

5883/WAL/LMP/3.1



**RED Industries Ltd.**

**Walleys Landfill Site**

## **Revised Leachate Management Plan**

**April 2019**

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**Prepared for**

**RED Industries RM Ltd**



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## **Document Review**

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## **1.0 INTRODUCTION**

### **1.1 Report Context**

- 1.1.1 RED Industries RM Limited have operated Walleys Landfill Site since November 2016. The Site is operated by RED under an Environmental Permit EPR/DP3734DC.
- 1.1.2 This document has been prepared on behalf of RED by Egniol Environmental Ltd and is an update and replacement to the current Leachate Management Plan<sup>1</sup> for the Site which has been referred to.
- 1.1.3 The objectives of the Leachate Management Plan are:
- To control leachate generation in the Site;
  - To prevent contamination of groundwater and surface water by leachate migration
  - To reduce the elevated leachate levels within the landfill and to maintain them below the control levels to comply with the Permit.

### **1.2 Site Location**

- 1.2.1 Walleys Landfill is located 1.5km to the west of the centre of Newcastle-under-Lyme, Staffordshire at National Grid Reference (NGR) SJ 8309 4603. The Site is classified as a non-hazardous landfill under the Landfill Directive.
- 1.2.2 The site is a former clay quarry and covers an area of approximately 23.5 hectares. To the west and south of the landfill boundary runs Cemetery Road which also provides access to the Site. The surrounding area is predominately suburban residential in setting with a cemetery located to the west of the Site beyond Cemetery Road, and to the north adjacent to the boundary a Garden Centre.
- 1.2.3 The landfill has been developed in the void created from the extraction of clay. Engineering work for landfill operations commenced in 2006 with waste being accepted in Cell 1 in January 2007. Since then waste disposal operations have continued in Cells 1, 2, 3 and 4 with the sidewall engineered to 110mAoD in Cells 1, 2, 3 and 4. The sidewall of Cell 1 was extended to the full height of the quarry wall in 2009 at around 114mAOD to provide waste void prior to completion of the engineering of Cell 4 which was completed in 2010.

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<sup>1</sup> Red Industries Limited, Walleys Landfill Site, Revised Leachate Management Plan, October 2017, Version 2.5

## 2.0 EXISTING ENGINEERING AND RESTORATION SETTING

- 2.1 The existing engineering details as outlined below have been extracted from the current leachate management plan.<sup>2</sup>
- 2.2 The cell layout is shown on Drawing 5883.LEAC.D01. The landfilling at the site will comprise of infilling the engineered void of the former quarry.
- 2.3 The engineered basal lining system in Cells 1 and 2 comprised of 3 metres thickness of engineered clay (Gorsty clay) to a minimum permeability of  $1 \times 10^{-9}$  m/s. In Cells 3 and 4, the 3 metres thickness of engineered clay was varied to comprise a metre of ex-site red clay and 2 metres of Gorsty clay to  $1 \times 10^{-9}$  m/s. The 3 metres basal lining was extended 2 metres above the height of the basal liner on the external sidewall of the engineered cells. The engineered sidewall lining comprises a metre thickness of engineered clay to a minimum permeability of  $1 \times 10^{-9}$  m/s placed on a 1 in 3 side-slope.
- 2.4 The base of the cells were constructed to fall with a 300mm thick 20/40mm aggregate drainage blanket placed above the basal liner. HDPE leachate collection pipework was installed within the drainage blanket and connected to the leachate collection points installed on a concrete base at the low points of the cell.
- 2.5 In Cell 1 the leachate collection point comprised of a HDPE sidewall riser (WAL\_LSR1), with two remote vertical leachate monitoring points WAL\_LS1 and WAL\_LS2 constructed. Both these leachate monitoring points (WAL\_LS1 and WAL\_LS2) failed due to settlement and were replaced with retro drilled monitoring points WAL\_LS1A and WAL\_LS2A installed on the target pads. Subsequently WAL\_LS1A and WAL\_LS2A were replaced with retro-drilled monitoring wells WAL\_LS1B and WAL\_LS2B since WAL\_LS1A and WAL\_LS2A could no longer be dipped or sampled due to movement in the well liner which had occurred during waste disposal operations around them. In Cell 2, there is a vertical HDPE telescopic leachate collection point (WAL\_LS4) and two vertical HDPE telescopic leachate monitoring points (WAL\_LS3 and WAL\_LS5), in Cell 3 there is a vertical HDPE telescopic leachate collection point (WAL\_LS6) and one vertical HDPE telescopic leachate monitoring points (WAL\_LS7) and in Cell 4 there is a vertical HDPE telescopic leachate collection point (WAL\_LS9) and one vertical HDPE telescopic leachate monitoring points (WAL\_LS8). As filling progresses additional HDPE prefabricated telescopic 3m sections are added to the leachate collection and monitoring wells.
- 2.6 Concrete target pads were constructed in Cells 2 to 4, so that in the event of the leachate wells having failed replacement wells could be retro-drilled down to the target pads.
- 2.7 In 2008 the bund between Cell 1 and 2 was deliberately breached with the liner level on the Cell 1 of the breach at 80.2mAoD and on the Cell 2 side of the breach at 81.2mAoD to allow leachate from Cell 2 to drain into Cell 1. The base of Cell 4 was constructed at an elevated level above Cell 2 with a minimum level of 84.3mAoD at the junction between the two cells with the leachate drainage blanket in Cell 4 connected to that of Cell 2. There is no intercell bund between Cells 2 and 4 therefore providing hydraulic connectivity between the two cells to allow leachate to drain from Cell 4 into Cell 2.
- 2.8 To date, waste has been tipped to varying levels in Cells 1, 2, 3 and 4 with only Cell 1 having been engineered and infilled to the top of quarry level but has not been completed

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<sup>2</sup> Red Industries Limited, Walleys Landfill Site, Revised Leachate Management Plan, October 2017, Version 2.5

to the permitted final waste profile. Waste will continue to be tipped to in all cells until sidewall engineering is undertaken in each, and thereafter it is understood that infilling is to progress to full height in a clockwise direction. As full height is reached the site is to be progressively permanently capped and restored.

- 2.9 In 2013 Cell 1 was temporary capped with a minimum of 300mm of clay overlain by a minimal depth of soils.

### 3.0 EXISTING LEACHATE MANAGEMENT

#### 3.1 General

- 3.1.1 The existing leachate management infrastructure on the Site comprises a Leachate Collection Sidewall riser, three vertical leachate collection points, six vertical remote leachate monitoring points, Leachate Storage Tank, Leachate Treatment Plant (LTP) and a treated leachate effluent discharge line to public sewer.
- 3.1.2 The existing leachate management at the Site comprises extraction of leachate from those wells with pumps installed with the leachate being disposed off-site by tanker or discharged to sewer via the LTP.

#### 3.2 Existing Leachate Extraction System

- 3.2.1 The existing leachate extraction and monitoring infrastructure at the Site is shown on Drawing 5883.LEAC.D02 and in the Table 1 below.

**Table 1 - Leachate Collection and Monitoring Points Infrastructure**

Well ID	Well Type	Cell Number	Base Datum <sup>1</sup> (mAoD)
WAL_LSR1	Leachate Collection Sidewall Riser	Cell 1	N/A
WAL_LS1A	Vertical Remote Telescopic Leachate Monitoring Point	Cell 1 Redundant	80.30
WAL_LS1B	Vertical Remote Telescopic Leachate Monitoring Point	Cell 1	80.82
WAL_LS2B	Vertical Remote Telescopic Leachate Monitoring Point	Cell 1	80.73
WAL_LS3	Vertical Remote Telescopic Leachate Monitoring Point	Cell 2	81.36
WAL_LS4	Vertical Telescopic Leachate Collection Point	Cell 2	81.07
WAL_LS5	Vertical Remote Telescopic Leachate Monitoring Point	Cell 2	81.83
WAL_LS6	Vertical Telescopic Leachate Collection Point	Cell 3	86.73
WAL_LS7	Vertical Remote Telescopic Leachate Monitoring Point	Cell 3	87.87
WAL_LS8	Vertical Remote Telescopic Leachate Monitoring Point	Cell 4	84.91
WAL_LS9	Vertical Telescopic Leachate Collection Point	Cell 4	84.02

#### Notes

1. Information in the above table has been extracted from Tarmac Leachate Management Plan, May 2015.
- 3.2.2 Currently raw leachate is extracted via electric submersible pumps installed in WAL\_LSR1 (the sidewall riser) in Cell 1, WAL\_LS3 (leachate monitoring point) in Cell 2, WAL\_LS4 (leachate collection point) in Cell 2, WAL\_LS5 (leachate monitoring point) in Cell 2, WAL\_LS6 (leachate collection point) in Cell 3 and WAL\_LS9 (leachate collection point) in Cell 4. The electric submersible pumps are float controlled and are fed from mains power. The leachate is pumped to a 30,000 litres steel bunded leachate storage tank (which was installed in February 2019 replacing the existing tank) located on Cell 1 via pipework. The leachate storage tank has an integral steel bund with a 110% capacity and is fitted with a biofilter to minimise odours. The tank is fitted with a high-level float that shuts down the leachate pumps to prevent the tank being overfilled. In addition, the tank is also fitted with a high-high level float to shut the pump down should the high-level float fail for any reason.



- 3.2.3 The pumps are set up to pump the leachate head below 1metre. The amp out-puts from the pumps can be checked to verify that the pumps are working. If the pumps are found not to be working correctly, the cause of the problem will be investigated by the Site Manager and the pump repaired or replaced as required.
- 3.2.4 Leachate from the leachate storage tank is pumped to the bunded 80m<sup>3</sup> Raw Leachate Balancing Tank (RLBT) located in the Leachate Treatment Plant (LTP) compound. From the RLBT leachate can either be tankered off site to a suitably licenced facility or can be fed to the LTP for treatment with the treated leachate being discharged to sewer via effluent discharge line.
- 3.2.5 There are 23 pneumatic pumps installed in the gas extraction wells discharging leachate/condensate into WAL\_LS4 and WAL\_LS6.
- 3.2.6 The responsibility for the maintenance of the leachate extraction system lies with the Site Manager.
- 3.2.7 All the equipment used within the leachate extraction system shall be regularly inspected, where possible, maintained and repaired as necessary. The Site Manager shall regularly inspect all the equipment used in the leachate extraction system, where possible. Inspection and maintenance activities may include the following:
- 1) Minimum weekly inspection, recorded in the Site Diary, of leachate collection and monitoring points for evidence of damage and the repair of damaged items to ensure the integrity of the system is maintained;
  - 2) Removal of the leachate extraction pumps at regular intervals, for cleaning, maintenance and repair;
  - 3) Inspection of leachate discharge lines for evidence of damage and leaks and the repair of damaged items to ensure the integrity of the system is maintained; and
  - 4) Where required the CCTV inspection and rodding/jetting of pipework, where possible to maintain its carrying capacity.
- 3.2.8 An action plan in the event of a failure of the leachate extraction system is contained in Section 7 of this plan.

### **3.3 Leachate Treatment Plant (LTP)**

- 3.3.1 The general layout of the LTP is shown on Drawing VSL 482. The LTP comprises of an 80m<sup>3</sup> bunded Raw Leachate Balancing Tank (RLBT), a 1,200m<sup>3</sup> bunded Sequencing Batch Reactor (SBR) tank, an 80m<sup>3</sup> bunded effluent tank, a 15m<sup>3</sup> bunded caustic soda storage tank, a blower, a tanker connection point and a containerised control room containing the electrical panels, PLC, HMI and SCADA system.
- 3.3.2 There is a detailed Operation and Maintenance Manual that covers the design, safety systems, maintenance and daily operation of the plant. The P&ID drawing for the LTP is presented on Drawing VSL 481.
- 3.3.3 The LTP was designed and built by Viridian Systems Limited (VSL) with commissioning of the plant commenced in April 2014. The leachate treatment process is biological using activated sludge within the SBR tank.

3.3.4 Raw leachate is pumped from the leachate storage tank on Cell 2 up to the 80m<sup>3</sup> banded raw leachate balancing tank located in the Leachate Treatment Plant (LTP) compound. The RLBT has a working capacity of 75m<sup>3</sup>. The RLBT has several functions:

1. To even out any differences in leachate quality that may exist in the different areas of the site and in particular to try and prevent acetogenic (high BOD) leachate from being overfed to the plant;
2. To control the feed rate to the plant, better control can be achieved by feeding from the RLBT rather than directly from leachate pumps in the wells; and
3. Leachate can be tankered from the RLBT in the event of excessive leachate volumes or plant shutdown.

3.3.5 The LTP has been designed by VSL to treat a flow rate of **75m<sup>3</sup>/day** based on the design concentrations and loadings in Table 2.

**Table 2 - Design Loadings**

Parameter	Average Concentrations (mg/l)		Design Loading (kg/day)
	Leachate	Effluent	
Ammonia	1,500	50	108.8
BOD	600	0	45.0
COD	4,200	1,680	189.0
Alkalinity	7,800	800	525.0

3.3.6 Leachate to be treated in the LTP is transferred from the RLBT into the SBR via pump. The SBR has a working volume of 1,088 m<sup>3</sup>. The SBR has two operational phases; an anoxic phase that can be activated if acetogenic (high BOD) is present. In this phase denitrification takes place in the absence of dissolved oxygen. The second operational phase is undertaken during aeration and is the nitrification phase. The aeration is provided by a 475m<sup>3</sup>/hour blower servicing four rotary aerators in the base of the tank. The default operational mode of the plant is nitrification.

3.3.7 In the nitrification process the conversion of ammoniacal nitrogen to nitrates generates acidity; to maintain the pH level of the mixed liquor it is dosed with 32% sodium hydroxide solution supplied from a 15m<sup>3</sup> banded caustic soda storage tank or Magnesium hydroxide solution from suitable tanks/containers. The alkali dosing of the mixed liquor is controlled by a pH probe with dosing initiated at pH 7.15 and ceasing at pH 7.5.

3.3.8 To prevent the build up of foam during the aeration process, antifoam is dosed automatically into the SBR Tank. Following on from the analysis of biomass condition, Ferromex is added to the biomass in the SBR to aid settlement and reduce biomass loss on treated leachate discharge.

3.3.9 A combined ammonia, temperature, pH probe and a separate Dissolved Oxygen (DO) probe are installed in the SBR to allow automatic control of the treatment process via the PLC.

3.3.10 The ammonia concentration in the RLBT is checked using on site test kits. This is used to calculate the volume of leachate that can be fed to the plant for treatment based on the

ammonia load. On the pipework between the RLBT and SBR tank is a flow meter that enables the volume fed to the SBR to be controlled by the PLC.

- 3.3.11 At the end of the treatment cycle in the SBR; the plant goes into settlement phase which allows for the biomass (activated sludge) to settle prior to decanting. A sample is recovered at the end of treatment cycle and is analysed for ammonia by Nesslerisation and pH via a multipoint calibrated pH meter. Once the settlement phase is completed the leachate is decanted to the bunded effluent storage tank via a floating off take. The treated leachate is discharged to sewer via a discharge pipeline under a trade effluent agreement with Severn Trent. A MCERTS certified Magflow type meter is fitted to the discharge pipeline to enable the volume of leachate discharged to the sewer to be logged and recorded on the PLC. A sampling point is fitted on the pipeline.
- 3.3.12 The trade effluent agreement with Severn Trent with the limits for treated leachate to be discharge to sewer are presented in Table 3, below.

**Table 3 - Severn Trent Trade Effluent Agreement Limits**

Parameter	Limit
Volume	100m <sup>3</sup> in any continuous 24 hour period
Maximum rate	3.5 litres / second
Temperature	43°C
pH	6 to 12
Suspended solids	550 mg/l
COD	3,500 mg/l
Mecoprop	25 ug/l
Chromium	1 mg/l
Copper	5 mg/l
Lead	2 mg/l
Nickel	1 mg/l
Zinc	5 mg/l
Ammonia laod	8.5 kg during a 24 hour period
Sulphides	1 mg/l
Sulphates	1,000 mg/l
Soluble methane	0.14 mg/l
2, 4 D-B	3 ug/l
2, 4 D-P	3 ug/l

- 3.3.13 There is the potential for odour emissions from the raw leachate in the RLBT. To mitigate the potential odour emissions the RLBT is vented via a biofilter, with the filter media comprising of medium and large soft woodchip and compost. This provides a substrate for micro-organisms which biologically degrade the volatile organic compounds. The filter media in the biofilter is irrigated with water via an automatic irrigation system controlled by the plant PLC.
- 3.3.14 The filter media in the biofilter requires to be checked annually as a minimum and replaced as required. The filter media has a life of between 2 to 5 years. The performance of the biofilter is to be checked by daily olfactory testing by the Site Manager.
- 3.3.15 The treatment process of the LTP is controlled and monitored by the PLC which can be monitored and operated remotely via the Human Machine Interface (HMI). Alarms are transmitted via SMS messaging.

3.3.16 The Operation and Maintenance Manual for the LTP details the inspections and maintenance activities to be undertaken.

### **3.4 Competence and Training**

3.4.1 All personnel involved in the leachate management at the Site shall have been trained to be able to fulfil their responsibilities.

3.4.2 RED personnel training records are kept on site or at head office, training records for monitoring personnel are kept centrally. Records can be made available for inspection on request.

## 4.0 LEACHATE LEVELS AND VOLUMES OF LEACHATE REMOVED FROM SITE

### 4.1 General

- 4.1.1 Since November 2016, when RED acquired the Site, they have continuously been extracting leachate from those wells with pumps installed to attempt to reduce the leachate levels to the compliance limits, with the extracted leachate being tankered off site to a suitably licenced facility and/or discharged to sewer via the LTP.

### 4.2 Leachate Levels

- 4.2.1 The leachate levels at the Site are affected by rainfall and also by 23 pneumatic pumps installed in the gas extraction wells which require to be run continuously which discharge in wells WAL\_LS4 and WAL\_LS6.
- 4.2.2 Based on the leachate level monitoring undertaken between January 2018 to December 2018, the leachate levels at the Site at present are elevated; as can be seen from the leachate well results presented in Appendix 1 of this Plan and summarised in Table 4, below.

**Table 4 - Leachate Levels Between January 2018 to December 2018**

Leachate Well	Dip Level (m)			Leachate Level (mAOD)			Count	Leachate Depth Above Compliance Limit (m)		
	min	max	ave	min	max	ave		min	max	ave
Control Level								83m AoD (LS1-LS5)		
WAL_LS1B	13.89	24.88	20.20	93.89	108.10	100.29	6	10.89	25.10	17.29
WAL_LS2B	2.90	30.35	15.99	92.99	120.44	104.02	6	9.99	37.44	21.02
WAL_LS3	2.76	38.00	13.67	81.41	116.65	105.74	6	-1.59	33.65	22.74
WAL_LS4	3.70	40.00	17.73	81.78	118.08	102.96	7	-1.22	35.08	19.96
WAL_LS5	7.18	40.00	22.22	82.59	115.90	101.19	7	-0.41	32.90	18.19
Control Level								1m above base		
WAL_LS6	10.64	30.00	13.56	87.32	112.97	109.27	8	-0.41	25.24	21.54
WAL_LS7	7.80	40.00	13.54	82.41	112.23	107.84	8	-6.46	23.36	18.97
WAL_LS8	8.80	40.00	21.72	79.78	111.70	99.02	5	-6.13	25.79	13.11
WAL_LS9	5.50	14.47	9.20	109.57	113.72	112.01	7	24.55	28.70	26.99

Notes

The basal level and control Level for WAL\_LS6 to WAL\_LS9 are as follows

Leachate Well	Base Datum (mAOD)	Control Level (mAOD)
WAL_LS6	86.73	87.73
WAL_LS7	87.87	88.87
WAL_LS8	84.91	85.91
WAL_LS9	84.02	85.02

- 4.2.3 In 2016 when the Site was operated by Tarmac; the leachate levels continued to be in agreed deviation, as can be seen in Table 5, which has been extracted from the Annual Environmental Monitoring Report<sup>3</sup>.

**Table 5 - Leachate Levels Extracted from 2016 Annual Environmental Monitoring Report**

**Table 1 Leachate Levels (EP Table S3.1)**

Leachate Well	Dip Level (m)			Leachate Level (mAOD)			Count	Leachate Depth (m)		
	min	max	average	min	max	average		min	max	average
<b>Control Level</b>				<b>83m aod (LS1-LS5)</b>				<b>1m above base (LS6-LS9)</b>		
WAL_LS1B	18.5	29.9	25.6	83.1	94.5	87.5	30			
WAL_LS2B	25.0	30.4	28.5	83.0	88.3	84.8	13			
WAL_LS3	3.9	24.8	18.8	83.6	104.6	89.7	34			
WAL_LS4	16.4	27.3	21.5	83.0	93.8	88.9	43			
WAL_LS5	16.5	23.1	21.6	84.6	91.5	86.1	11	2.7	9.7	
WAL_LS6	16.1	22.6	19.9	88.3	94.6		41	1.6	7.8	4.3
WAL_LS7	n/a	n/a	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a
WAL_LS8	15.8	24.1	19.9	0.0	93.3		13	0.0	8.4	4.3
WAL_LS9	13.6	22.2	18.0	85.5	4.1		37	1.5	10.0	5.8

#### 4.3 Volume of Leachate Removed from Site

- 4.3.1 Leachate extraction, tankering off site, treatment and disposal to sewer are on-going by RED. The volume of leachate removed from Site by RED in 2017 and 2018 is summarised in Table 6, below.

**Table 6 - Volume of Leachate Removed from Site by Red in 2017 and 2018**

Year	Treated by LTP and Discharged to Sewer (m <sup>3</sup> ) <sup>1</sup>	Tankered Off Site (m <sup>3</sup> ) <sup>1</sup>	Total Removed from Site (m <sup>3</sup> )	Ave Volume per day Treated by LTP (m <sup>3</sup> /day) <sup>2</sup>	Ave Volume Disposed by Tanker per day (m <sup>3</sup> /day) <sup>3</sup>
2017	17,844.1	14,589.7	32,433.8	48.9	71.4
2018	16,480.7	7,876.26	24,356.96	45.2	31.5

Notes

1. Volumes taken from the respective Annual Environmental Monitoring Reports<sup>4,5</sup>
2. Based on 365 days per annum
3. Based on 250 days per annum

- 4.3.2 During Tarmac tenure of the Site the volume of leachate removed from Site between 2012 to 2016 is summarised in Table 7 overleaf.

<sup>3</sup> Walleys Landfill Site Annual Environmental Monitoring Report, 2016 Review Period, January 2017

<sup>4</sup> Walley's Landfill Site Annual Environmental Monitoring Report, 2017 Review Period, January 2018

<sup>5</sup> Walley's Quarry Landfill Site Annual Environmental Monitoring Report, 2016 Review Period, January 2017

**Table 7 - Volume of Leachate Removed from Site by Tarmac between 2012 to 2016**

Year	Treated by LTP and Discharged to Sewer (m <sup>3</sup> )	Tankered Off Site (m <sup>3</sup> )	Total Removed from Site (m <sup>3</sup> )	Ave Volume per day Treated by LTP (m <sup>3</sup> /day) <sup>1</sup>	Ave Volume Disposed by Tanker per day (m <sup>3</sup> /day) <sup>2</sup>
2012 <sup>3</sup>	0	22,543	22,543	0	90
2013 <sup>3</sup>	0	39,007	39,007	0	156
2014 <sup>3</sup>	11,543	21,621	33,164	47	86
2015 <sup>3</sup>	20,546	5,753	26,299	56	23
2016 <sup>4</sup>	22,790	5,157	27,947	62	21

**Notes**

1. Based on 365 days per annum (but for April 2014 245 days assumed as the LTP was commissioned in April 2014).
2. Based on 250 days per annum
3. Volumes taken from Table 5 in Tarmac Walleys Landfill Site, Leachate Management Plan, May 2015
4. Volumes provided by RED from LTP SCADA and tanker tickets from Site
5. Volumes taken from Walleys Landfill Site, Annual Environmental Monitoring Report

- 4.3.3 In 2017 RED commissioned Egniol Environmental Ltd (Egniol) to undertake a review of the LTP to ascertain the condition of the plant with a view to optimising performance and to evaluate potential future developments to increase the volume and throughput of leachate which can be treated per day. The biomass condition was sampled and analysed on a number of occasions by Egniol. The latest sample, undertaken on 29.08.17 showed that the condition of the biomass had improved since the previous sampling on 15.03.17. This was thought to be due to the addition of Ferromex to the biomass. On the basis of this improvement and a requirement to keep the plant operational rather than take it off line to re-seed the biomass it was decided to postpone any further changes to the plant.

## **5.0 PROPOSED LEACHATE MANAGEMENT IMPROVEMENTS**

### **5.1 General**

- 5.1.1 RED are committed to reducing the elevated leachate levels at the Site through improvement to the existing leachate management strategy including improvements to the leachate extraction system, optimisation of the LTP and the on-going removal of leachate via tankering to a suitably licenced facility.
- 5.1.2 Since their acquisition of the Site Red have undertaken a number of improvements to the existing leachate management systems in a phased approach, including;
1. Provision of mains electrical feed to the landfill to remove the necessity for generators to provide power to the pumps. This enables the pumps to run on a 24/7 basis, so that the leachate can be fed to the LTP on a constant float switch system.
  2. The installation of electric submersible pumps to WAL\_LS5 (Cell 2), WAL\_LS6 (Cell 3) and WAL\_LS9 (Cell 4).
  3. Reviewing the performance of the LTP and improving the condition of the biomass by addition of Ferromax and the use of Magnesium Hydroxide rather than Sodium hydroxide.

### **5.2 Future Improvements**

- 5.2.1 Red have a tipping strategy that aims to temporary cap approximately half the current operational area by the end of 2019
- 5.2.2 To achieve this strategy, sidewall engineering works will take place in Cells 1, 2 & 3 during 2019. This will provide void located predominantly in Cell 1 (after removal of the current 10,000 sq. temporary cap in this area) that will facilitate tipping for approximately 2 years.
- 5.2.3 Restricting tipping in this Cell 1 area will enable the remaining active areas of the site to be temporary capped thereby reducing rainfall infiltration and hence leachate generation.
- 5.2.4 It is anticipated that the temporary cap will comprise approximately 50,000 sq.m of geomembrane with a suitable surcharge.

### **5.3 Strategy to Compliance**

- 5.3.1 Egniol have undertaken a review of the likely timescales to achieve compliance with the currently approved control levels for leachate after installation of the proposed temporary cap in 2019.
- 5.3.2 Using conservative assumptions for the quantities of leachate likely to be required to be removed from the site it is estimated that compliance can be achieved by the end of 2022.
- 5.3.3 The above is based on an average 2,000 m<sup>3</sup> of leachate a month being removed from the site up to the end of 2022. The quantity for each individual month may be subject to variation caused by changing conditions on site e.g weather.
- 5.3.4 The removal of leachate from the site would be through a combination of tankering off site and treatment via the LTP with subsequent disposal to sewer, as per the current on-site practice.



- 5.3.5 Red will report the volumes of leachate removed from the site on a monthly basis to the Environment Agency to enable them to monitor progress.
- 5.3.6 As discussed already with the Environment Agency, Red will be reviewing options for increasing the permitted leachate levels at the site together with alternative sidewall lining construction details. These will form the basis of a future Permit Variation Application that Red will look to progress with the Environment Agency during 2019.

## 6.0 LEACHATE MONITORING PLAN

### 6.1 General

6.1.1 The purpose of the leachate monitoring plan is to detail the monitoring parameters, methodologies, reporting procedures with regards to leachate at the Site in order to:

- to determine the leachate levels and quality in each cell;
- to monitor the efficiency of the leachate management system and where required to determine appropriate leachate management measures; and
- ensure that the assessment criteria and reporting is undertaken in accordance with the Permit.

6.1.2 This Leachate Monitoring Plan has been prepared to meet the requirements of the Environmental Permit EPR/DP3734DC/T001 relating to Leachate Levels and quality monitoring.

6.1.3 The Leachate Monitoring Plan will be subject to annual review with no changes being made to the Plan without prior consultation and agreement with the Environment Agency.

6.1.4 All personnel involved in the leachate monitoring will have been trained to able to fulfil their responsibilities.

6.1.5 In the preparation of this Leachate Monitoring Plan reference has been made to Section 5 of the existing Leachate Management Plan prepared by Tarmac.

### 6.2 Leachate Monitoring

6.2.1 Leachate level and quality are monitored on a monthly basis at the leachate collection and monitoring points referred to in Table 8, whose locations are shown on Drawing 5883.LEAC.D02.

**Table 8 - Leachate Level and Quality Monitoring Locations**

Well ID	Well Type	Cell Number
WAL_LS1B	Vertical Remote Telescopic Leachate Monitoring Point	Cell 1
WAL_LS2B	Vertical Remote Telescopic Leachate Monitoring Point	Cell 1
WAL_LS3	Vertical Remote Telescopic Leachate Monitoring Point	Cell 2
WAL_LS4	Vertical Telescopic Leachate Collection Point	Cell 2
WAL_LS5	Vertical Remote Telescopic Leachate Monitoring Point	Cell 2
WAL_LS6	Vertical Telescopic Leachate Collection Point	Cell 3
WAL_LS7	Vertical Remote Telescopic Leachate Monitoring Point	Cell 3
WAL_LS8	Vertical Remote Telescopic Leachate Monitoring Point	Cell 4
WAL_LS9	Vertical Telescopic Leachate Collection Point	Cell 4

6.2.2 Leachate level monitoring is undertaken as outlined in Table 9, as per Table S3.1 of the Permit.

**Table 9 – Leachate Level Limits and Monitoring Requirements as Per Table 3.1 of the Permit**

Monitoring Point Reference/Description	Limit	Monitoring Frequency
Cells 1 and 2	83 mAoD  2m below the level of the surrounding groundwater during post closure	Monthly
Cells 3 and 4	1m above the surface of the basal seal during the operational phase  2m below the level of the surrounding groundwater during post closure	Monthly

6.2.3 Leachate quality monitoring is undertaken as outlined in Table 10, as per Table S3.11 of the Permit.

**Table 10 – Leachate – Other Monitoring Requirements as Per Table 3.11 of the Permit**

Monitoring Point Reference/Description	Parameter	Monitoring Frequency
<b>Operational Cells or Phases (Any cell or phase that do not have a final engineered cap)</b>		
Cell 1 (sample from one of WAL_LS1B & WAL_LS2B, Cell 2 (sample from one of WAL_LS3, WAL_LS4 & WAL_LS5), Cell 3 (sample from one of WAL_LS6 & WAL_LS7) Cell 4 (sample from one of WAL_LS8 & WAL_LS9)	Ph, EC, total alkalinity, ammoniacal nitrogen, Chloride, COD, BOD, cadmium, chromium, copper, lead, nickel, iron, arsenic, magnesium, potassium, total sulphates, calcium, sodium, zinc, manganese	Quarterly
	Hazardous substances	Annually
	Depth to base (mAoD)	Annually
<b>Non Operational Cells or Phases (Any cell or phase that have a final engineered cap)</b>		
Cell 1 (sample from one of WAL_LS1B & WAL_LS2B, Cell 2 (sample from one of WAL_LS3, WAL_LS4 & WAL_LS5), Cell 3 (sample from one of WAL_LS6 & WAL_LS7) Cell 4 (sample from one of WAL_LS8 & WAL_LS9)	Ph, EC, total alkalinity, ammoniacal nitrogen, Chloride, COD, BOD, cadmium, chromium, copper, lead, nickel, iron, arsenic, magnesium, potassium, total sulphates, calcium, sodium, zinc, manganese	Annually
	Hazardous substances	Once every four years
	Depth to base (mAoD)	Annually

- 6.2.4 The treated leachate effluent from the LTP shall be sampled at the designated location.
- 6.2.5 All leachate collection and monitoring points as listed in Table 8, which are monitored shall be checked on each monitoring visit by the Monitoring Technician to confirm that the point remains 'fit for purpose'. Any defects identified are to be reported by the Monitoring Technician to the Site Manager before leaving site. The Site Manager shall investigate the defect and effect a programme of remedial works.

### **6.3 Methodologies and Equipment**

- 6.3.1 Leachate levels will be recorded using an electronic water level meter with leachate samples being recovered using a leachate bailer. The monitoring equipment will be maintained in good working condition and serviced according to the manufacturer's recommendations.
- 6.3.2 The leachate monitoring procedures used at the Site are included in Appendix 2. The Standard Operating Procedure for leachate monitoring, SOP 8, has been appropriately adopted into the management system. SOP 8 has been based on industry best practice and the Environment Agency document 'Guidance on monitoring of landfill leachate, groundwater and surface water'.
- 6.3.3 Meteorological conditions will be recorded at the time of the monitoring and include the general weather conditions and atmospheric pressure prior to and following the field works.
- 6.3.4 All monitoring data relating to routine leachate monitoring will be entered into an electronic database system and checked against compliance limits.
- 6.3.5 If compliance limits are exceeded, the cause should be investigated. If required the Action Plan (Section 7) will be implemented.

### **6.4 Data Storage and Reporting**

- 6.4.1 All monitoring data relating to routine leachate monitoring will be entered into an electronic database system.
- 6.4.2 The electronic database system will be used to collate, manage and report on leachate monitoring data for the Site.
- 6.4.3 Reporting of leachate to the Environment Agency will be quarterly in accordance with the requirements of the Permit. Whilst the elevated leachate levels are being brought back into compliance a written monthly report on the progress in reducing the leachate levels during the previous months will be submitted to the Environment Agency.
- 6.4.4 As required by condition 4.2.2 of the Permit, the results of the monitoring over the previous year will be collated in an annual report and shall be submitted to the Environment Agency by 31<sup>st</sup> January each year (or such other date as agreed in writing by the Environment Agency).

## **7.0 CONTINGENCY ACTION PLAN**

### **7.1 General**

7.1.1 This contingency action plan establishes the steps to be undertaken in the event of the following being identified during routine monitoring and operations:

- a) Breach of Leachate Control Level
- b) Failure of leachate extraction system
- c) Failure of LTP

7.1.2 In the preparation of this Leachate contingency action plan reference has been made to Section 6 of the current Leachate Management Plan prepared by Tarmac.

### **7.2 Breach of Leachate Control Level**

7.2.1 In the event of the leachate control levels specified in Table 9, being exceed the following action will be undertake:

- a) The monitoring technician shall inform the Site Manager/Supervisor before leaving the Site.
- b) The Environment Agency shall be informed (in accordance with the requirements of Schedule 5 of the Permit).
- c) The reason where the leachate control levels being exceed shall be investigated which shall include a review of the performance of the leachate extraction system and the LTP. If a fault is identified on the leachate extraction system, then the 'Failure of Leachate Extraction System' action plan shall be instigated. For the LTP the Operation and Maintenance Manual should be referred to for corrective actions and if necessary the LTP designer consulted.
- d) If no faults are identified and leachate levels are elevated exceeding the control levels due to rainfall, then the daily volume through the LTP shall be reviewed to establish if the throughput is being maximised and if is deemed necessary to arrange for tankering of leachate off site.
- e) Following completion of any remedial action the leachate levels will be monitored.
- f) Where breaches of the leachate control levels are on-going due to elevated levels, a remedial leachate action plan will be agreed with the Environment Agency within one month.

### **7.3 Failure of the Leachate Extraction System**

7.3.1 The leachate extraction system shall be inspected on a daily basis to check that its operating correctly and, that there is no damage or leaks on the pipework.

7.3.2 Where possible any identified minor faults or damage shall be repaired within 48 hours by site personnel, however for works relating to the pumps, telemetry or electrical works then a specialist contractor will be required to effect any repairs.

7.3.3 In the event of a pump failure or telemetry / electrical fault, a specialist contractor will be contacted the same day to attend site to investigate and remedy the fault within 7 working days.

7.3.4 The Environment Agency will be informed of any major failures (in accordance with the requirements of Schedule 5 of the Permit).

## **7.4 Failure of the LTP**

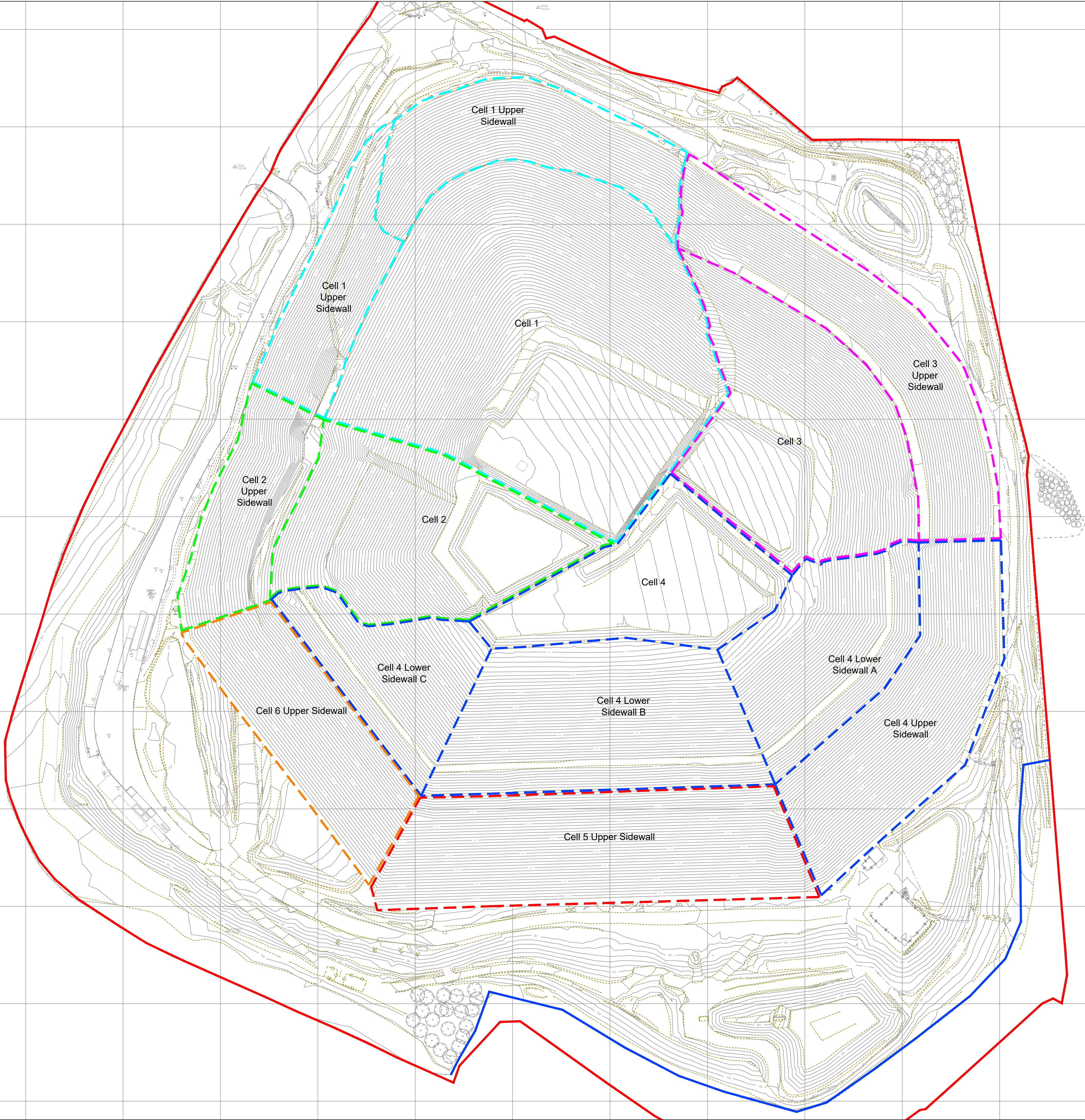
- 7.4.1 Should the LTP break down the reason for the breakdown shall be investigated with the Operation and Maintenance Manual being referred to for corrective actions and if necessary the LTP designer consulted.
- 7.4.2 During the breakdown the RLBT and the leachate storage tank on Cell 2 shall be utilised to store leachate.
- 7.4.3 Once the timescales for repairing the LTP are known the leachate levels will be assessed against the control levels and if necessary the Site Manager will arrange for leachate to be tankered off site. The Site Manager will also arrange for the LTP to be repaired.
- 7.4.4 The Environment Agency will be informed of any major failures (in accordance with the requirements of Schedule 5 of the Permit).

## **DRAWINGS**

5883.LEAC.D01	Cell Layout Plan
5883.LEAC.D02	Leachate Collection and Monitoring Points Locations
VSL 481	Walleys LTP P&ID
VSL 482	Walleys LTP General Arrangement



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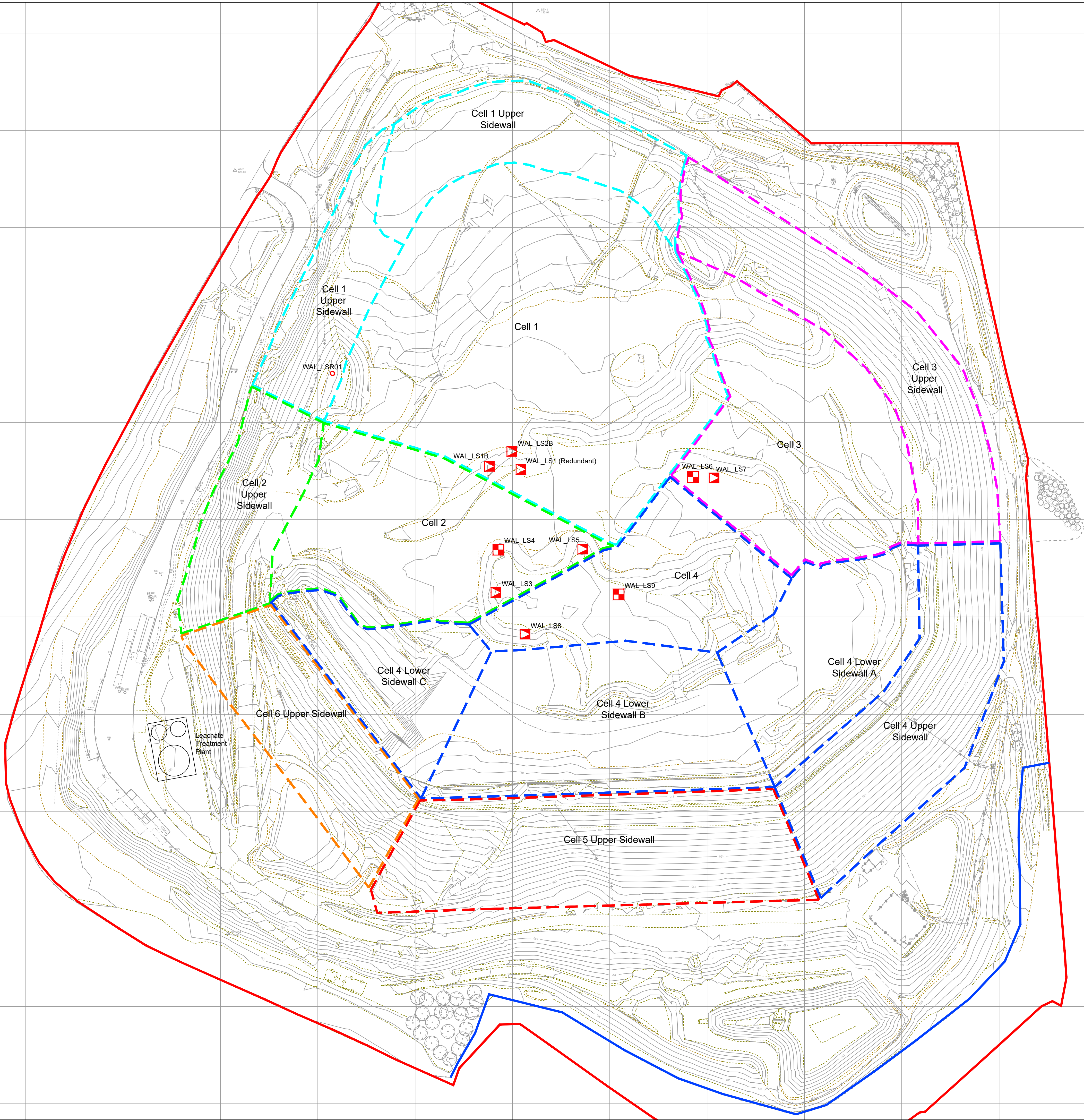
- Notes
1. Survey information provided by Red Industries Ltd.
  2. All levels in metres Above Ordnance Datum Newlyn.
  3. Do not scale from this drawing.
  4. Any anomalies on this drawing should be bought to the attention of Egniol Environmental Ltd.
  5. Key:
- Denotes Environmental Permit Boundary
  - Denotes Site Boundary (where different from Permit Boundary)
  - Denotes approximate Cell Boundaries

Rev	Modification	By	Chk	App	Date
Red Industries Ltd					
Walleys Landfill Site					
Cell Layout Plan					
Drawn by	RP	Checked by	PT	Approved by	PT
Date	26.05.2017	Scale @ A1	1:1000	Revision	-
Status					
Final					
Drawing Number					
5883.LEAC.D01					





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- Notes
1. Survey information provided by Red Industries Ltd.
  2. All levels in metres Above Ordnance Datum Newlyn.
  3. Do not scale from this drawing.
  4. Any anomalies on this drawing should be brought to the attention of Egniol Environmental Ltd.
  5. Key:
- Existing leachate sidewall riser
  - Existing leachate collection point
  - Existing leachate monitoring point
- WAL\_LSB1 Well reference (ID)
- Denotes Environmental Permit Boundary
  - Denotes Site Boundary (where different from Permit Boundary)
  - Denotes approximate Cell Boundaries

Rev	Modification	By	Chk	App	Date
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Red Industries Ltd

Walleys Landfill Site

Leachate Collection &  
Monitoring Points Plan

Drawn by RP	Checked by PT	Approved by PT
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Date 26.05.2017	Scale @ A1 1:1000	Revision -
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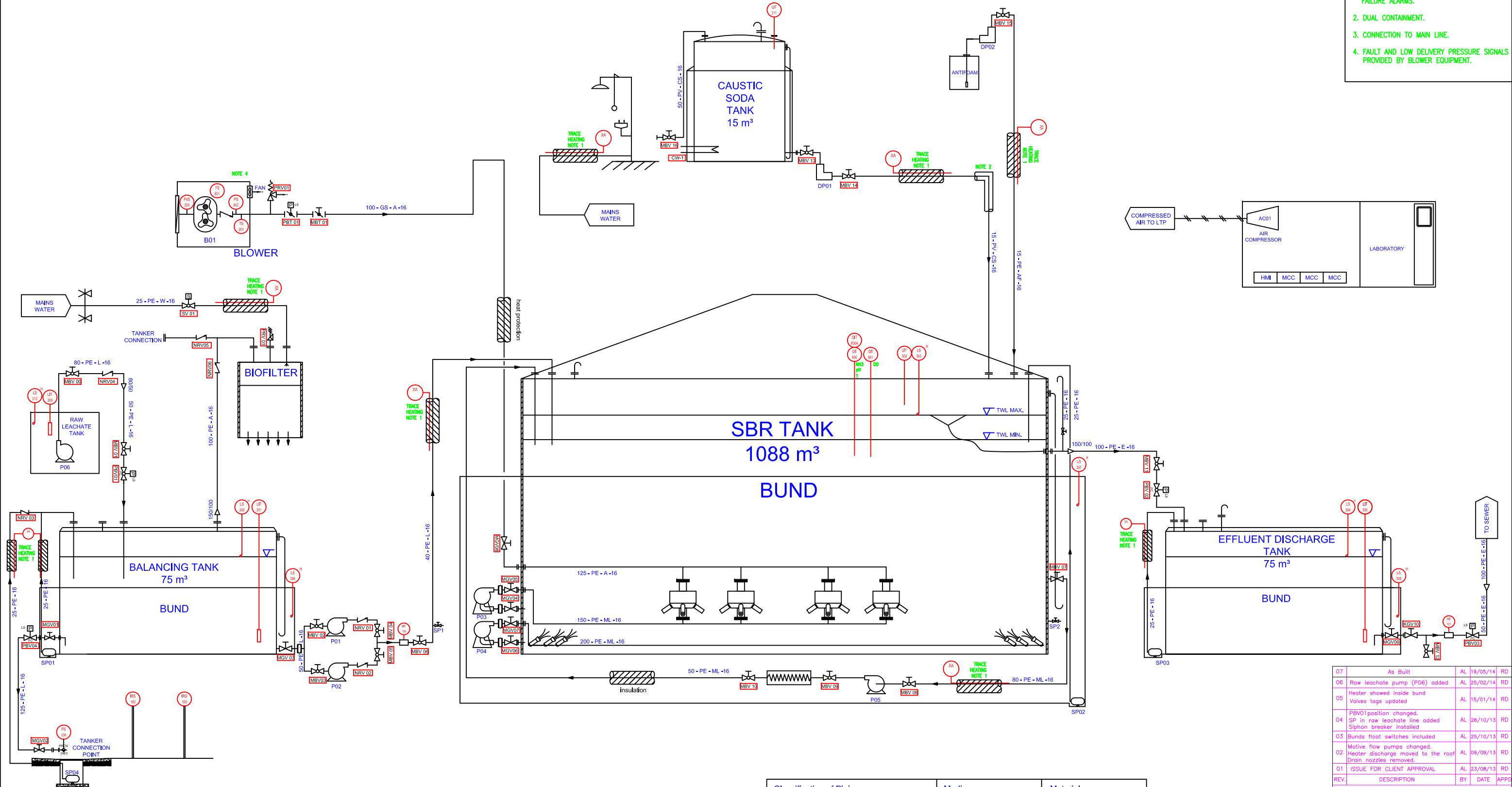
Status <b>Final</b>
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Drawing Number 5883.LEAC.D02
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- NOTES
1. ALL TRACE HEATING CIRCUITS TO HAVE FAILURE ALARMS.
  2. DUAL CONTAINMENT.
  3. CONNECTION TO MAIN LINE.
  4. FAULT AND LOW DELIVERY PRESSURE SIGNALS PROVIDED BY BLOWER EQUIPMENT.



Classification of Piping	Medium	Material
100 - GMS - L - 16	L : LEACHATE	PE : POLYETHYLENE
Nominal diameter DN	ML : MIXED LIQUOR	PV : POLYVINYLCHLORIDE
Material	E : TREATED EFFLUENT	GS : GALVANIZED STEEL
Medium	A : AIR	SS : STAINLESS STEEL
Nominal Pressure PN	CS : CAUSTIC SODA	
	AF : ANTIFOAM	

07	As Built	AL	19/05/14	RD
06	Raw leachate pump (P06) added	AL	25/02/14	RD
05	Heater showed inside bund Valves tags updated	AL	15/01/14	RD
04	PBV01 position changed. SP in raw leachate line added Siphon breaker installed	AL	28/10/13	RD
03	Bunds float switches included	AL	25/10/13	RD
02	Motive flow pumps changed. Heater discharge moved to the roof Drain nozzles removed.	AL	09/09/13	RD
01	ISSUE FOR CLIENT APPROVAL	AL	23/08/13	RD
REV.	DESCRIPTION	BY	DATE	APPD

Unit 39  
Wirral Business  
Centre  
Birkenhead  
Wirral  
CH41 1JW  
Tel: 0151 639 8666  
Fax: 0151 691 2279

Viridian Systems Limited

CLIENT LAFARGE

PROJECT Walleys SBR - RD002/9166

DRAWING TITLE

RD002/9166 P&ID

DATE 13.AUG.13

DRAWN A.L.

CHECKED R.D.

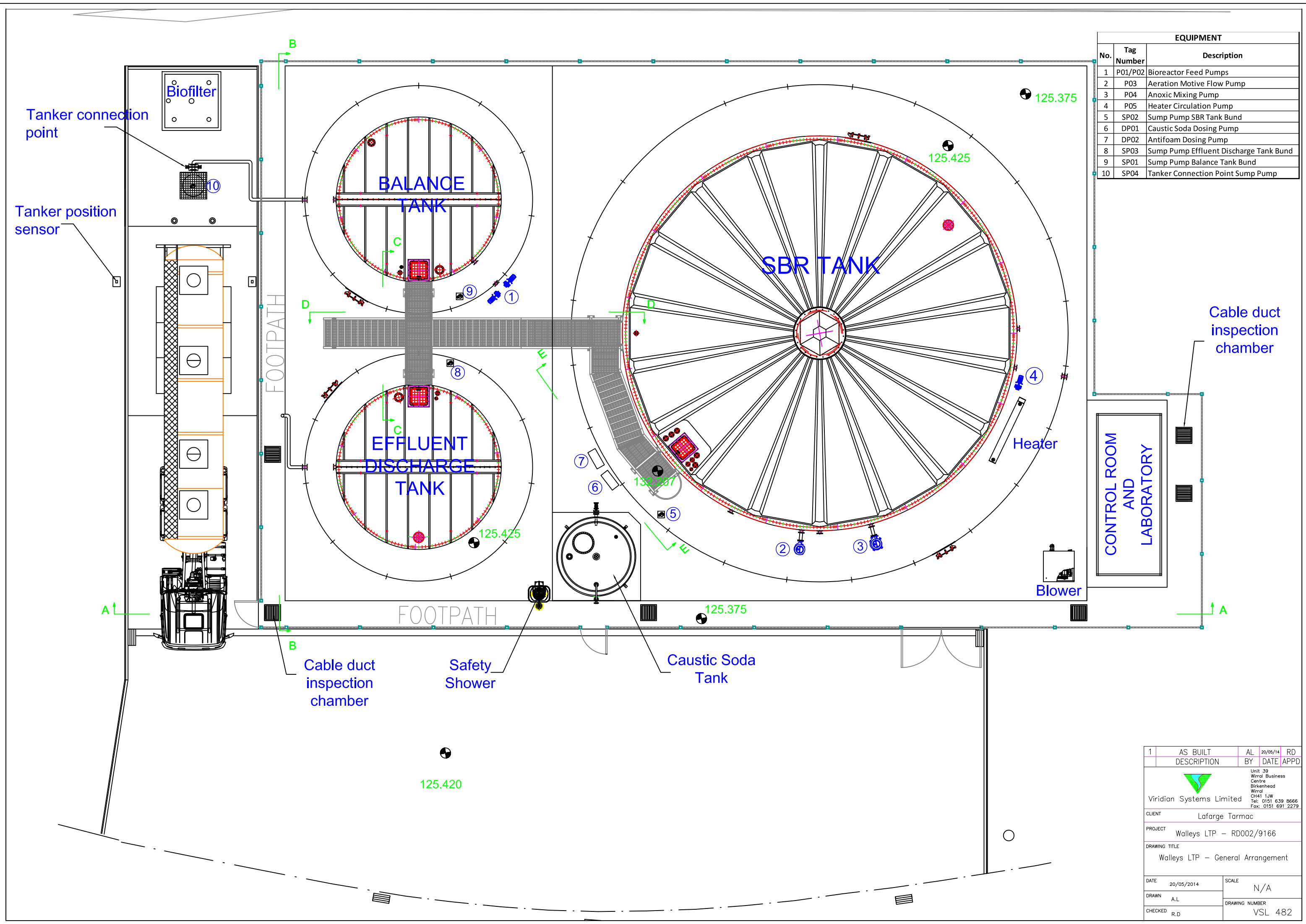
SCALE N/A

DRAWING NUMBER


VSL481

CLIENT VSL  
LIMIT OF DELIVERY

LEGEND



EQUIPMENT		
No.	Tag Number	Description
1	P01/P02	Bioreactor Feed Pumps
2	P03	Aeration Motive Flow Pump
3	P04	Anoxic Mixing Pump
4	P05	Heater Circulation Pump
5	SP02	Sump Pump SBR Tank Bund
6	DP01	Caustic Soda Dosing Pump
7	DP02	Antifoam Dosing Pump
8	SP03	Sump Pump Effluent Discharge Tank Bund
9	SP01	Sump Pump Balance Tank Bund
10	SP04	Tanker Connection Point Sump Pump

1	AS BUILT	AL	20/05/14	RD
	DESCRIPTION	BY	DATE	APPD
		Unit 39 Wirral Business Centre Birkenhead Wirral CH41 1JW Tel: 0151 639 8666 Fax: 0151 691 2279		
Viridian Systems Limited				
CLIENT		Lafarge Tarmac		
PROJECT		Walleys LTP – RD002/9166		
DRAWING TITLE		Walleys LTP – General Arrangement		
DATE	20/05/2014	SCALE	N/A	
DRAWN	A.L	DRAWING NUMBER		
CHECKED	R.D	VSL 482		

## **APPENDIX 1**

### Leachate Wells Data for 2018

WALLEYS LANDFILL - LEACHATE WELLS DATA FOR 2018 (JANUARY TO JUNE)

Date	Sample point	AOD Level (m)	Base (mAOD)	Dip Level (m)	Control Level (mAOD)	Water Level (mAOD)	Leachate Depth (m)	CH4 % Vol	CO2 % Vol	O2 % Vol	Balance Gas %Vol	H2S ppm	CO ppm	Atmos Pressure	Relative Pressure	Data Comments
17/01/2018	WAL_LS1B	112.99	80.82	19.1	83	93.89	13.07	21.4	13	13.8	51.8	73	-	980	-113.38	
17/01/2018	WAL_LS2B	113.34	80.73	19.6	83	93.74	13.01	68.7	35.9	0.4	0	469	0	980	-113.78	
17/01/2018	WAL_LS3	115.70	81.36	-	83	-	-	66	39.7	0.4	0	912	-	979	-1.48	Dip tape met obstruction at around 5m.
17/01/2018	WAL_LS4	117.97	81.069	10.5	83	107.47	26.40	51.1	32.6	5	11.3	285	0	978	-1.68	
17/01/2018	WAL_LS5	118.69	81.83	-	83	-	-	16.9	12.9	13.6	56.6	6	-	979	-1.36	Dry
17/01/2018	WAL_LS6	117.32	86.734	-	87.7	-	-	56.9	34.8	2.3	6	181	-	979	-1.27	Dip tape going off at around 5m. Continued to dip but tape recovered dry. Taps turned off prior to dipping.
17/01/2018	WAL_LS7	118.30	87.867	-	88.9	-	-	64.1	38	0.8	0	87	-	979	-1.22	Dry
17/01/2018	WAL_LS8	116.21	84.908	-	85.9	-	-	4.1	4	18.2	73.7	98	-	979	-1.46	Well located in active tipping area. Could not access safely.
17/01/2018	WAL_LS9	118.57	84.021	-	85.0	-	-	24.6	13.8	12.3	49.3	13	-	979	-1.46	Dipping point cam lock rusted and could not remove. Could not dip.
21/02/2018	WAL_LS1B	112.99	80.82	-	83	-	-	65.9	37.2	0.5	0	238	0	1015	-45.59	Standing water around well. Could not access safely.
21/02/2018	WAL_LS2B	113.34	80.73	-	83	-	-	65.6	37.4	0.6	0	266	0	1015	-39.89	Dipping attempted but obstruction dip tape would not pass at around 2- 3m
21/02/2018	WAL_LS3	115.70	81.36	-	83	-	-	-	-	-	-	-	-	-	-	Well being extended. Located in tipping area.
21/02/2018	WAL_LS4	117.97	81.069	8.9	83	109.07	28.00	71.8	36.3	0.3	0	1350	0	1015	-0.94	
21/02/2018	WAL_LS5	118.69	81.83	36	83	82.69	0.86	46.7	34.7	1.5	17.1	46	-	1014	-0.94	
21/02/2018	WAL_LS6	117.32	86.734	30	87.7	87.32	0.59	67.7	36.9	0.4	0	3227	-	1014	-0.86	Dip tape going off at around 5m. Continued to dip but tape recovered dry. Taps turned off prior to dipping.
21/02/2018	WAL_LS7	118.30	87.867	7.8	88.9	110.50	22.63	59.4	35.6	0.6	4.4	>>>>		1014	-0.74	Bentonite on dip tape when recovered from well.
21/02/2018	WAL_LS8	116.21	84.908	-	85.9	-	-	-	-	-	-	-	-	-	-	Well located in active tipping area. Could not access safely.
21/02/2018	WAL_LS9	118.57	84.021	-	85.0	-	-	10.9	16.4	14.3	58.4	78		1014	-1.03	Dipping point cam lock rusted and could not remove. Could not dip.
22/03/2018	WAL_LS1B	112.99	80.82	-	83	-	-	14.1	6.8	16.8	62.3	5	1	1005	-36.24	Leachate surrounding well and deep – not safe to access.
22/03/2018	WAL_LS2B	113.34	80.73	13.7	83	99.64	18.91	72.1	25	0.9	2	44	3	1005	-75.07	
22/03/2018	WAL_LS3	115.70	81.36	-	83	-	-	40	40	1.6	13	947	30	1003	-0.63	Dip tape met obstruction at around 5m.
22/03/2018	WAL_LS4	117.97	81.069	-	83	-	-	-	-	-	-	-	-	-	-	Tipping operations taking place around well – not safe to access.
22/03/2018	WAL_LS5	118.69	81.83	-	83	-	-	46.9	36.4	46.9		42	6	1004	-0.32	Dry
22/03/2018	WAL_LS6	117.32	86.734	-	87.7	-	-	39.4	28.9	5.1	26.6	382	12	1004	-0.41	Dip tape going off at around 5m (regular occurrence). Progressed dip tape but came back up dry?
22/03/2018	WAL_LS7	118.30	87.867	7.8	88.9	110.50	22.63	64.4	36.2	0.1	0	>>>	35	1004	-0.31	Bailer would not recover sample?
22/03/2018	WAL_LS8	116.21	84.908	-	85.9	-	-	54.5	47.2	0.5	0	>>>	25	1004	-0.39	Dry
22/03/2018	WAL_LS9	118.57	84.021	5.5	85.0	113.07	29.05	8	15.9	15.2	60.9	444	22	1004	-0.41	Insufficient access to dipping point.
18/04/2018	WAL_LS1B	112.99	80.82	-	83	-	-	-	-	-	-	-	-	-	-	Could not access safely.
18/04/2018	WAL_LS2B	113.34	80.73	-	83	-	-	-	-	-	-	-	-	-	-	Could not access safely.
18/04/2018	WAL_LS3	120.5	81.36	-	83	-	-	54.8	42.7	1	1.5	>>>	29	1013	0.26	Obstruction in the well at around 5.3m. Could not dip.
18/04/2018	WAL_LS4	122.77	81.069	-	83	-	-	-	-	-	-	-	-	-	-	Could not access safely.
18/04/2018	WAL_LS5	118.69	81.83	-	83	-	-	59.4	43	0.1	0	440	42	1014	0.55	Dry
18/04/2018	WAL_LS6	117.32	86.734	-	87.7	-	-	44.1	30.2	2.7	23	>>>	20	1013	0.44	Dip tape going off at around 2.8m. Pumping occurring into well
18/04/2018	WAL_LS7	118.30	87.867	-	88.9	-	-	58.9	34.3	0.5	6.3	>>>	37	1014	0.22	Dry
18/04/2018	WAL_LS8	121.01	84.908	-	85.9	-	-	54.1	40.3	0.2	5.4	807	45	1013	0.44	Dry
18/04/2018	WAL_LS9	118.57	84.021	2.1	85.0	-	-	20.9	24	9.1	46	68	32	1014	0.39	Dip tape going off at around 2.1m Pumping occurring into Well.
16/05/2018	WAL_LS1B	121.99	80.82	-	83	-	-	-	-	-	-	-	-	-	-	Unable to access safely.
16/05/2018	WAL_LS2B	123.34	80.73	-	83	-	-	-	-	-	-	-	-	-	-	Unable to access safely.
16/05/2018	WAL_LS3	119.41	81.36	38	83	81.41	0.05	51.9	38.8	2	7.3	>>>	23	1017	-0.34	Dip tape met obstruction at around 2.3m.
16/05/2018	WAL_LS4	121.78	81.069	38	83	83.78	2.71	-	-	-	-	-	-	-	-	Unable to access safely.
16/05/2018	WAL_LS5	122.59	81.83	38	83	84.59	2.76	61.5	43.2	0.1	0	335	34	1017	-0.03	
16/05/2018	WAL_LS6	123.61	86.734	-	87.7	-	-	66.8	36.1	0.1	0	>>>	13	1017	0	Dip tape going off at 9.6m
16/05/2018	WAL_LS7	122.41	87.867	7.7	88.9	-	-	62.9	37.1	0.1	0	>>>	25	1017	0.27	Dip tape met obstruction at around 7.7m.
16/05/2018	WAL_LS8	119.78	84.908	38	85.9	81.78	-3.13	10.3	9.9	15	64.8	143	12	1017	-0.1	Dry
16/05/2018	WAL_LS9	119.24	84.021	2.1	85.0	-	-	0.8	4.7	20.2	74.3	30	13	1017	0.22	Dip tape going off at 2.1m. Bentonite present upon recovery of dip tape, condensate setting tape off
14/06/2018	WAL_LS1B	121.99	80.82	-	83	-	-	0	0.1	21	78.9	0	0	994	-11.34	Unable to access to Dip
14/06/2018	WAL_LS2B	123.34	80.73	-	83	-	-	49	40.2	3.2	7.6	>>>>	88	995	-42.53	bale sample point to be replaced, scheduled re-install July/August2018
14/06/2018	WAL_LS3	119.41	81.36	-	83	-	-	50.7	37.8	1.8	9.7	>>>>	33	996	-0.09	bale sample point to be replaced, scheduled re-install July/August2018
14/06/2018	WAL_LS4	121.78	81.069	40	83	81.78	0.71	49.5	34.6	3.7	12.2	>>>>	33	995	-7.75	bale sample point to be replaced, scheduled re-install July/August2018
14/06/2018	WAL_LS5	122.59	81.83	40	83	82.59	0.76	52.3	38.3	0.7	8.7	573	47	995	0.03	bale sample point to be replaced, scheduled re-install July/August2018
14/06/2018	WAL_LS6	123.61	86.734	11.82	87.7	111.79	25.06	55.7	38.4	0.7	5.2	269	35	996	0.31	Bale sample point to be replaced, scheduled re-install July/August2018. Rreading set off by condensate filling
14/06/2018	WAL_LS7	122.41	87.867	40	88.9	82.41	-5.46	38.8	32.3	6.4	22.5	506	29	996	0.39	Dry
14/06/2018	WAL_LS8	119.78	84.908	40	85.9	79.78	-5.13	3.2	5.7	16.6	74.5	584	12	996	0.26	Dry
14/06/2018	WAL_LS9	119.24	84.021	2.1	85.0	-	-	26.3	26.4	6.2	41.1	137	34	996	0.05	Dip tape going off at 2.1m.

WALLEYS LANDFILL - LEACHATE WELLS DATA FOR 2018 (JULY TO DECEMBER)

Date	Sample point	AOD Level (m)	Base (mAOD)	Dip Level (m)	Control Level (mAOD)	Water Level (mAOD)	Leachate Depth (m)	CH4 % Vol	CO2 % Vol	O2 % Vol	Balance Gas %Vol	H2S ppm	CO ppm	Atmos Pressure	Relative Pressure	Data Comments
23/07/2018	WAL_LS1B	121.99	80.82	13.89	83	108.10	27.28	2.0	1.5	21.0	75.5	0	0	1003	0.92	bale sample point replaced in July 2018
23/07/2018	WAL_LS2B	123.34	80.73	15.87	83	107.47	26.74	56.3	37.2	2.7	3.8	>>>>	75	1003	-79.21	bale sample point replaced in July 2018
23/07/2018	WAL_LS3	119.41	81.36	10.51	83	108.90	27.54	54.4	38.4	1.3	5.9	>>>>	39	1001	1.09	bale sample point replaced in July 2018
23/07/2018	WAL_LS4	121.78	81.069	-	83	-	-	14.2	11.5	15.1	59.2	4	44	1003	1.07	Dry
23/07/2018	WAL_LS5	122.59	81.83	-	83	-	-	57.3	41.6	0.3	0.8	919	26	1003	1.04	Dry
23/07/2018	WAL_LS6	123.61	86.734	12.36	87.7	111.25	24.52	0.0	1.3	19.4	79.3	10	32	1003	1	bale sample point replaced in July 2018
23/07/2018	WAL_LS7	122.41	87.867	-	88.9	-	-	3.9	8.8	12.0	75.3	10	108	1003	0.95	Dry
23/07/2018	WAL_LS8	119.78	84.908	-	-	-	-	55.0	41.4	0.2	3.4	>>>>	74	1001	1.02	Dry
23/07/2018	WAL_LS9	119.24	84.021	8.43	85.0	110.81	26.79	62.8	33.5	0.2	3.5	697	31	1003	1.04	bale sample point replaced in July 2018
21/08/2018	WAL_LS1B	121.99	80.82	15.95	83	106.04	25.22	7.5	5.7	17.7	69.1	0	1	999	-84.13	
21/08/2018	WAL_LS2B	123.34	80.73	13.53	83	109.81	29.08	63.9	38.6	1.5	0	>>>>	56	999	-76.33	
21/08/2018	WAL_LS3	119.41	81.36	8.84	83	110.57	29.21	58.0	41.9	0.2	0	>>>>	27	999	-0.07	
21/08/2018	WAL_LS4	121.78	81.069	11.54	83	110.24	29.17	62.3	40.8	0.1	0	>>>>	41	999	0.17	
21/08/2018	WAL_LS5	122.59	81.83	7.24	83	115.35	33.52	25.4	19.8	11.0	43.8	231	14	999	-2.42	
21/08/2018	WAL_LS6	123.61	86.734	10.91	87.7	112.70	25.97	20.6	24.0	4.3	51.1	20	29	999	0.1	
21/08/2018	WAL_LS7	122.41	87.867	10.74	88.9	111.67	23.80	0.6	7.6	10.8	81	9	34	999	0.1	
21/08/2018	WAL_LS8	119.78	84.908	8.94	85.9	110.84	25.93	57.7	41.7	0.2	0.4	>>>>	40	998	-0.02	
21/08/2018	WAL_LS9	119.24	84.021	8.43	85.0	110.81	26.79	69.1	32.1	0.2	0	647	28	998	0.02	
19/09/2018	WAL_LS1B	121.99	80.82	24.88	83	97.11	16.29	0.0	0.2	20.7	79.1	0	8	994	-0.09	
19/09/2018	WAL_LS2B	123.34	80.73	30.35	83	92.99	12.26	45.6	32.1	5.1	17.2	>>>>	46	995	-92.08	
19/09/2018	WAL_LS3	119.41	81.36	8.75	83	110.66	29.30	59.6	41.9	0.2	0.0	>>>>	32	993	0.07	
19/09/2018	WAL_LS4	121.78	81.069	11.5	83	110.28	29.21	35.9	26.9	7.0	30.2	553	40	995	0.03	
19/09/2018	WAL_LS5	122.59	81.83	7.18	83	115.41	33.58	56.9	41.2	0.2	1.7	>>>>	38	995	0.12	
19/09/2018	WAL_LS6	123.61	86.734	10.69	87.7	112.92	26.19	43.8	38.9	3.0	14.3	125	26	994	-0.15	
19/09/2018	WAL_LS7	122.41	87.867	10.58	88.9	111.83	23.96	12.4	14.1	11.0	62.5	3	25	994	-0.24	
19/09/2018	WAL_LS8	119.78	84.908	8.8	85.9	110.98	26.07	55.2	44.5	0.1	0.2	628	45	995	-0.17	
19/09/2018	WAL_LS9	119.24	84.021	6.5	85.0	112.74	28.72	55.7	40.4	0.8	3.1	399	30	995	-0.02	
23/10/2018	WAL_LS1B	121.99	80.82	22.58	83	99.41	18.59	2.5	22.6	13.2	61.7	0	1	1017	0	
23/10/2018	WAL_LS2B	123.34	80.73	2.9	83	120.44	39.71	25	18.2	11.3	45.5	>>>>	0	1016	-88.41	
23/10/2018	WAL_LS3	119.41	81.36	2.76	83	116.65	35.29	60.6	39.1	0.1	0.2	>>>>	2	1017	0	
23/10/2018	WAL_LS4	121.78	81.069	3.7	83	118.08	37.01	3.2	5.7	19	72.1	12	4	1017	0.09	
23/10/2018	WAL_LS5	127.39	81.83	15.61	83	111.78	29.95	59.3	42.2	0.2	0	953	2	1016	-0.14	
23/10/2018	WAL_LS6	123.61	86.734	11.25	87.7	112.36	25.63	24.1	26.2	9.3	40.4	54	100	1016	-0.14	
23/10/2018	WAL_LS7	122.41	87.867	10.18	88.9	112.23	24.36	33.6	22	8.7	35.7	482	29	1016	-11.73	
23/10/2018	WAL_LS8	124.58	84.908	-	85.9	-	-	-	-	-	-	-	-	-	-	Unable to gain access
23/10/2018	WAL_LS9	124.04	84.021	14.47	85.0	109.57	25.55	59.4	42.4	0.1	0	533	2	1017	-0.09	
21/11/2018	WAL_LS1B	121.99	80.82	24.8	83	97.19	16.37	8	16	14.3	61.7	0	0	998	-0.14	
21/11/2018	WAL_LS2B	128.14	80.73	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access. Extended 4.8m
21/11/2018	WAL_LS3	119.41	81.36	13.18	83	106.23	24.87	63.6	41.2	0.2	0	>>>>	0	998	-0.07	
21/11/2018	WAL_LS4	121.78	81.069	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access
21/11/2018	WAL_LS5	127.39	81.83	11.49	83	115.90	34.07	62.7	42.1	0.2	0	>>>>	3	998	-0.15	
21/11/2018	WAL_LS6	123.61	86.734	10.64	87.7	112.97	26.24	31.6	21.4	9.2	37.8	11	33	998	-73.32	
21/11/2018	WAL_LS7	122.41	87.867	10.71	88.9	111.70	23.83	6.2	9.6	13.7	70.5	17	101	999	-10.54	
21/11/2018	WAL_LS8	124.58	84.908	12.88	85.9	111.70	26.79	58.4	41.4	0.1	0.1	>>>>	8	998	0.02	
21/11/2018	WAL_LS9	124.04	84.021	10.32	85.0	113.72	29.70	58.7	43.8	0.1	0	401	6	999	-0.15	
13/12/2018	WAL_LS1B	121.99	80.82	-	83	-	-	4.5	16	15.1	64.4	0	0	1003	0	Unable to access to Dip
13/12/2018	WAL_LS2B	128.14	80.73	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access. Extended 4.8m
13/12/2018	WAL_LS3	119.41	81.36	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access. Extended 4.8m
13/12/2018	WAL_LS4	121.78	81.069	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access
13/12/2018	WAL_LS5	127.39	81.83	-	83	-	-	-	-	-	-	-	-	-	-	Unable to gain access. Extended 4.8m
13/12/2018	WAL_LS6	123.61	86.734	10.78	87.7	112.83	26.10	51	46.8	0.2	2	>>>>	14	1003	-0.27	
13/12/2018	WAL_LS7	122.41	87.867	10.53	88.9	111.88	24.01	21.1	18.1	11	49.8	572	8	1002	-0.1	
13/12/2018	WAL_LS8	124.58	84.908	-	85.9	-	-	-	-	-	-	-	-	-	-	Unable to gain access. Extended 4.8m
13/12/2018	WAL_LS9	124.04	84.021	10.72	85.0	113.32	29.30	15.2	9.6	15.3	59.9	242	10	1003	-0.14	

## **APPENDIX 2**

### Monitoring Procedure for Leachate



## Adopted into Red Management System

<b>Standard Operating Procedure (SOP) Title</b>	Document No.
	<b>SOP 8</b>

AMENDMENT No.	ACTION	AMENDED BY	DATE
1	First Issue		
2	Review by Red/Egniol	Red/Egniol	07.07.17

### 1. SCOPE

- This procedure has been prepared to cover the activities relating to the monitoring and sampling of leachate in order that it is carried out in a safe and consistent manner, in accordance with the management system and the Environmental Permits.
- The procedure has been developed based on industry best practice and Environment Agency guidance for the Monitoring of Landfill Leachate, Groundwater and Surface water LFTGN02.

### 2. PRE Checks

2.1	<ul style="list-style-type: none"> <li><b>Monitoring Personnel must have read and understood Egniol Risk Assessment Ref: 5883 RA/01 (Landfill Monitoring at Walleys LFS) before attending the site to undertake any environmental monitoring.</b></li> <li>All equipment should be serviced and calibrated in line with the manufacturer's Guide-lines and a record of the service certificates kept in the Instruments Log file.</li> <li>All instruments should be used in line with the manufacturers guidelines</li> <li>All equipment should be fully functional</li> <li>The monitoring technician should be familiar with the operating instructions of the equipment to be used.</li> <li>Check that an adequate number of appropriate sample bottles are available for the type of analysis that is required. Order the bottles from the laboratory where necessary.</li> <li>Where bottles are supplied with a preservative ensure the CoSHH sheet has been read and adhered to.</li> <li>The monitoring regime and monitoring point location plan and trigger levels and action plans for the site should be checked prior to the commencement of monitoring.</li> </ul>
2.2	<p><b><u>Environmental Considerations</u></b></p> <ul style="list-style-type: none"> <li>Monitoring will be undertaken in various weather conditions. Consideration needs to be given to any increase in risk that may result from the weather conditions.</li> <li>Be aware of ground conditions which will vary across sites. Around the perimeter of the sites ground conditions are likely to be uneven and vegetated. Trip hazards such as re-bar may be present.</li> </ul>
2.3	<p><b><u>Equipment Involved</u></b></p> <ul style="list-style-type: none"> <li>GA5000 Gas analyser</li> <li>ATEX Dip Meter</li> <li>Leachate Teflon Bailer</li> <li>Sample Bottles</li> <li>Field note book</li> </ul>
2.4	<p><b><u>Personal Protective Equipment (PPE) – in addition to site mandatory PPE</u></b></p> <ul style="list-style-type: none"> <li>Disposable gloves</li> <li>Gas alarm</li> </ul>



2.5	<p><b><u>Training</u></b></p> <p>All personnel undertaking leachate monitoring should be trained in this procedure</p> <p>All personnel carrying out leachate monitoring shall be inducted with the site rules</p> <p>All personnel carrying out leachate monitoring shall sign in and out at the weighbridge</p>
2.7	<p><b><u>On-Site Pre-Monitoring Checks</u></b></p> <ul style="list-style-type: none"> <li>▪ The following information is recorded in the monitoring technicians note book: <ul style="list-style-type: none"> <li>○ Site.</li> <li>○ Date.</li> <li>○ Technician.</li> <li>○ Equipment type and serial number.</li> <li>○ Start time.</li> <li>○ Ground conditions – i.e. dry, wet, water logged, frozen.</li> <li>○ Weather conditions – i.e. dry, wet, windy, overcast, sunny.</li> <li>○ Atmospheric pressure</li> <li>○ Atmospheric temperature</li> <li>○ Wind speed if possible</li> <li>○ Wind direction if possible</li> </ul> </li> </ul> <p>Whilst under taking the monitoring a visual inspection of the site and its surroundings shall be undertaken. A note shall be made of any abnormalities spotted.</p>
3.0	<p><b><u>Procedure</u></b></p>
3.1	<p><b><u>Leachate level monitoring</u></b></p> <ul style="list-style-type: none"> <li>• A separate dip tape is used for leachate level monitoring.</li> <li>• If a gas measurement is required this should be taken prior to dipping.</li> <li>• Remove leachate chamber cap or bung and lower probe down the chamber until alarm sounds. Record the measurement to the chamber cover level (or otherwise agreed borehole datum). If the location is dry record the level that it is dry at.</li> <li>• The monitoring technician should be aware of false dip readings caused by condensate, frothing, or catching on joins in wells and towers. A suitable dip tape with a sensitivity control is used.</li> <li>• Where pumps are located in leachate wells care should be taken not to get the tape wrapped around the lines.</li> <li>• If the base level is required continue to lower the probe until the base is encountered. This is usually evident by the tape going slack. Tighten the tape until the weight of the probe can be felt. Record the measurement to the borehole cover level (or otherwise agreed borehole datum).</li> <li>• If a leachate sample is not required, reseal chamber and proceed to next location.</li> <li>• On completion of the monitoring record finish time, advise Site Management of results of monitoring and any damage to monitoring facilities or significant observations.</li> </ul>
3.2	<p><b><u>Leachate Sampling – Bailer</u></b></p> <ul style="list-style-type: none"> <li>• If a gas measurement is required this should be taken prior to sampling.</li> <li>• Lower clean disposable or teflon bailer used for leachate monitoring only down the chamber. The bailer should not be dropped down the chamber as this will agitate the sample.</li> <li>• Once the bailer has filled retract from the chamber and discard the first sample.</li> <li>• If a location is dry or cannot be sampled a note should be made of why it cannot be sampled.</li> <li>• Fill the bailer again and take any field reading from this sample.</li> <li>• Transfer the sample into the bottle provided and clearly label with the company name, site, location code and date. Fill the bottle to the brim to exclude air unless otherwise specified by the laboratory. Make a note of the colour of the sample or if it is particularly silty.</li> <li>• Replace chamber lid.</li> </ul>

	<ul style="list-style-type: none"> <li>• Proceed to next location and repeat.</li> <li>• On completion of the monitoring record finish time, advise Site Management of results of monitoring and any damage to monitoring facilities or significant observations.</li> <li>• On returning to the office clean equipment as required.</li> </ul>
3.3	<p><b>Leachate Sampling – Pneumatic Pumps</b></p> <ul style="list-style-type: none"> <li>• If a gas measurement is required this should be taken prior to sampling.</li> <li>• In chambers where pumps and sample points have been fitted the leachate samples can be collected using these.</li> <li>• If connected to a carrier main ensure the pump is cycling before sampling to ensure leachate collected has been pumped from the tower to be sampled</li> <li>• Open sample tap and obtain sample either directly into bottle or bucket/</li> <li>• Transfer the sample into the bottle provided and clearly labelled with the company name, site, location code and date. Fill the bottle to the brim to exclude air unless otherwise specified by the laboratory. Make a note of the colour of the sample or if it is particularly silty.</li> <li>• Close sample tap. Proceed to next location and repeat.</li> <li>• On completion of the monitoring record finish time, advise Site Management of results of monitoring and any damage to monitoring facilities or significant observations.</li> <li>• On returning to the office clean equipment as required</li> </ul>

4.

4.1	<p><b><u>Emergency procedures</u></b>  <b><i>The Site Manager or locum tenens should be informed immediately if there is any evidence of leachate outbreaks, smoke / fire or any other non-conforming activity on site.</i></b></p> <p>Any incidents or accidents must be reported immediately to Site Management. Details of the nearest hospital and emergency phone numbers are available at the site office. The Incident reporting Procedure H&amp;S009 shall be followed.</p> <p>The technician should advise the Site Manager of any breaches of trigger levels specified in Environmental Permits or other contra-indicators before leaving site. In all cases the Non Conformance and Corrective Action procedure SYS008 shall be followed along with The incident reporting procedure H&amp;S009.</p> <p>The Site Manager shall follow the appropriate action plan and all details are recorded within the non conformance/incident report.</p>

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