is a combination of leachate containment in Zone 3, accompanied by removal for above-ground treatment and disposal, and controlled extraction from the base of Zone 1 when confirmed / required.

The main change in leachate composition is likely to be realised from Zone 3. Raw leachate following capping of the lined cell will be generated, with leachate continuing to percolate and collect in the base of the cell, from where it will be pumped out. This leachate stream will potentially have higher concentrations of substances to be treated. The flow rate would initially reduce from that of the current scenario because of the elimination of rainfall; however, it is anticipated that the volume may then steadily increase as the newly placed waste further decomposes. It is considered that the flow rate would decline and the leachate stream be exhausted in about 20 years.

Leachate monitoring wells are to be provided in Zone 1 with three points installed per five hectares, as shown on Drawing Number 32EW5604/031. However a detailed check of monitoring data will be required to confirm that the levels detected are reflective of leachate and not groundwater, given the unlined nature of that zone.

Leachate monitoring wells are not proposed for Zones 2A and 2B. The waste types are low risk and shallower in depth and do not pose a significant risk to groundwater. This is further detailed in the DQRA.

Throughout the period of remediation works monitoring of all off-site boreholes should be conducted at least monthly. During active remedial works, or where materials are moved on to uncapped areas of wastes for temporary storage, more frequent monitoring of off-site boreholes adjacent to affected areas is likely to be required. Frequency will be determined by the risk assessment for each phase of works and incorporated within the method statement for working.

Whilst there are measures detailed in Table 4.2 above which will help to reduce leachate generation, appropriate methods to control the leachate that is generated are also proposed, including:

- Monitoring of leachate via wells;
- Collection of leachate via extraction wells and pipework;
- Storage of leachate (untreated) within on-site balancing tank;
- Treatment of leachate within a methane stripping plant;
- Leachate discharge to sewer as a trade effluent;
- Leachate recirculation within the lined landfill cell;
- Storage of leachate (treated) within on-site tank; and
- Tankering leachate to a suitably licensed treatment facility (only at times when there are any abnormal occurrences with the treatment process or restrictions on discharge to sewer).

Details of the proposed leachate management and control systems are shown on Drawing Numbers 32EW5604-00-035, 32EW5604-00-036 and 32EW5604-00-037. Details of the proposed leachate extraction infrastructure are outlined further in Section 5. Work instructions detailing duties of staff carrying out leachate management are detailed in Section 8.

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## 5. Leachate Management System

### 5.1 Normal Operating Conditions

The following section sets out the proposed leachate extraction and treatment infrastructure that will be in place following the completion of the remediation works. The layout of the proposed leachate management system is outlined on Drawing Number 32EW5604-00-031. The normal operation of the system is outlined in Figure 5.1.

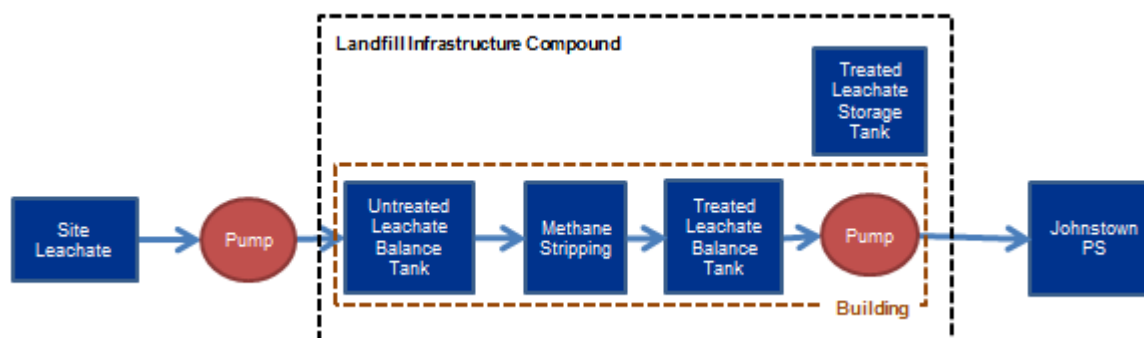


Figure 5.1 : Normal Operating Conditions Flow Diagram

A piping and instrumentation drawing (P&ID) of the leachate management system is shown on Drawing Number 32EW5604-00-035.

Leachate extracted from the waste mass will be pumped along a pipeline to the Landfill Infrastructure Compound. A building will be constructed housing the leachate infrastructure. Leachate will be discharged into a balancing tank (for untreated leachate). The tank is designed to hold 10m<sup>3</sup> of leachate.

Flows from the balancing tank will gravitate into the methane stripping plant/tank (also located within the leachate management building) where the leachate is retained in the tank for a minimum of 2 hours while dissolved methane is removed by aeration. The dissolved methane concentration in the leachate is designed to reduce to at least the upper consented limit of 0.14 mg/l with the excess methane drawn off in the process air stream to be burnt in the gas flare located immediately adjacent to the building within the landfill infrastructure compound. The treated leachate will overflow from the methane stripping tank into the treated leachate balance tank. The proposed layout of the leachate management building is shown on Drawing Number 32EW5604-00-034.

From the treated leachate balance tank leachate will be pumped through a 150mm (ID) MDPE pipeline (rising main / gravity main) to the public sewer network via Johnstown Wastewater Pumping Station (WwPS), located approximately 450m to the east of the site. The pipe will be installed within the bounds of the landfill up to the east boundary, where it will be buried in a field at a minimum depth of 0.9m below ground level and with a minimum 5m wayleave proposed (subject to landowner agreement). There will be a requirement to directional drill beneath the N7 road and Morell River, immediately west of the pumping station. Leachate will discharge into a chamber located within the pumping station grounds, to flow into Johnstown WwPS collection tank via buried pipework. The proposed route of the rising main and associated pipework are shown on Drawing Numbers 32EW5604-00-031 and 32EW5604-00-032.

Agreement with Irish Water for this connection has been agreed in principle. A copy of the connection agreement will be appended to the management plan for record purposes.

The leachate will be transferred through the public sewer network by Irish Water for treatment at Osberstown WWTP, with final effluent quality monitored to meet agreed standards.



## 5.2 Abnormal Operating Conditions

### 5.2.1 Process Diagram

There will be occasions when effluent levels are high within the public sewer network and specifically within the WwPS where Irish Water (IW) will request leachate discharges to the WwPS to cease. A telemetry system will be utilised to stop pumps operation. The hierarchy of leachate management shown in Figure 5.2 will then be initiated, specific to the source of leachate. As outlined in Section 4 there is a requirement to validate that levels observed in Zone 1 are representative of leachate for normal operation to apply to this source.

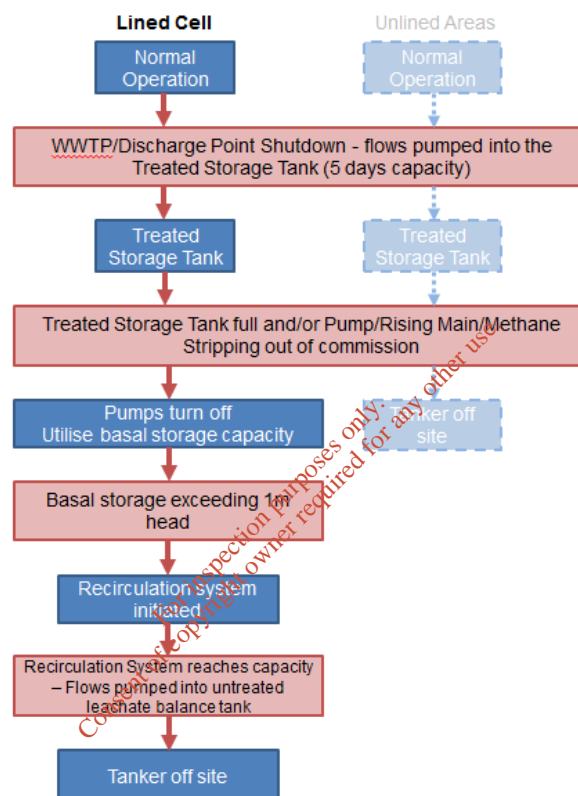


Figure 5.2 : Abnormal Operating Conditions Process Diagram

### 5.2.2 Storage

The treated leachate storage tank is designed to provide three days storage at maximum flow ( $150\text{m}^3$ ). This tank will be located in the landfill infrastructure compound and will be constructed of glass reinforced steel. After each use the tank will be drained and washed down to prevent any remaining leachate becoming stagnant. The treated leachate storage tank will be constructed within a similar tank that will act as the 110% bund to account for a catastrophic failure. The proposed location of the treated leachate storage tank is detailed on Drawing Number 32EW5604-00-033. Should the leachate storage tank reach capacity and sewer network still not be available for recommencement of discharge, level monitoring of the lined cell will determine whether storage capacity is available, up to a maximum 1m head above the liner. To utilise this storage the extraction pumps located within the inclined risers will be turned off, with monitoring of head continuing. This stage is interchangeable with leachate recirculation, described below.

### 5.2.3 Leachate Recirculation

Recirculation of leachate will be used to employ absorptive capacity within the landfill cell. When the leachate is recirculated, the constituents are attenuated by biological activity and by other physical and chemical reactions within the landfill, which can lead to accelerated stabilisation of the landfill mass.

Recirculation of the untreated leachate in the lined cell will be achieved via the operation of a recirculation unit and various actuated valves, which will as far as possible, evenly distributed the recycled leachate throughout the body of the lined cell. Any leachate recirculation works will be undertaken and managed in such a way as to avoid the spraying of leachate into the atmosphere, and will not impact upon air quality around the installation boundary, or cause odours.

As identified in EPA guidance (Landfill Operational Practices), recirculation of leachate within cells designed without basal lining and leachate drainage is not recommended. As such recirculation will not take place within Zones 1, 2A, 2B or 4.

#### **5.2.4 Tanker Arrangements**

The utilisation of various storage capacities within the site allow for a period for tankers to be mobilised to site to remove leachate directly from the leachate system. This use of capacities is necessary as a fail-safe as the prevention of discharge to sewer network via sewer may also apply for direct disposal to a treatment plant, which requires the assignation and agreement of Irish Water.

The treated leachate storage draw-off point will be located externally on the plant building in order to contain any potential spillages within the tanker draw-off area. The transfer of leachate to the draw-off point will be done via a pipe of fully welded construction. The pipe will be located below ground to offer enhanced hydraulics control, enabling full leachate transfer from the tank.

An underground tank will be constructed adjacent to the plant building. The tank will have a reinforced concrete surround for structural support. This has an added benefit of reduce risk of leaks escaping to the ground. The tank will have sufficient volume to collect all potential spillage from the building, delivery area and tanker draw-off area. This volume will be assessed on the basis of detailed design, risk assessment including probability of incident and supported by an appropriate Hazard And Operability Study (HAZOP) stage. For the purposes of outline design, a worst case scenario of 30m<sup>3</sup> capacity (largest permissible road tanker) is assumed, recognising that such plant may be sectional with compartment tanks reducing this storage requirement.

It is anticipated that a call-off agreement with a licensed contractor would be in place such that when tankers are required these can be mobilised within the period prior to full utilisation of storage capacity on site.

### **5.3 Leachate Management Review**

#### **5.3.1 Leachate Management**

Management of leachate will be maintained under review by site management to ensure that as far as is reasonably practicable the leachate collection, treatment and disposal system will have sufficient capacity to handle the maximum predicted rate of leachate generation for the installation and maintain leachate levels in the lined cell and to monitor levels within the unlined areas.

If the review process identifies potential shortfalls in the provision of leachate management facilities at the installation, action will be taken to upgrade the system capability. Proposed changes are to be discussed with the EPA prior to implementation.

#### **5.3.2 Detailed Design**

Detailed design will be undertaken to confirm arrangements for leachate management at the site. This design process will also include a HAZOP assessment to determine required security controls for each key part of the system.

#### **5.3.3 Incident Control Measures**

The following table provides the outline for the incident control measures put in place in order to minimize the risk of any leachate pollution / release into the environment.



Incident	Probability	Impact	Control Measures
Spillage of leachate within the plant building	1	1	<ul style="list-style-type: none"> <li>Any leachate spillage in the plant building will be contained within the building.</li> <li>The plant building floor will be impermeable and drainage channels will collect any spillage.</li> <li>Spillages will be transferred to an underground tank, located adjacent to the plant building.</li> <li>Sensors will be installed in the underground tank to inform the site personnel of the current level and provide an alarm when the tank requires emptying.</li> <li>Testing of water required to confirm presence of contamination. Where clean, this can be discharged to site surface water drainage system. Where deemed unsuitable, tank contents to be pumped out from the underground tank via road tanker.</li> </ul>
Failure of treated leachate storage tank	1	5	<ul style="list-style-type: none"> <li>The treated leachate storage tank will be provided with minimum 110% bunding capacity provided by an external tank of similar construction, to account for a catastrophic failure of the treated leachate storage tank.</li> <li>The external tank will have a conical roof and therefore no rainwater will be collected to ensure that the bunded capacity is maintained at min. 110%.</li> <li>Sensors will be installed to inform the site personnel of the current level of the internal tank and provide an alarm when the tank requires emptying.</li> <li>Secondary sensor will be provided to indicate reduction in level in the internal tank where extraction is not being initiated.</li> <li>Further sensor installed to indicate presence and level of effluent in outer tank, setting off alarm to inform the site personnel of potential internal tank failure.</li> </ul>
Failure of pipework from leachate storage tank	1	3	<ul style="list-style-type: none"> <li>The pipe transferring the leachate from the treated leachate storage tank to the leachate draw-off point (located adjacent to the plant building) will be of fully welded construction to remove the risk of leaks.</li> </ul>
Spillage within tanker draw-off area	2	3	<ul style="list-style-type: none"> <li>The tanker draw-off area will be impermeable and drainage channels in the centre of the area will collect any spillages.</li> <li>Spillages will be transferred to an underground tank.</li> <li>A manual valving arrangement will be used to divert rainwater to the site drainage during normal operations to ensure that the tank remains empty of rainwater. During tanker operations the valves will be set to divert all flows to the underground tank. The area must be washed down fully prior to the flow being diverted back to the site drainage, with sampling to confirm quality as suitable for discharge to the site surface water management system.</li> <li>Sensors will be installed in the underground tank to inform the site personnel of the current level and provide an alarm when the tank requires emptying.</li> <li>The leachate will be pumped out from the underground tank as required via road tanker.</li> </ul>

Incident	Probability	Impact	Control Measures
Spillage within delivery area	1	2	<ul style="list-style-type: none"> <li>The delivery area will be impermeable and drainage channels in the centre of the area will collect any spillages.</li> <li>Spillages will be transferred to an underground tank.</li> <li>A manual valving arrangement will be used to divert rainwater to the site drainage during normal operations to ensure that the tank remains empty of rainwater. During tanker operations the valves will be set to divert all flows to the underground tank. The area must be washed down fully prior to the flow being diverted back to the site surface water drainage system.</li> <li>Sensors will be installed in the underground tank to inform the site personnel of the current level and provide an alarm when the tank requires emptying.</li> <li>Spillages will be pumped out from the underground tank as required via road tanker.</li> </ul>
Valve, coupling and hose failure (tank to tanker draw-off area)	1	4	<ul style="list-style-type: none"> <li>Pressure sensors will constantly monitor the pressure during tanker operations and will be able to identify any increased flow resulting from the failure of the valve, coupling and/or hose. This will result in the automatic closure of the actuated emergency shut off valves and prevent large volume of leachate escape.</li> <li>Should leachate escape from valves, coupling or hoses it will be minimal in quantity and will be contained within the underground tank.</li> <li>Sensors will be installed in the underground tank to inform the site personnel of the current level and provide an alarm when the tank requires emptying.</li> <li>Spillages will be pumped out from the underground tank as required via road tanker.</li> </ul>

Probability / Incident rating is on the 1 to 5 scale where 1 is the lowest and 5 the highest.

Below is non-exhaustive list of guidance that should be followed when designing the incident control measures.

Guidance	
EPA Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities	2011
EPA Landfill Manual - Guidance note of Landfill Monitoring	2003

Review of these and prevailing best practice should be made when all of the control measures are designed.

## 6. Installation, Monitoring and Maintenance

### 6.1 Installation Plan

The leachate rising/gravity main shall undergo a water pressure test in accordance with BS EN 805:2000 to ensure the integrity of pipes, joints, fittings and other components such as anchor blocks.

During the operation of the leachate rising/gravity main, routine volume checks will be carried out to ensure that the integrity leachate transfer system is operating as designed. The volume of leachate received at Johnstown WwPS will be monitored to determine any change in volume. Where there is no reduction, within a specified allowance, the integrity of the rising/gravity main will be considered to be assured.

After installation, the treated leachate storage tank and the external bunding tank will be tested as per the Civil Engineering Specification for the Water Industry to ensure the integrity of the tank. This testing typically comprises filling the tank with water and measuring levels for three days to determine level change, as a possible indicator of leakage.

### 6.2 Construction Quality Assurance

The outline design principles for the leachate management system are provided herein. Detailed design of future leachate management facilities will be undertaken following agreement with Irish Water regarding the connection agreement to Johnstown WwPS, to include a Hazard And Operability Study (HAZOP) to assist in determining the level and detail of security controls required on the infrastructure and management system.

The installation of the requisite infrastructure and management measures will be subject to Construction Quality Assurance and Control. This will provide assurance that the leachate management system was constructed as specified in the design and will include inspections, verifications, audits and evaluations of materials and workmanship necessary to determine and document the quality of the constructed facility.

To enable overall quality management works to the leachate management system will be governed by a comprehensive Construction Quality Assurance (CQA) Plan, prepared for submission to and review by the EPA. CQA is defined as a planned system of activities that provide assurance that the materials used meet design specifications and infrastructure is constructed in accordance with the contract and technical specifications. The CQA Plan will set out:

- Construction quality control (CQC) procedures;
- Technical specification and the conditions of contract drawn up by the designer; and
- Roles and responsibilities for the works. The Construction Environmental Management Plan (CEMP) may also inform and be informed by the CQA Plan.

On completion of the infrastructure works a CQA Report will be prepared, to demonstrate that the system(s) and associated components comply with the specification as set out in the CQA Plan.

### 6.3 Monitoring Plan

Routine monitoring of the site to assess the performance of the leachate management systems will be undertaken. Details of the monitoring programme/plan for the site are set out in the Monitoring and Control Management Plan and will cover (as a minimum):

- Leachate monitoring (on-site; levels, quality and quantities);
- Leachate monitoring (off-site; flows to network; quality; capacity);
- Leachate infrastructure inspections;
- Leachate infrastructure maintenance programmes; and
- Leachate recirculation procedures (where required).

## 6.4 Maintenance and Reporting Procedures

The leachate management system will be subject to an operational, preventative maintenance and servicing programme. Procedures detailing all the operational and maintenance requirements for the leachate management plant will be contained within the operational and maintenance manual, which will be retained in the Site Office. The operational and maintenance manual will include the following:

- System description (construction, process and operational parameters) including full as built drawings, together with a record of all subsequent changes;
- Operating instructions;
- Commissioning into service and out of service procedures;
- Specification for routine operational monitoring;
- Register of all routine adjustments;
- Record of all non-routine incidents;
- Health and safety instructions for routine operation and further guidance on procedures to adopt in the event of an accident or emergency;
- Detailed inspection programme with inventories and frequencies (including responsibilities for monitoring, inspection and maintenance, daily, weekly and monthly requirements, documentation and recording procedures, procedures for implementing corrective actions);
- Register of fault conditions and corrective actions taken to overcome faults;
- Details of routine repairs and replacements;
- Review requirements for fault conditions and repairs; and
- Inventory of replacement parts and contact details for relevant suppliers and manufacturers.

Personnel responsible for the operation and maintenance of the leachate management system require to be fully conversant with the operational procedures and safety and maintenance programmes. See Section 8 for Work Instructions for responsible personnel.

## 7. Leachate Action Plan

### 7.1 Overview

As identified in Section 4 reductions in infiltration will be achieved by progressive phases of capping works, across areas of the landfill. The surface water management scheme is also important in providing a collection system for surface water runoff that will reduce the loading on the leachate collection and disposal system (see also Surface Water Management Plan (Document reference 32EW5604/DOC/0042)).

It is proposed that the Leachate Management Plan and Leachate Action Plan would be regularly reviewed, and updated where necessary, to ensure that sufficient leachate management options are available to adequately control leachate generation at the site, and to prevent any uncontrolled escape of leachate into the surrounding environment.

### 7.2 Action Plan

The following Action Plan provides the outline for processes to be followed during abnormal operating occurrences/ incidents associated with the leachate management system.

Incident	Actions
<b>Current, Pre-Remediation Phase</b>	
Road accident causing environmental pollution caused by tankering of leachate from site	<ul style="list-style-type: none"> <li>Contractor to report to emergency services.</li> <li>Contingency plan to be arranged with contractor.</li> </ul>
Leachate level exceeds 1m head in lined cell	<ul style="list-style-type: none"> <li>Arrange for additional tankers to site to remove excess leachate.</li> </ul>
Leachate outbreak observed	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Immediately instigate installation of drain back into waste mass to prevent run-off.</li> <li>Inspect off-waste area for pollution and remediate.</li> <li>Report to EPA, if environmental risk identified.</li> <li>Arrange repairs to cap or determine whether leachate extraction is necessary as soon as possible.</li> </ul>
<b>Development / Remediation Phase</b>	
Construction run-off found to be contaminated	<ul style="list-style-type: none"> <li>Procedures to be detailed in construction contract, to include reiteration of no discharge from site being permitted.</li> <li>Ensure Contractor assesses level of contamination and agrees disposal route with Operator.</li> </ul>
Spillage of leachate on tankering location(s)	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Arrange for spilled leachate to be collected and either recirculated to lined cell or returned to storage tank.</li> <li>Check storage tanks and pipework - arrange repairs, as necessary.</li> </ul>
Spillage of leachate outwith tankering locations	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Immediately contain with spill kit or other equivalent as necessary.</li> <li>Arrange for spilled leachate to be collected and either recirculated to lined</li> </ul>

Incident	Actions
	<ul style="list-style-type: none"> <li>cell or returned to storage tank.</li> <li>Report to EPA, if environmental risk identified.</li> <li>Check storage tanks and pipework - arrange repairs, as necessary.</li> </ul>
Leachate outbreak observed	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Report to EPA, if environmental risk identified.</li> <li>Arrange repairs to cap or determine whether leachate extraction is necessary as soon as possible.</li> </ul>
Inclined riser blocked (Zone 3)	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Ensure pump in other riser is operational.</li> <li>Determine extent of blockage and instigate remedial works.</li> <li>If remedial works are unsuccessful instigate retro-drilling to target pad.</li> </ul>
Blocked leachate abstraction pipework	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Turn off pumps.</li> <li>Maintain monitoring of leachate level in lined cell.</li> <li>Initiate repair of pipework with appropriate quality checks and commissioning.</li> </ul>
Failure of leachate extraction pumps	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Check levels of</li> <li>Retain boxed spare pump on site for use in emergency.</li> <li>Rectify pump fault with supplies and tools on site if possible, if not order relevant parts or specialist contractor assistance to fix.</li> </ul>
Leachate level monitoring equipment fails	<ul style="list-style-type: none"> <li>Utilise dip meter (check inclined riser calculation to compensate for slope gradient adjustment).</li> <li>Replace inducer as soon as possible.</li> </ul>
Leachate level exceeds 1m head in lined cell	<ul style="list-style-type: none"> <li>Turn on pumps; pump to Leachate storage tank.</li> <li>Pump to recirculation facility in lined cell.</li> <li>Arrange for additional tankers to site to remove excess leachate.</li> </ul>
<b>Operational / Aftercare Phase</b>	
High level within IW pumping station reached	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Divert treated leachate to the treated leachate storage tank. Tank provides 5 days of storage at 50m<sup>3</sup> per day.</li> <li>Following confirmation from IW that the high level within the pumping station has receded the treated leachate pumps will pass treated leachate to the IW pumping station taking the flow from the methane stripping plant in precedence over the treated leachate storage tank.</li> </ul>
High levels within IW pumping station and treated leachate storage tank	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Methane stripping plant will be taken off line.</li> <li>Use lined cell pumps to recirculate untreated leachate within the lined cell via the operation of various actuated valves.</li> </ul>

Incident	Actions
	<ul style="list-style-type: none"> <li>Following confirmation from IW that the high level within the pumping station has receded revert to normal treatment and operating procedures.</li> </ul>
High levels within IW pumping station, treated leachate storage tank and lined cell	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Use lined cell pumps to manually transfer leachate to the untreated leachate balancing tank.</li> <li>Arrange for tankers to remove leachate off-site from the untreated leachate balancing tank.</li> <li>Following confirmation from IW that the high level within the pumping station has receded revert to normal treatment and operating procedures.</li> </ul>
Failure of methane stripping plant	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Take methane stripping plant offline.</li> <li>Recirculate untreated leachate in lined cell.</li> <li>Where high levels are recorded in the lined cell, use lined cell pumps to manually transfer leachate to the untreated leachate balancing tank and arrange to remove from site via tanker.</li> <li>Arrange repairs to methane stripping plant.</li> </ul>
High level within untreated leachate balance tank	<ul style="list-style-type: none"> <li>Report to Site Manager.</li> <li>Use lined cell pumps to recirculate untreated leachate within the lined cell via the operation of various actuated valves.</li> <li>Or arrange to remove untreated leachate from balancing tank via tanker.</li> </ul>

Following incidents occurring at the site the Action Plan should be updated to ensure that the document is kept relevant.



## 8. Work Instructions

### 8.1 Maintaining Leachate Infrastructure

Work instructions for the Site Manager, Designated Representative and Site Operatives are as follows:

#### 8.1.1 Duty of Site Manager

- Ensure that all constructed engineering works prevent the uncontrolled escape of leachate into the surrounding environment or into the surface water collection system;
- Undertake daily inspections of leachate storage tanks, pumps and methane stripping plant for signs of leaks;
- Regularly inspect bunded areas for ponding liquids and remove as necessary;
- Undertake regular inspection and maintenance of the underground tank;
- Check alarms system(s) are maintained and regularly tested;
- Ensure building in Landfill Infrastructure Compound is securely locked each night;
- Ensure that routine monitoring of leachate is undertaken in accordance with the guidelines detailed within this management plan;
- Ensure that weekly checks upon the operation of the installed leachate extraction system are undertaken;
- Ensure that any notifications required by this management plan are submitted to the EPA or IW as appropriate; and
- Ensure that the Action Plan detailed within this management plan is implemented.

#### 8.1.2 Duty of the Designated Representative

- Ensure that the pumps, pipework, treatment plant and other ancillary equipment required as part of the extraction system are regularly serviced / maintained as per the manufacturer's instructions; and
- Where faults/errors are noted within the leachate extraction system, the Designated Representative will notify the Site Manager as soon as reasonable practicable and will arrange repairs, as required.

#### 8.1.3 Duty of the Site Operative

- Take all reasonable precautions when deposition and compaction of waste takes place adjacent to the leachate collection sumps and chambers to mitigate the likelihood of damage occurring;
- Where damage does occur to either the surrounding stone structure or the inclined riser pipework notify the Site Manager as soon as reasonable practicable;
- Ensure that no debris or waste enters the leachate collection sumps / wells, and if this does occur contact the Site Manager immediately; and
- Maintain personnel access to the leachate extraction chambers at all times for the purpose of inspection and monitoring.



## Appendix A. Relevant Guidance Documents

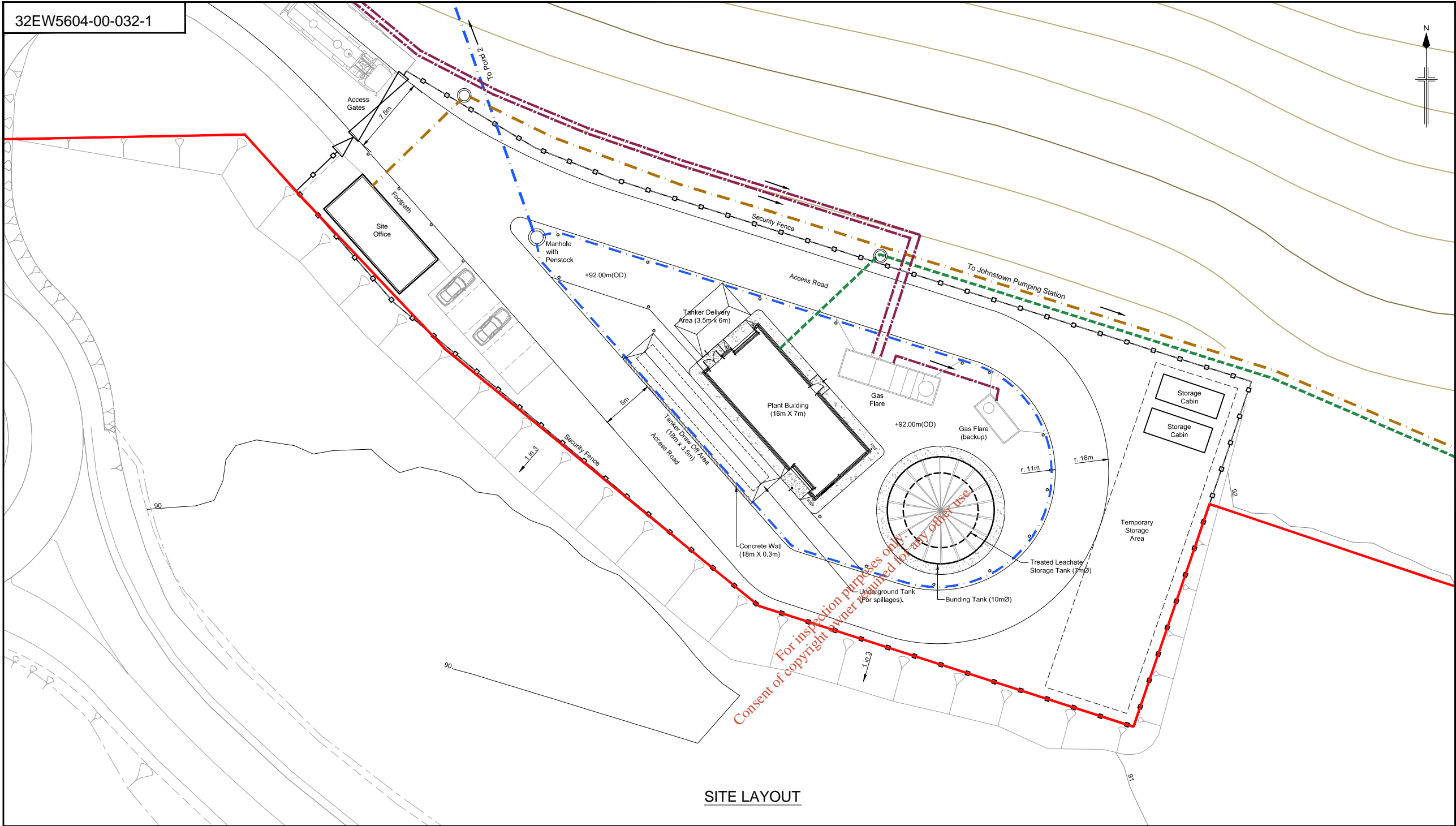
Below is a non-exhaustive list of guidance. Review of this and prevailing best practice should be made on future updates to this Management Plan:

Guidance	Year
Sewers for Adoption (7 <sup>th</sup> Edition)	2013
Civil Engineering Specification for the Water Industry (7 <sup>th</sup> Edition)	2011
Sewers for Scotland (3 <sup>rd</sup> Edition)	2015
Scottish Water Standard and Specifications for Waste Water Pump Stations	2015
EPA Final Draft BAT Guidance Note on Best Available Techniques for the Waste Sector: Landfill Activities	2011
EPA Landfill Manual - Guidance note of Landfill Monitoring	2003
EPA Landfill Site Design	2000
EPA Landfill Manuals Investigations for Landfills	1995
EPA Landfill Manuals Landfill Operational Practices	1997
EPA Landfill Manuals Landfill Restoration and Aftercare	1999
EPA Landfill Manuals Landfill Monitoring	2003
EA Guidance for the Treatment of Landfill Leachate	2007
The Safety, Health and Welfare at Work Act	2005
The Safety, Health and Welfare at Work (Construction) Regulations 2013 SI 291	2013
ATEX 94/9/EC Directive, the ATEX 'Product' Directive, concerned with the manufacture of equipment and protective systems designed for use in potentially explosive atmospheres	1994
ATEX 1999/92/EC Directive, the Worker Protection Directive (also known as the 'ATEX 137' Directive), concerned with the "minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres"	1999

The UK landfill industry has also developed a series of Industry Codes of Practice (ICoPs), comprising guidelines on compliance with ATEX regulations with respect to landfill gas, leachate, drilling and general landfill operations, including the undertaking of area classifications / zoning around landfill infrastructure.

Available [Online] from [www.esauk.org/reports\\_press\\_releases/esa\\_reports/dsear\\_guidance.html](http://www.esauk.org/reports_press_releases/esa_reports/dsear_guidance.html) [accessed 9 December 2016].

32EW5604-00-032-1



SITE LAYOUT

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- KEY:
- Licence Boundary
  - Surface Water Drainage
  - Treated Leachate Transfer Pipe
  - Foul Water Pipeline
  - Landfill Gas Carrier Main

- NOTES:
- All levels to metres OD (Malin Head).
  - All dimensions to millimetres unless otherwise stated.
  - For details of plant building and leachate storage tank refer to Drawing 32EW5604-00-033, for details of site office refer to Drawing 32EW5604-00-034.
  - For details of Leachate Management Infrastructure refer to Leachate Management Plan.
  - For details of Landfill Gas Flares refer to Landfill Gas Management Plan.



1	30/06/2017	EIAR SUBMISSION	KMA	CD	CD	RR
0	26/09/2016	DRAFT EIAR SUBMISSION	AR	ND	CD	RR
Rev	Rev. Date	Purpose of revision	Drawn	Checked	Rev'd	Apprv'd

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Client  
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Comhairle Contae Chill Dara

Project  
**KERDIFFSTOWN LANDFILL  
REMEDATION PROJECT**

Drawing title  
**LEACHATE MANAGEMENT PLAN  
LANDFILL INFRASTRUCTURE COMPOUND  
LAYOUT AND INDICATIVE ELEVATION**

Drawing status  
**EIAR SUBMISSION**

1:200 @ A1 DO NOT SCALE

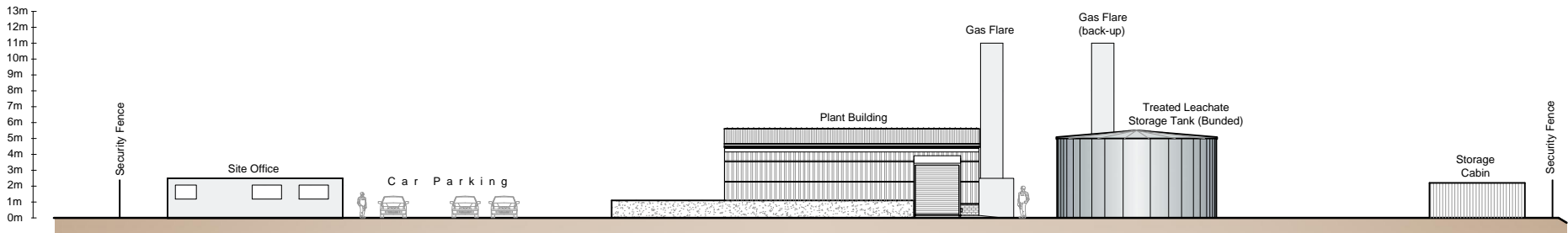
Jacobs No. 32EW5604

Client no. 6286

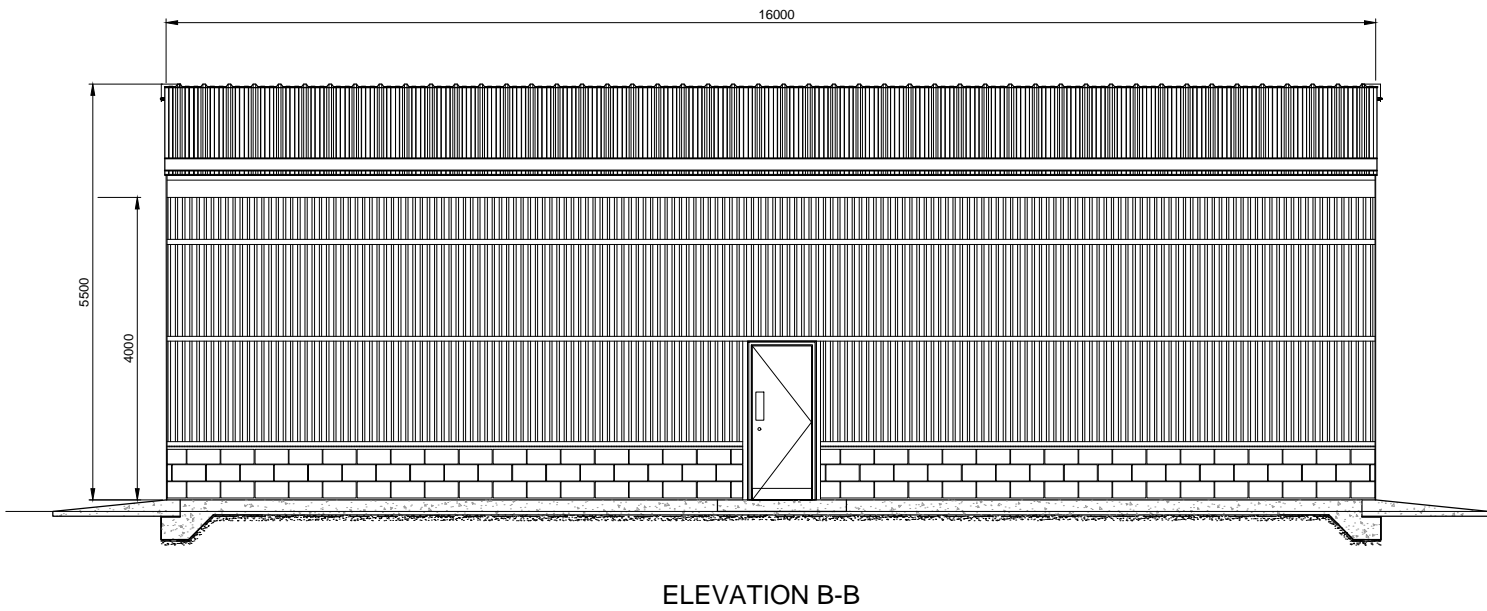
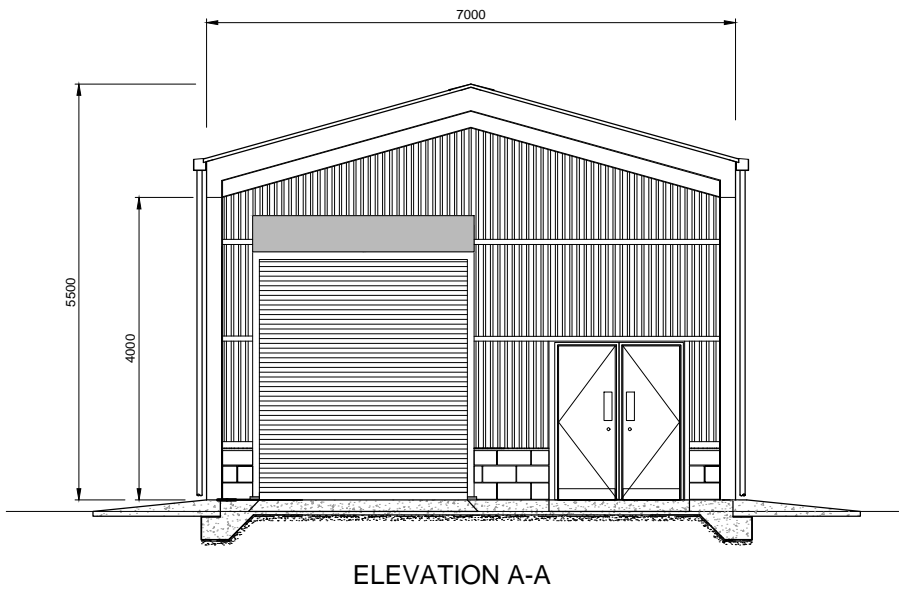
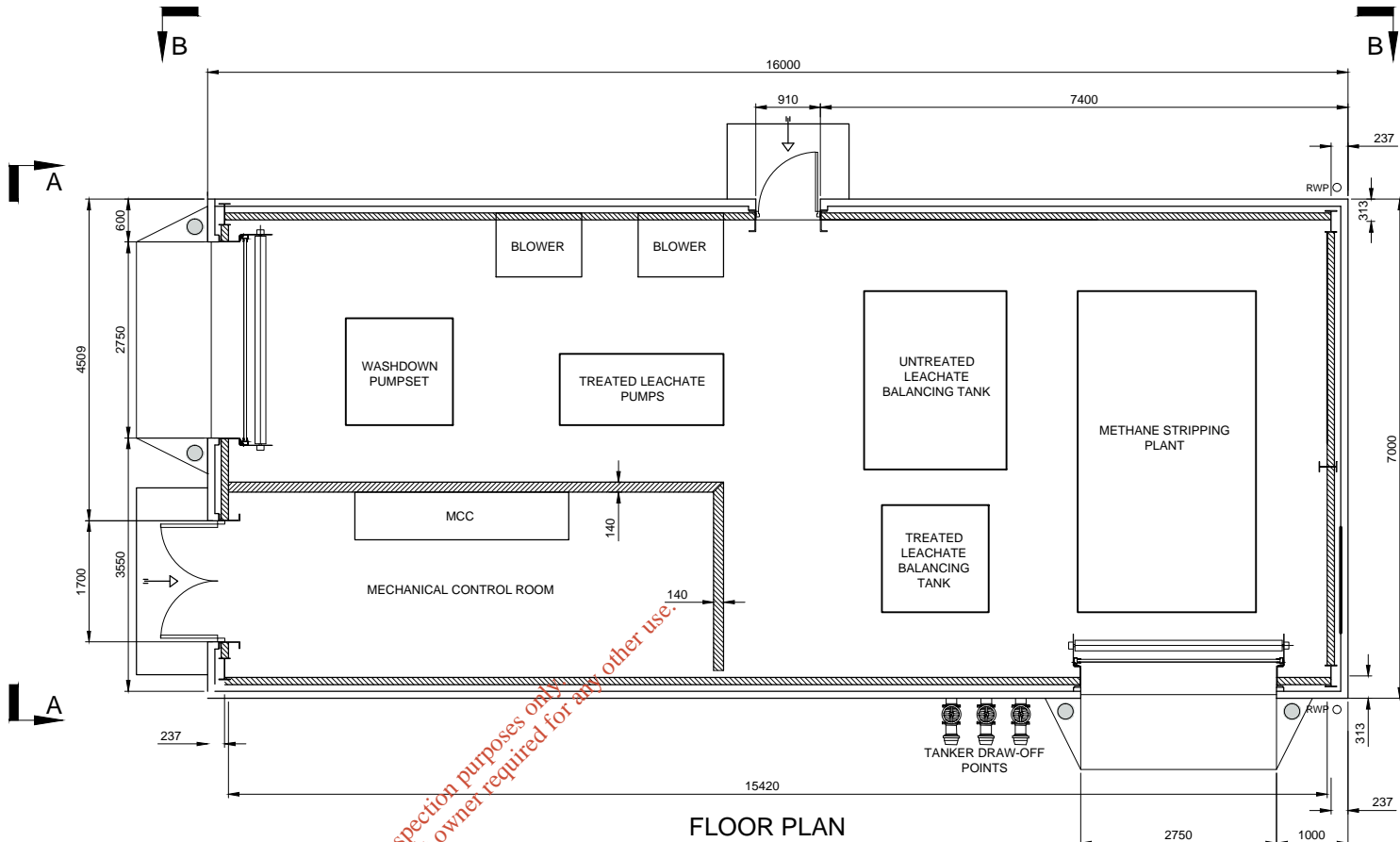
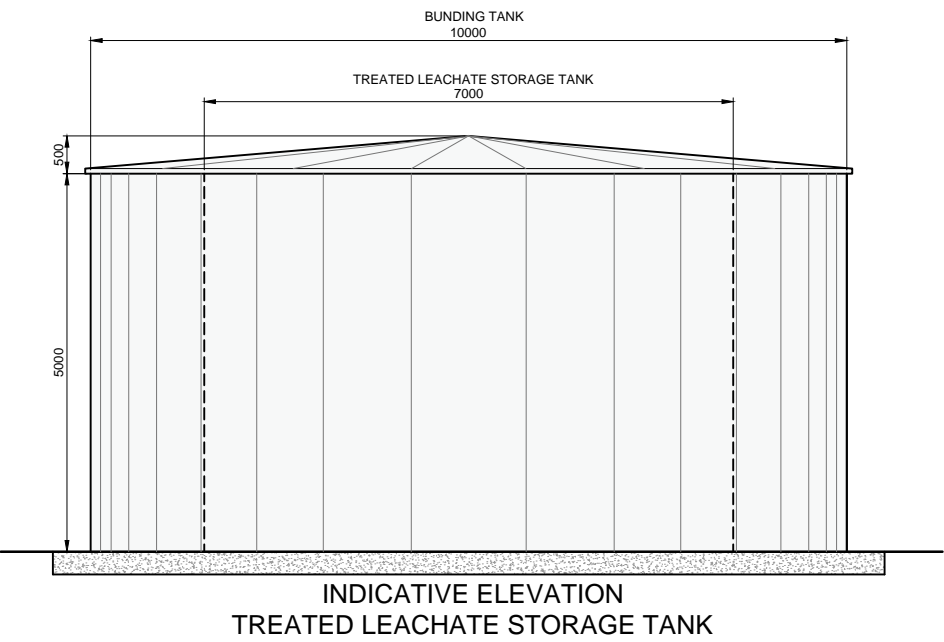
Drawing number  
**32EW5604-00-032**

Rev  
**1**

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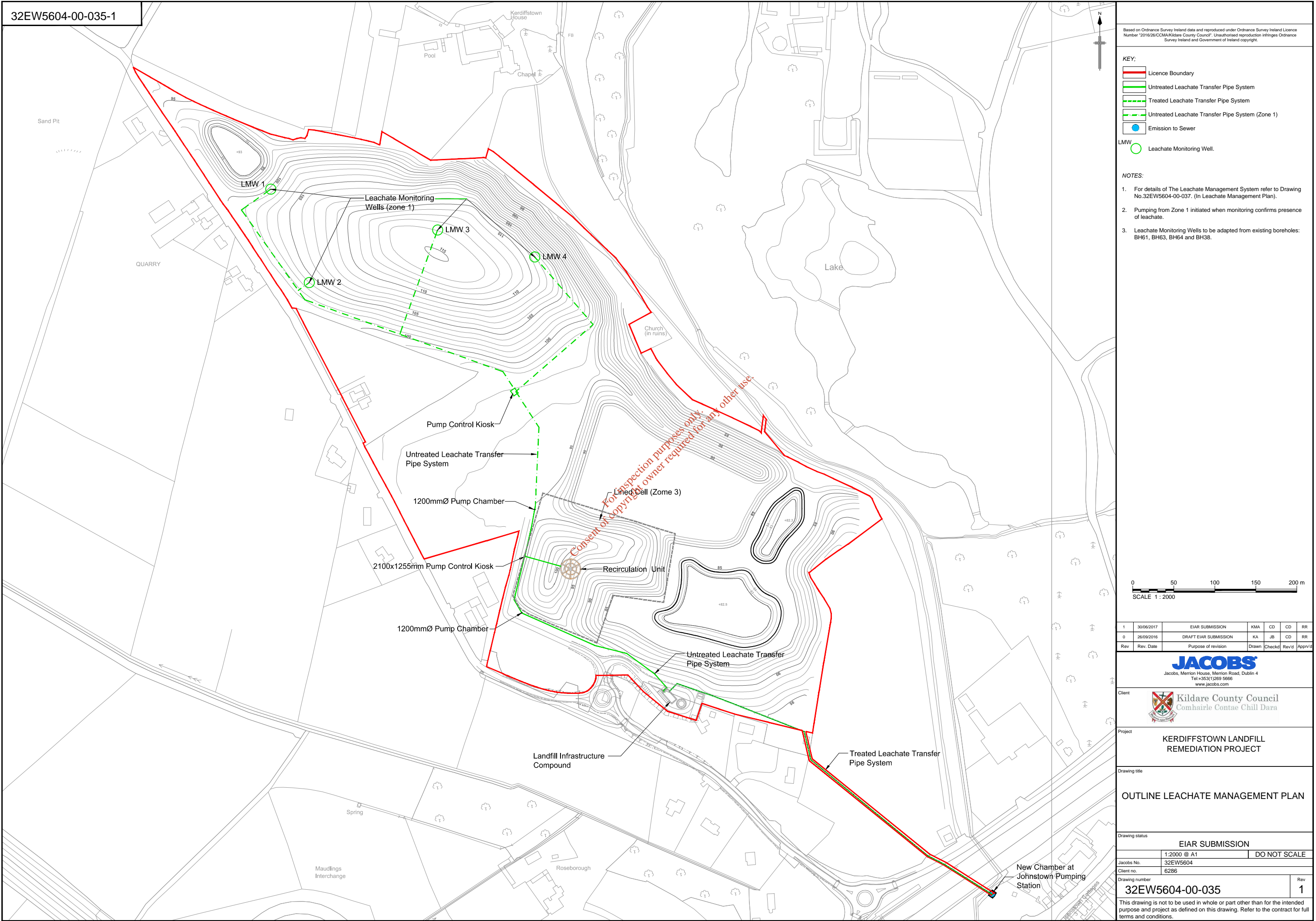
INDICATIVE ELEVATION



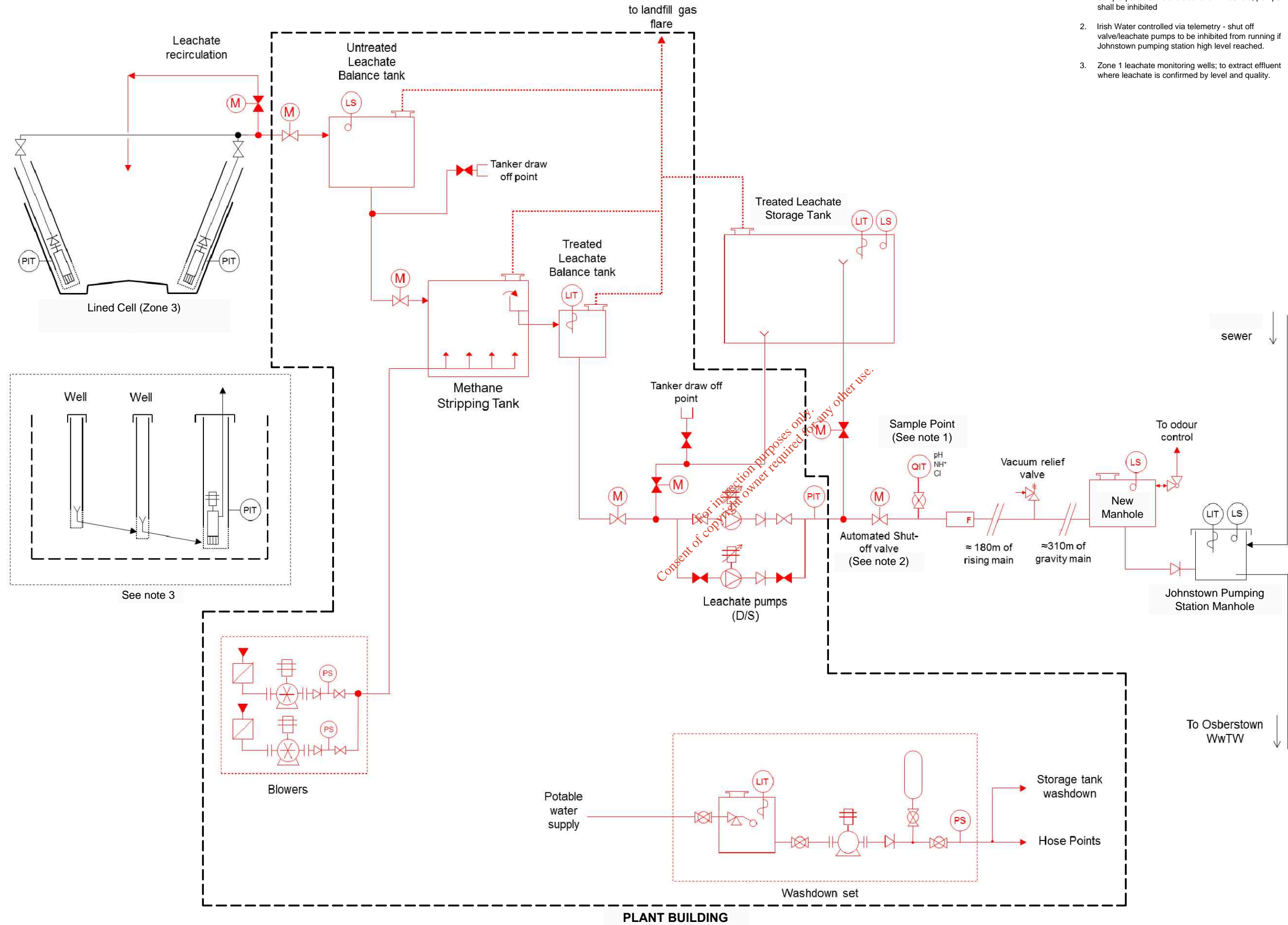
- NOTES:
1. All dimensions in millimetres unless otherwise stated.
  2. Layout of internal infrastructure is indicative only.



1	30/06/2017	EIAR SUBMISSION	KMA	CD	CD	RR
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Rev	Rev. Date	Purpose of revision	Drawn	Checked	Rev'd	Appr'd
<b>JACOBS</b> Jacobs, Merrion House, Merrion Road, Dublin 4 Tel: +353(1)269 5666 www.jacobs.com						
Client  Kildare County Council Comhairle Contae Chill Dara						
Project KERDIFFSTOWN LANDFILL REMEDIATION PROJECT						
Drawing title LEACHATE MANAGEMENT PLAN LEACHATE MANAGEMENT BUILDING AND LEACHATE STORAGE TANK LAYOUT AND INDICATIVE ELEVATIONS						
Drawing status EIAR SUBMISSION						
1:50 @ A1			DO NOT SCALE			
Jacobs No. 32EW5604						
Client no. 6286						
Drawing number 32EW5604-00-033						Rev 1
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- NOTES :
1. Sample points to draw off flows for monitoring ph, ammonia and chlorine. Lab sample available for metals concentration, BOD load etc. If continuous sample parameters are above fail threshold, pumps shall be inhibited
  2. Irish Water controlled via telemetry - shut off valve/leachate pumps to be inhibited from running if Johnstown pumping station high level reached.
  3. Zone 1 leachate monitoring wells; to extract effluent where leachate is confirmed by level and quality.

KEY:

- Existing/Outside Scope
- New
- Gas Pipework
- Valve (normally open)
- Valve (normally closed)
- Ball Valve
- Actuated Valve
- Sealed Tank
- Level Sensor
- Ultrasonic Level Indicator
- Pressure Indicator
- Pressure Sensor
- Quality Instrument
- Flowmeter
- Angle Float Valve
- Variable Speed Motor and Pump
- Pump
- Air Blower
- Non Return Valve
- Pressure Relief Valve
- Vacuum Relief Valve
- Borehole Pump
- Submersible Pump
- Pressure Vessel
- Air Intake and Filter

1	30/06/2017	EIAR SUBMISSION	KMA	CD	CD	RR
0	26/09/2016	DRAFT EIAR SUBMISSION	AR	ND	CD	RR
Rev	Rev. Date	Purpose of revision	Drawn	Checked	Rev'd	Appr'd
<div><div><div>JACOBS</div><div>Jacobs, Merrion House, Merrion Road, Dublin 4 Tel: +353(1) 269 5666 www.jacobs.com</div></div><div><div>Client</div><div><div>Kildare County Council Comhairle Contae Chill Dara</div></div></div><div><div>Project</div><div>KERDIFFSTOWN LANDFILL REMEDATION PROJECT</div></div><div><div>Drawing title</div><div>LEACHATE MANAGEMENT HIGH LEVEL P&amp;ID</div></div><div><div>Drawing status</div><div>EIAR SUBMISSION</div></div><div><div>Scale</div><div>NTS</div><div>DO NOT SCALE</div></div><div><div>Jacobs No.</div><div>32EW5604</div></div><div><div>Client No.</div><div>6286</div></div><div><div>Drawing number</div><div>32EW5604-00-037</div></div><div><div>Rev</div><div>1</div></div></div>						
This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.						