CAULMERT LIMITED

Engineering, Environmental & Planning
Consultancy Services

Yanley Landfill Site

Viridor Waste Exeter Limited

Methane Stripping Process Description and BAT review

Environmental Permit Variation Application

Prepared by:

Caulmert Limited
14 Farrington Way, Eastwood Link Business Park, Eastwood, Notts, NG16 3BF
Tel: 01773 749132
Fax: 01773 746280
Email: andystocks@caulmert.com
Web: www.caulmert.com

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Project Manager: Andy Stocks

Caulmert Limited: 14 Farrington Way, Eastwood Link Business Park, Eastwood, Notts, NG16 3BF

Tel: 01773 749132

Author	Kellie-Marie P. Burston	**Date**	03/08/2021
Reviewer	Andy Stocks	**Date**	03/08/2021
Approved	Andy Stocks	**Date**	03/08/2021

DISCLAIMER

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1. INTRODUCTION

1.1 Background

1.1.1 This report is an assessment of compliance of the proposed new methane stripping plant at the Yanley Landfill site in accordance with the Waste Treatment BREF, Best Available Techniques (BREF) 'Waste Treatment Industries, under Article 16(2) of Council Directive 96/61/EC (IPPC Directive) and an assessment of Best Available Techniques (BAT) which has been taken from the Commission Implementing Decision (EU) 2018/1147 of 10 August 2018 'Establishing Best Available Techniques (BAT) Conclusions for Waste Treatment, Under Direction 2010/75/EU of the European Parliament and of the Council.

1.1.2 The guidance is considered to be relevant in order to demonstrate that the proposed new MSP leachate treatment system constitutes the Best Available Technique (BAT) for the treatment of the wastewater (leachate) from Yanley Landfill Site.

1.1.3 A general process description for the treatment activities is provided in Section 2 of this report.

2. PROCESS DESCRIPTION

2.1 Site Background

2.1.1 Viridor Waste Exeter Limited (the Operator) propose to install a methane stripping plant at their Yanley Landfill which will provide leachate treatment for their site. The Methane Stripping Plant (MSP) will enable the Operator to comply with conditions detailed in the Wessex Water discharge consent. It is proposed to utilise any existing pipework infrastructure for the new MSP, although new constructed pipework may be required to provide a discharge connection from the MSP, leaving the site boundary to the public foul sewer network owned by Wessex Water and subsequently treated at the Avonmouth Sewage Treatment Works and then discharged out to sea. These proposals will be made under a normal variation application.

2.1.2 Yanley Landfill Site is already served with a leachate storage lagoon constructed from HDPE membrane liner with a storage volume of approximately 600m^3, 18m wide by 28m long and is approximately 3m deep. The lagoon is constructed from an HDPE membrane liner. Raw leachate is pumped into the lagoon and also withdrawn from the lagoon and pumped to sewer. For the last few years, the lagoon has been by-passed and exists only as an emergency outlet should there be an issue with discharging to sewer. It is believed that a suitable MSP plant could be installed within the fenced area surrounding the lagoon area.

2.1.3 A trade effluent consent is already in place at Yanley Landfill Site from Wessex Water which allows the discharge of 300cubic metres of treated effluent in any period of 24 hours. The proposed MSP will discharge up to 150m^3 per day of treated effluent from the Yanley landfill MSP into the public foul sewer.

2.1.4 The treatment activity will be 50tonnes or more per day and will be added to Yanley Landfill permit (EPR/BT7272IW) as a listed activity. Effluent from the MSP will discharge to sewer as shown in the 'MEPP Monitoring & Extraction Point Plan' drawing ref: YAN3000.

2.1.5 Pipework between the leachate storage tank and MSP will be above ground, HDPE, with isolation valves and flanges to enable the valve/pipework to be removed and blanked off if required.

2.1.6 The collection system Yanley Landfill site will feed into the methane stripping plant and will undergo aeration and agitation to strip the methane from the leachate. Treated leachate will be discharged to foul sewer and subsequently treated at Avonmouth Treatment works prior to discharge to the Severn tidal estuary. The site location of the MSP will be sited adjacent to the gas flare compound as shown in 'Yanley Methane Stripping Plant- leachate lagoons and MSP area' drawing 04C. Further detail on pipework infrastructure is in Section 3 of this report under 'Plant and pipework design specification'.

2.1.7 The trade effluent discharge consent with Wessex Water for the discharge of effluent into the public foul sewer is included in Appendix 1.

2.2 Approach to selection of leachate treatment plant

2.2.1 It is considered that the most effective and long-term leachate management options for Yanley Landfill Site is the discharge of effluent to sewer with further treatment at the Avonmouth Sewage Treatment Works prior to final discharge to the Severn Tidal Estuary. However, this is subject to a requirement to meeting dissolved methane limits to enable compliance set in the trade effluent consent prior to discharge into public sewer which has been imposed by Wessex Water. Therefore, the installation of a methane stripping plant will ensure that methane levels are reduced to allow discharge of treated leachate into the public foul sewer network.

2.2.2 There are different methods for driving out dissolved methane out of solution in leachate, aeration is most widely employed in the UK and is considered BAT. The selection of leachate management options by the operator has, in accordance with the principles outlined in BAT Conclusions and BREF guidance, been based on thorough leachate characterisation and assessment of the most appropriate leachate treatment option. Taking into consideration leachate quality data to date, water balance calculations that provide predictions for future leachate production, the site setting, physical constraints on the site, costs, and limitations of the trade effluent consent.

2.2.3 Leachate management will be required at Yanley Landfill Site for many years following the closure of the site, the quality and quantity of leachate arising at the site is now within an established range for the extended aftercare period.

2.2.4 The leachate treatment by methane stripping has been designed to meet the current Wessex Water discharge consent limit (Appendix 1).

2.2.5 The receiving sewage treatment works is capable of treating the predicted volumes and strengths of leachate from the site without any additional infrastructure requirements, or pre-treatment except for removal of dissolved methane.

2.2.6 The effluent will discharge to Wessex Water's foul public sewer network via a pipeline from the MSP which will flow towards the Avonmouth Treatment works prior to final discharge to the Severn Tidal Estuary.

2.2.7 It is therefore considered that this is the most efficient and effective method for leachate treatment at site and is considered to represent BAT with respect to IPPC BAT Conclusions and BREF Guidance.

2.3 Leachate quality and trade effluent consent limits

2.3.1 A Surface Water Pollution Risk assessment has been prepared under document reference: 4898-CAU-XX-XX-RP-V-0304 which assesses the environmental impacts of the proposed permit variation application. The Surface Water Pollution Risk assessment took monitoring data based on raw leachate at the site, the Operator has previously agreed trade effluent discharge consent limits based on the leachate data as detailed in Table 1 below.

Table 1: Summary of Trade Effluent Agreement Values

Raw Trade Effluent Discharge Consent (mg/l)		Percentage removal rate of substance by activated sludge plant	Proportion remaining in activated sludge plant	RC Value	
				mg/l	ug/l
Suspended Solids 105°C *	500		1	500	500000
Sulphate as SO4 *	1000		1	1000	1000000
Chromium Total	2.5	84	0.16	0.4	400
Copper Total	2.5	79	0.21	0.525	525
Lead Total	2.5	83	0.17	0.425	425
Zinc Total	2.5	67	0.33	0.825	825
Nickel Total	2.5	24	0.76	1.9	1900
Sulphide as SO2 *	5	100	0	0	0

* Indicates substances without STRF values.

STRF from
http://www.fwr.org/WQreg/Appendices/horizontal_Guidance_H1_Annex_D_Surface_Water_Basic_geho0810bsxl-e-e(1).pdf

2.3.2 Only substances limited by the trade effluent consent have been assessed in Table 1. A number of parameters do not have sewage treatment reduction factors as shown.

2.4 Principles of the methane stripping process

2.4.1 The purpose of the methane stripping plant is to degas the leachate so that it meets the limit required by the Trade Effluent Consent for discharge to sewer.

2.4.2 This process removes the methane gas from solution using the passage of air bubbles through the leachate.

2.4.3 Provided that adequate volumes of air are used during the stripping process, concentrations of methane present in leachate will be well below explosive levels.

2.4.4 The process can potentially create foaming, and so this is controlled by dosing with antifoam solution.

2.4.5 Experiences from existing methane stripping installations in the UK has shown that odour effects have been minimal and have not required specific treatment unless in a very sensitive location.

2.5 Plant design selection

2.5.1 Viridian Systems Limited (Viridian) have been appointed to for the design, construction and commissions of the Yanley Landfill Site treatment plant to strip dissolved methane from landfill leachate. A tender submission including plant specification is included under Appendix 2. Viridian provides process guarantees for their MSP including:

- Feed pump for raw leachate are controllable between 0.4 and 1.74m^3 per hour;
- The MSP sized to accommodate at least 100m^3 per day as continuous flow can operate in batch mode to accommodate discontinuous demand;
- Air flow rate is manually adjustable which can help to reduce over-aeration and hence calcification; and,
- 4 reaction tanks providing ≥1hours residence time and 4 times air flow to leachate flow.

2.6 Plant size calculations

2.6.1 The MSP has been designed based on the treatment and daily flow of effluent at Yanley Landfill Site based in leachate volumes and methane stripping. The supplier has designed and sized the plant to treat the 95th%ile daily flows for dissolved methane as shown below:

Yanley Landfill Site	m^3 per day	m^3 per hour	Dissolved methane (mg/l)
	142.3	5.93	7.2

2.6.2 The plant has been designed for a maximum throughput capacity of >50 tonnes/day to remove dissolved methane. The MSP will discharge in line with the discharge consent from Wessex Water which allows up to 100m^3 in a 24hour period.

2.6.3 In order to provide a plant of the right size, the typical dissolved methane levels within the leachate have been monitored for by Viridor and the plant specified is based on manufacturer recommendations for the site's leachate strength. Analytical detail on methane concentrates Yanley Landfill site leachate is included in Appendix 3.

2.7 Plant design details

2.7.1 Based on the landfill site and leachate treatment requirements, the MSP will generally comprise:

- Duty/standby raw leachate progressing cavity feed pumps, mounted on a concrete plinth;
- Electromagnetic flow meter on feed to MSP;
- Prefabricated steel ski and bund arrangement, approximately 10.9m long x 3.0m wide with a bund depth of 0.7m to provide CIRIA C736 compliant bunding in respect of hydraulic containment, jetting and surge. The bund will have a small sump, pump c/w/ level controls and a hi-hi float switch;
- Steel access gantry and stair to 1m below the top of the reaction tanks to enable access for viewing, sampling and maintenance;
- Enclosure with MCC/SCADA and telemetry, mounted externally to the bund on the skid;
- 4 x 1.8m^3 HDPE reaction tanks, 455mm diameter top access and vent, tanks connected in series at high level;
- 1 x 1.8m^3 HDPE degassing tank fitted with a top-mounted agitator;
- 1 x 1.8m^3 discharge pumping tank;
- Duty/standby progressing cavity discharge pumps;
- MCERTS Electromagnetic flow meter on discharge to sewer;
- Each reaction tank will be fitted with two easy-to-remove Jaeger TD63 x 750mm long, fine-bubble tube diffusers, capable of accepted 2-9m_N^3/hour of air
- Enclosure mounted at high level within the bund, housing duty/standby blowers capable of delivering 25m^3 /hour at 200mBars.

2.7.2 Dosing pump enclosure housing a duty only antifoam and antiscalent dosing pumps. The dosing pump enclosure incorporates bunded storage for 1 x 25 litre drums of antifoam and antiscalent. The dosing pump enclosure is also mounted on the skid, externally to the bund for easy access to exchange 25 litre drums.

2.7.3 The proposed MSP is skid-mounted, allowing it to be placed on compacted stone base overlain with free-draining gravel, no concrete base needed. The typical arrangement for the MSP is detailed in Figure 1 below.

Figure 1 Methane Stripping Process Description.

2.7.4 Raw leachate will be pumped from the existing raw leachate tanks via duty/standby progressing cavity (PC) feed pumps. PC pumps are more suited because they can be readily speed controlled to achieve reliable flow rates and less prone to calcification (less agitation compared to a centrifugal pump).

2.7.5 Raw leachate will enter each reaction tank at the top and flow downwards, exiting via a pipe carrying liquid up to the top of the next tank. This will provide counter-current

flow to the aeration system which is by far the most efficient system for removing dissolved methane.

2.7.6 In the third tank there will be similar pipe exiting the tank at the liquid height of 1.6m. There will be removable lids on each tank to facilitate maintenance, de-scaling and de-sludging as required. The lids can also be used as an inspection point to enable the operator to check on foam level or aeration pattern.

2.7.7 Air to the diffusers will be supplied by duty/standby Elmo Rietschle, oil-free sliding vane blowers. The model is a V-DTE 6 Capable of delivering $25m_N^3$/hour at 200mBars, 0.75kW motor. Blowers are energy efficient at the duty point. Air-flow measurement to each reaction tank will be via 4 variable area flowmeters.

2.7.8 On exiting the third reaction tank, leachate will enter a degassing tank which, like the aerated reaction tanks, remains constantly full and its stirred with an agitator to encourage liberation of residual micro-bubbles of gases.

2.7.9 From the degassing tank, leachate then passes to the pumping tank allowing treated leachate to be discharged to sewer by pump. Pump discharge is able to achieve self-cleansing velocity in the rising main.

2.7.10 Aeration and/or agitation of leachate will, in most cases result in the formation of foam and therefore antifoam dosing has been included.

2.8 Performance and leachate treatment

2.8.1 Viridian guarantees that the completed facility at Yanley Landfill site will process leachate as a minimum in accordance with the data contained in Table 2 and Table 3 below.

Table 2: Performance Guarantee Yanley Landfill Site: Equipment

Item Description	Units	Guaranteed Figure
MSP Flow Volume	m^3/day	150
	l/s	1.74
Maximum annual power consumption	MW/hr	30
Maximum instantaneous power consumption	kW	10
Maximum noise (internally located equipment)	dB at 1 metre from outside of enclosure	45
Maximum noise (externally located equipment)	dB at 1 metre from equipment	4

Table 3: Performance Guarantee Yanley Landfill Site: maximum treated leachate discharge concentration limits

Item Description	Units	Guaranteed Figure
COD	Kg/day	No greater than influent quality on same day
COD	mg/l	
pH	Unit	
Suspended Solids at 105°C	mg/l	
Copper (total)	mg/l	
Chromium (total)	mg/l	
Nickel (total)	mg/l	
Lead (total)	mg/l	
Zinc (total)	mg/l	
Dissolved Methane	mg/l	0.11

3. REVIEW AGAINST INDICATIVE BAT STANDARDS

3.1 Leachate Pre-Acceptance, Acceptance, Handling and Storage

3.1.1 Only leachate arisings from Yanley Landfill Site will be treated at the MSP. The leachate is well characterised and will continue to be sampled.

3.1.2 Leachate storage and treatment vessels will be specified for a suitable "design life" that takes account of the proposed operational life of the plan to suitable BSS and Eurocodes. Vessels will not be used beyond the specified design life and will be inspected at regular intervals with recorded and written records to prove they remain fit for purpose. The Viridian MSP plant is designed for a minimum operational life of up to 25 years (subject to process) as detailed in the anticipated life schedule as shown below in Table 4 below.

Table 4: Anticipated Life schedule

Component Mechanical Items	
Item	**Anticipated life (years)**
Diffusers	5
Blowers x 2	5
Transfer pump	Subject to process
Dosing pumps x 2	5
MSP Tanks	25 (subject to process)
Component Electrical Items	
Level control floats x 6	5
Level transducers x 3	5 (subject to process)
Control panel	15
Component Process/Consumable items	
Antifoam	Consumable
Anti-scalent	Consumable
Vane set	6 months
Blower Air Filter	6 months

3.1.3 A planned preventive maintenance (PPM) programme for all elements of the plant will be put in place which will include regular inspection of storage vessels.

3.1.4 To ensure that tanks are protected from possible corrosion, any parts, pipework's etc in direct contact with leachate shall not include unsuitable materials such as zinc, or galvanising. Aluminium is not considered suitable in most instances and will not be used. To minimise corrosion and leaks, all tanks will be provided with a secondary containment bund. The storage and treatment vessel design will take account of the following:

- The treatment properties of the leachate being stored;
- How storage is operated, level of instrumentation needed operatives required and their workloads;

- How operatives are informed of deviations from normal process conditions (alarm systems) and how leachate storage is protected against deviations from normal process conditions (safety instructions, interlock systems, pressure relief devices, etc)
- What equipment has to be installed, largely taking account of past experience of the product (construction materials, valves quality, etc.)
- Which maintenance and inspection plan needs to be implemented and how to ease the maintenance and inspection work (access, layout, etc.)
- Dealing with emergency situations (distances to other tanks, facilities and to the boundary, fire protection, access for emergency services such as the fire brigade, etc.).

3.1.5 The methane stripping plant (MSP) will comprise of elements in line with BAT compliance to achieve optimum performance.

Plant and pipework design specification

3.1.6 The tanks will be manufactured from HDPE materials and will be lined with epoxy resin paint on the interior surfaces to prevent corrosion. The system will operate on an automatic continuous system. It is proposed that the methane stripping plant will operate continuously, treating and discharging up to 150m³ per day.

3.1.7 A Planned preventive maintenance (PPM) programme will be in place. In the design, the operator has taken account of the anticipated maintenance requirements and has chosen equipment which is easier to maintain. Maintenance is site specific and dependant on flows on the MSP. Viridian have recommended that the MSP is operated initially for 12 months and can offer planned maintenance/calibration/servicing and plant-desludging. As all pipework will be above ground, all potential leaks will be assessed via visual inspections.

3.1.8 In terms of 'Emergency situations', Viridor's operational manual will incorporate emergency procedures for the operation of the plant covering explosions, fire, spillages etc. All operators and site staff will be trained in the correct procedures and actions to take. In addition, the existing accident management plan for the Site includes a fire action plan that will be updated as necessary to take into account operational and infrastructure changes on site.

3.1.9 Viridian MSPs are skid mounted and placed on a level, stable and free-draining surface. A concrete plinth will be included for transfer pumps (pumps that would transfer raw leachate to the MSP at a controlled rate). Bunding of the MSP will comply with CIRIA C736 and the bund floor will incorporate a sump c/w/ sump pump for rainwater control. Rainwater will be discharged into the first reaction tank. The bunded area shall have a capacity at least 110% of the largest vessel or 25% of the total tankage volume, whichever is the greater. Connections and fill points should be

within the bunded area and no pipework should penetrate the bund wall. The bund will be provided with a sump, control levels and a hi-hi float switch.

3.1.10 If required, as antifoam is not a hazardous chemical, it will be stored in a suitable and appropriate container. Delivery pipes of the antiscalent will be double contained. Where appropriate, pipework will be trace-heated, lagged and clad with rodent/bird proof cladding.

3.2 Acceptance procedures of process materials at site

3.2.1 The required process materials include antifoam and antiscalent which will be delivered in a 25l drums and stored in a designated storage room provided with bunding of sufficient size to contain it. The dosing pump enclosure is mounted for easy access to exchange the drums. All documentation for antifoam will be checked, approved and any discrepancies resolved before acceptance. Any incorrect labelling will be removed prior to placing the material in storage. To ensure the correct storage of all process materials, all vessels and tanks used for the storage will be above ground provided with secondary containment that are appropriate to the mechanical nature of the materials stored, in addition, all chemical containers will be sited within a bund.

3.2.2 To ensure appropriate training relevant staff involved with the operation of the MSP will receive appropriate training relevant to the tasks they will be carrying out including safe handling, use and disposal of process chemicals. Spill kits will be provided along with a first-aid kit and eyewash, staff will also be trained in their correct usage.

3.3 Treatment processes

General

3.3.1 The standards for storage and treatment vessels are detailed in Section 3.1 of this report, the standards for the storage and treatment of raw and process materials are detailed in Section 3.12 of this report. Leachate of some composition, particularly those from more recent wastes will cause foaming in stripping plants. Foaming should be countered by routine addition of antifoam agents. Odour and ventilation from the MSP is discussed in further detail in Section 3.9 of this report.

Methane Stripping

3.3.2 The MSP is able to reduce methane content to <0.11mg/l as shown in Table 3, this is in line with limits detailed in the trade effluent discharge consent (Appendix 1). During the stripping process, adequate volumes of air shall be used to keep the concentrations of methane present in the exhaust gas below explosive levels. Air will be provided by blowers powered by an electric supply. The MSP will be installed with the provision of downstream pipework which will be relatively short and laid above

ground to enable easy inspection and maintenance, air input can be regulated by the control system.

3.3.3 To monitor the concentration of dissolved methane, a sample of treated leachate will be monitored for analysis at an UKAS accredited lab monthly. If inspection of the MSP or analysis of effluent quality indicates that the plant is not removing sufficient methane concentrations, the following actions can be taken:

1) Supply of air can be increased from the duty blower;

2) Supply of air can be increased by amending the PLC (via the SCADA system) to operate the blower as Duty/Assist;

3) Residence time in the plant can be increased by partially closing the throttle valve installed on the outlet from the transfer pump from the balance tank to the aeration tank this would increase the residence time the raw leachate has in the aeration chambers.

Inlet Control

3.3.4 The Viridian Systems MSP performance provides a guaranteed flow at Yanley Landfill Site of up to 150m^3 per day at a rate of up to 1.74 l/s.

3.3.5 Flow will be controlled via an actuated fail safe close pneumatic valve located in the inlet pipework. An MCERTS Electromagnetic flow meter will be installed to record the leachate feed into the MSP and another on the final effluent. When an enable signal has occurred from the pressure transducer within the balance tank, the system will open the actuated valve which then allows raw leachate to fill the balance tank. When the pressure transducer reaches the agreed set point, one of the duty standby pumps located in the balance tank will activate and then pump leachate into the first of the aeration chambers. Leachate will not be transferred into the aeration tank if any of the following occurs:

4) A high level is detected in the aeration chambers;

5) The trigger point for the pump has not been reached in the balance tank;

6) A high level has been detected in the discharge tank; and,

7) A Hi-high level is indicated in the balance tank.

3.3.6 The level transducer will indicate the level of the tank at the SCADA system. The high-level alarm from the transducer is not a latched alarm therefore the alarm will reset when the level is below the high level setpoint.

Aeration

3.3.7 Aeration is a continuous process when the plant (flow present) is operational. The airflow is regulated via an airflow regulator situated on each separate air food to the aeration vessels. This ensures an evenly distributed supply of air to each tank. The airline to each tank is then connected to the vessels via sealed HDPE pipe and connected inside the vessel via threaded hose which in turn is connected to a manifold with two fine bubble diffusers.

3.3.8 Fine bubble tube or disc diffusers are used as they are more effective at methane stripping that course bubble diffusers and they are significantly more energy efficient that course bubble diffusers. In addition, they have a long-life expectancy anticipated at 5-10 years and inexpensive to place.

3.3.9 As liquor flows through the aeration chambers the fine bubble diffusers release air in the form of micro-bubbles in each of the tanks. The upward flow is vigorous causing the necessary agitation to drive the dissolved methane out of solution. The transit time to surface for a fine bubble is much longer than course bubble and therefore has an effective treatment time. Bubbles are held longer within the liquor and are therefore more efficacious in removing methane.

3.3.10 The residence time in each aeration chamber provided is in excess of 1 hour in the reaction tanks.

3.3.11 As part of the scheduled inspections, the flow to each chamber should be observed. If an imbalance is detected (i.e. one or more of the chambers are displaying unequal levels of air flow) then a visual inspection should be made for the bubble pattern in each chamber. If no obvious leak is detected and increasing the flow via the valve does not increase airflow then the blower will need a service. In any case it should be arranged for additional analysis of dissolved methane in the effluent to determine whether the methane removal efficiency has decreased.

3.3.12 In the event of a high level being detected in the aeration chambers a float level switch will activate and switch of the active transfer pump in the balance tank – the pump will activate again once the level falls de-activating the switch. If the level rises further and triggers the secondary hi-high level switch then the actuated valve will close preventing any additional liquid entering the balance tank from the field system. Additionally, the system will de-activate the bund pump. In both events an SMS alarm will be sent to inform the operator of the alarm and a site inspection is required.

Level and electrical Control

3.3.13 All design, factory assembly and installation shall conform to a relevant recognised British, European or US standard. All switchgear will be Schneider equipment and all outdoor enclosures are to be IP66 GRP Enclosures built to EN62208:2011. The installation will be tested in accordance with BS7671:2018 with the rated voltage of the installation being 415v/230v/50hz.

3.3.14 A PLC system will be installed, and a SCADA will provide the 'point of view' (POV) where the status of all electrical pumps, all level sensors in storage tank, flow meters, float switches and limit switches can be viewed. The SCADA system will be provided with facilities for remote access to Viridor's "VOIS" (Viridor Operational Information System) and connection to Viridor's Monitoring Pro for exporting data. The SCADA system will include mimic screen diagrams and means for adjusting parameters and record operational data and display historical data and trends.

3.3.15 The SCADA will display plants items including:

- Graphical overview of whole plant;
- Individual graphic screens;
- running status, flow rate, levels, motor run hours, fault status and alarm systems;
- Process parameters;
- Alarm history;
- Historic trends for each of the levels and flow rates;
- Data logging, emailing and downloading of CSV reports; and,
- Telecommunication links.

3.3.16 All tanks will have Hi and Hi/Hi float switches to provide alarms in the first instance to inhibit feed.

3.3.17 The bund sump pumps will have integral float switches. The bund will have a float switch for alarm purposes and to inhibit the leachate feed.

3.3.18 VEGAPUKS WL S 61 Radar level monitoring and control sensors (widely used in water and wastewater industry) will be used for level measurement in treatment and overflow tanks. Radar level sensors will be installed in the following tanks:

Raw leachate tank – level indication and pump control

Discharge pumping tank – pump control

<u>Trace heating and lagging</u>

3.3.19 Trace heating, lagging and cladding will be provided for all exposed pipework's and pumps. Cladding will be rodent and bird proof.

<u>Discharge Control</u>

3.3.20 Flow from the final aeration chamber will flow into the discharge tank. In the discharge tank the level monitor (once the agreed set-point has been reached) signals one of the duty standby discharge pumps to discharge the treated leachate into the

effluent discharge line. An MCERTS Electromagnetic flow meter will record discharge into the foul public sewer line.

Sludge Management

3.3.21 The generation of significant volumes of sludge is not expected, it is anticipated that the annual sludge production rate will be less than 10kg per year. It is likely that solids will accumulate in all tanks containing leachate and recycling pad water, in particular the MSP and de-gassing tank. If sludge production is observed, it will be removed on an ad-hoc basis. The tube diffusers can be removed and cleaned (or replaced). The de-gassing tank will be fitted with an agitator which will be run continuously to prevent the settling of solids and to actively disperse entrained gas.

3.3.22 The access gantry provides a safe working platform for a suction and getting to clean the tanks out. Sludge removal will be carried out to remove the contents of each chamber. A high-power jet can also be used to remove any residual sludge and put it into suspension of the water and then removed/

Calcification

3.3.23 Aeration or agitation of raw leachate can induce calcification; where dissolved carbon dioxide is driven out of solution with methane which destabilises the calcium bicarbonate equilibrium with automatically readjusts by precipitating calcium carbonate. To reduce calcification, the aeration rate can be adjusted to a minimum whilst still achieving compliance with the methane tender limit. For Yanley, the airflow rate can be adjusted manually with regular laboratory methane analysis to ensure the optimum airflow rate is achieved. Viridian systems have carried out anti-scalent trials, calcification can be reduced by dosing anti-scalent at very low dosage rates of between 5-50m/m^3 of leachate. Operational experience with the installed plant will determine the need for and dosing rate of anti-scalent.

3.3.24 Anti-scalent contains phosphonate and changes the leachate chemistry very slightly and the resulting calcium phosphonate is much more soluble that calcium carbonate and should not precipitate out in the MSP. With a continuous dosing of anti-scalent at a controlled rate in the MSP, the antiscalent is unlikely to diminish in the discharge main to foul public sewer, provided a self-cleansing velocity is maintained. The effluent discharged to sewer will be fully compliant with the trade effluent consent. The quality of effluent from the sewage works to controlled waters will not be affected by the anti-scalent in the MSP discharged effluent.

Foam and Scaling Control (raw materials)

3.3.25 Foam and scaling can be generated during the aeration process. To ensure foam does not overtop the tanks, anti-foam can be pumped to the aeration chamber via a small dosing pump from a 25l drum located within the bund.

3.3.26 To prevent scaling of the MSP and associated network lines, an anti-scaling dosing system to inhibit formation of calcium carbon will be installed. The action of methane stripping by aeration causes agitation that drives methane out of solution, this also drives CO2 out of solution whereby the de-stabilisation and stabilisation process form calcium carbonate. The scaling ions attach themselves to any particles (grit, fibres etc) and surfaces including pipe, tanks, walls and diffusers. Antis-calent will also be dosed into the aeration chamber via a small dosing pump from a 25l drum.

3.3.27 Both solutions will be pumped in a timed basis, the timings of the pump can be control using the SCADA control panel. Anti- foam solution is pumped into the first aeration chamber only as the solution will transfer across to the other chambers preventing the formation of foam in the other aeration chambers.

3.3.28 The location of both anti-scaling and anti-foam drums will be within the footprint of the methane stripping plant assembly.

3.3.29 Antifoam is not considered a hazardous chemical and therefore does not require any secondary containment. Anti-scalent is classed as an irritant, delivery pipes will be double contained. Where appropriate, pipework will be trace-heated, lagged and clad with rodent/bird proof cladding.

Methane Removal

3.3.30 Viridian Systems are guaranteeing that their MSP will process leachate with a maximum dissolved methane discharge of 0.11mg/l. Concentrations for dissolved methane in the discharge of leachate to sewer will be monitored by analysis at a UKAS accredited laboratory.

Inspection and Maintenance

3.3.31 The frequency of plant and maintenance is detailed in Table 5 below.

Table 5 Inspection and Maintenance schedule

Frequency	Description
Weekly	Interrogate LTP SCADA system, record any faults, alarms or warning and investigate
	Confirm discharge volumes
	Assess the stocks of anti-foam/anti-scalent. Order/arrange delivery as necessary.
	Check site security
	Inspect around MSP and electric supply for any signs of damage
Monthly	Inspect all tanks, bunds, pipes, pumps and other equipment associated with the LTP for signs of leaks, check diffuser bubble pattern in aeration chambers
	Sample the Raw Leachate and the Effluent Quality

Frequency	Description
6 Monthly	Check operations of LTP inlet Actuated Valves (raise a flow switch in the balance tank)
	Check operation of bund sump pump (lift the low-level float switch)
	Overpressure diffusers to remove scale build up
	Service blowers
	Check for sludge build up in tank
	Check operation of float
	Check transducer level readings
	Check all electric pump cables for signs of damage (isolate power before inspection)
	Check Vane set (replace if necessary)
	Check Blower air filter (replace if necessary)
Yearly	Calibrate flowmeter
5 Years	Inspect and if necessary, replace: Diffusers Blowers Dosing Pumps Level control floats Level transducers
	Electrical systems condition inspection and report
10 years	Drain down and inspect MSP and bund
15 years	Inspect and if necessary, replace: Control Panel
25 Years	Inspect MSP and Bund and if necessary replace

3.4 Point source emissions to air

3.4.1 As the treatment process will be using a tank-based methane stripping, the biological and chemical treatment processes are not considered necessary to the application.

3.4.2 There is very low potential for odour release from untreated leachate and during venting to the atmosphere (venting to atmosphere will reduce the potential for pressure fluctuations). Adequate volumes of air are used in the stripping process, therefore methane concentration in the exhaust gases will be minimal and well below explosive levels. In line with the majority of full-scale methane installations across the UK, odour potential will be minimal and does not require further odour suppression measures. Odour control measure in relations to the methane stripping plant will remain under review. Odour is further considered in the Amenity and Accidents Risk Assessment in document ref: 4898-CAU-XX-XX-0306.

3.5 Point source emissions to surface water and sewer

3.5.1 The primary treatment of the leachate will occur within Avonmouth Sewage and then final discharge to sea. Effluent will be discharged to Wessex Waters foul public sewer then to the treatment plant via pipeline.

3.5.2 The treatment process proposed is to strip out dissolved methane before it enters the plant for which there are no BAT emission benchmark values as it is not relevant. There will be no direct emissions to surface water. However, it is recognised in BREF guidance that where effluent is treated off-site at a sewage treatment works, the wastewater producer needs to demonstrate that:

- The treatment provided at the sewage treatment works is as good as would be achieved if the emission was treated on-site, based on the reduction of load (not concentration) of each substance to the receiving water;
- A suitable monitoring programme is in place to check the emissions to sewer, taking into consideration the potential inhibition of any downstream biological processes and action plan for any such event.

3.5.3 The chemical quality of the effluent to be released to sewer from Yanley Landfill site through the MSP has been assessed via the Surface Water Pollution Assessment. All parameters were found to be within acceptable concentrations. The Surface Water Pollution Risk assessment (document ref: 4898-CAU-XX-XX-RP-V-0304) demonstrates that there will be no breach of water quality standards, as can be seen from the assessment, the effects on the resulting receiving surface water are below the initial screening criteria of the risk assessment.

3.5.4 The monitoring of the effluent will be done as per the trade effluent consent and backed up with additional on-site monitoring. The location of the trade effluent discharge and monitoring point is shown as 'YN/501' in the 'Yanley Landfill MEPP Monitoring & Extraction point plan' under drawing ref: YAN3000. The trade effluent consent requires that sampling methods must be in place for recording the volume, rate, and composition of the trade effluent. A monitoring programme for the effluent discharged to sewer will be in place to ensure compliance with the trade effluent consent and the permit. To gain an understanding of the main chemical constituents of the treated leachate, current leachate quality was assessed in terms of its suitability for treatment.

3.5.5 As per the BAT Conclusions and BREF guidance, the primary objective of leachate treatment operations has been to produce an effluent that can be transferred to the sewage undertaker under the terms of a trade effluent discharge consent. If emissions can be reduced further than the treatment provided by the undertaker, or prevented altogether, at a reasonable cost, then this should be done irrespective of the requirement a trade effluent consent. No additional treatment was required beyond methane stripping, therefore, no justification for building a leachate treatment plant to specifically reduce emissions beyond those required by the sewage undertaker was required.

3.6 Point source emissions to groundwater

3.6.1 There will be no emissions to groundwater from the Yanley Landfill Site Methane Stripping Plant.

3.7 Fugitive Emissions to air

3.7.1 Without mitigation, there is very low potential for odour release from the storage of untreated leachate and then during venting of exhaust air to the atmosphere. To minimise odours, raw leachate will enter the tank through an internal pipe extending vertically downwards to submerge the pipe end via a sealed leachate extraction system.

3.7.2 Odour is further considered in the Amenity and Accidents Risk Assessment in document ref: 4898-CAU-XX-XX-0301, the methane removal rate is detailed in Section 3.4 Point Source Emissions to Air of this report.

3.7.3 Based on analytical data of leachate, typical methane influent quality is between 5.25-9.1mg/l. It is anticipated that at a discharge rate of 100m^3 per day of treated leachate, where 1cm^3 of CH_4 is equivalent to 0.00055g the volume of CH_4 released to the atmosphere for influent quality of 2.7mg/l/day and 7.5mg/l/day is detailed in Table 6 below. This assumes all CH_4 is stripped and vented from the leachate.

Table 6: Approximate volume of methane released to air as a result of methane stripping

Leachate influent methane quality (volume rate of 100m^3 per day)	Mass of 1cm^3 of CH_4	Mass of methane (g) at 100m^3 discharge rate per day	Volume of CH_4 released to air
2.7mg/l	0.00055g	270	0.49 m^3/day
7.5mg/l	0.00055g	750	1.36m^3/day

3.7.4 A review of Table 6 has calculated assuming that all concentrations of CH_4 is removed from the leachate and vented as emissions to air. Table 6 indicates that the volumes of CH_4 release to air daily are low therefore their impact to atmosphere considered low. The calculation is based on the mass and volume of methane present in the leachate, analytical detail in included in Appendix 3.

3.8 Fugitive Emissions to surface water, sewer and groundwater

3.8.1 There are no subsurface structures associated with the MSP which could result in leakages of hazardous substances to the groundwater. In addition, as there are no sumps associated with the plant, a programmed engineered inspection and frequent inspection of sumps is therefore not required.

3.8.2 All above ground tanks/containers/ drums containing liquids harmful to the environment will be bunded, impermeable and resistance to the stored materials. All tanks associated with the MSP and any chemical drums containing raw/process materials will be impermeable to the liquids they contain and constructed out of materials suitable for the holding contents. Antifoam is not a hazardous chemical and does not require secondary containment, the delivery pipe for antiscalent will be double contained. However, the storage of antifoam and antiscalent chemicals will be within the MSP bunded area which is within the curtilage of the landfill sites security fencing which will minimise the risk of vandalism and product misuse. The MSP tanks will have effluent intake at high level, and there will be no outlets other than towards the top of the tanks. Inlets are positioned at the top of the tanks and all discharges from the tanks are pumped out. Tanks are self-contained having a capacity to hold in excess of 110% of their contents, additionally, they will be fitted with pneumatic level probes which are connected to the plant control system. There will be a maintenance programme in place that will include the regular inspection of all element on the MSP on a periodic basis. In addition, the system, including raw materials dosing will be subject to secondary containment which will comply with the UK Landfill Industry Cope of Practice 'Leachate Storage Infrastructure'. This includes primary containment which will be designed and provided for leachate storage, treatment and effluent tanks with interconnecting pipework systems. Primary containment systems will be designed to prevent the likelihood of accidental damage, no penetrations in containment bunds and all pipework to be above ground.

3.8.3 There will be a maintenance programme in place that will include the regular inspection of all elements on the MSP on a periodic basis where the frequency of inspection and maintenance is detailed in Table 5.

3.9 Odour

3.9.1 Experiences from existing methane stripping installations in the UK has shown that odour effects have been minimal beyond site boundaries and have not required specific treatment unless in a very sensitive location. Leachate from the landfill will be collected by the MSP all within a sealed extraction system. Adequate volumes of air are used in the stripping process, thus methane concentration in the exhaust gases will be minimal and also below explosive levels. It is expected that in line with the majority of full-scale methane stripping installations in the UK, odour effects will be minimal and do not require further odour suppression measures. Odour control measures in relation to the methane stripping plant will remain under review. For further information see section 'Point Source Emissions to Air' and 'Fugitive Emissions to Air'.

3.9.2 The PPMP for the plant will include maintenance measures to ensure the plant operates efficiently to design parameters. To minimise the potential for odour release, the design of the MSP will pump raw leachate directly to the tanks whereby leachate will enter through an internal pipe extending vertically downwards to

submerge the pipe end. The treatment process is specially designed to remove potentially explosive and/or odorous gases from the leachate.

3.10 Management, Operations and training

3.10.1 The MSP will operate in accordance to the procedures as detailed within the company's Environmental Management System which will adopt:

- *includes a commitment to continual improvement and prevention of pollution;*
- *includes a commitment to comply with relevant legislation and other requirements to which the organisation subscribes; and*
- *identifies, sets, monitors and reviews environmental objectives and key performance indicators independently of the permit.*

3.10.2 Effective operational and maintenance systems will be employed on all aspects of the treatment process and the system will have in place documental operational procedures for all elements of the site operations that could have significant environmental impact. Following on from the introduction of the new methane stripping plant, any additional procedures to be incorporated in the system will be included in the planned preventative maintenance programme for the plant and its associated infrastructure. Relevant staff will be trained and aware of any new procedures or documentation relating to the effective operational running of the MSP. To monitor and record training the company's management system includes internal auditing and reporting of results to senior management at Viridor this will ensure that the appropriate skills and competencies necessary are carried by the relevant persons and identify any further training needs.

3.10.3 Any contractors attending site will complete a site induction which includes measures that must be taken to protect the environment whilst working on site. Overall, staff with the appropriate WAMITAB qualifications will oversee the operations at the methane stripping plant.

3.11 Accidents, Incidents and Non-conformances

3.11.1 Written procedures for handling, investigating, communicating and reporting non-compliances with operating procedures or emissions limits will form part of Viridor's management system. Any non-compliances in the discharge consent will be reported to Wessex Water.

3.11.2 Viridor's environmental policy provides demonstrable procedures which incorporates environmental considerations in the following areas:

- the control of process and engineering change on any waste installation/operation;
- design, construction and review of new facilities and other capital projects (including provision for their decommissioning);
- capital approval; and
- purchasing policy.

3.11.3 In addition, Viridor will conduct audits at least annually to check and monitor that all activities are being carried out in conformity with a clear and logical system for keeping records including:

- Policies
- Roles and Responsibilities
- Targets
- Procedures
- Results of reviews

3.12 Raw materials

3.12.1 The only raw process materials that will be used for the proposed MSP are antifoam and antiscaling agents, these are used in very small quantities and are widely used in the industrial wastewater treatment sector. Antifoam and antiscaling will be contained in seperate25l drum which will sit within a bund which will hold a 110% capacity. In line with BAT Conclusions and BREF guidance, copies of Material Safety Data Sheets (MSDS) will be obtained when materials are purchased and any relevant recommendations in relation to the handling or storage of the materials will be followed and in accordance with the site's management procedures. Records of the quantities or raw materials will be recorded with periodic reviews on usage with a view to identify opportunities for improved efficiency.

3.12.2 The operator will have a regular review of new developments in raw materials and for the implementation of any suitable ones with an improved environmental profile. This will be based on a number of factors such as; price, process suitability, environmental impact including impurities content.

3.12.3 Quality-assurance procedures for controlling the impurity content of raw materials will be assessed when purchasing raw materials from suppliers and requesting information and the raw material content of that product. Where any potentially-less polluting options for process materials are identified, the operator can trial the alternative raw process materials to assess its suitability for the MSP, ease of use and any other relevant chemical properties.

3.12.4 To ensure that the use of raw materials is minimised, the operator will carry out a waste minimisation audit every 4 years – this will form part of the scope of the audit as required for the ISO14001 certified EMS. The audit will include a review of the use of process materials.

3.13 Water Use

3.13.1 Water used by the MSP is anticipated to be minimal and restricted to cleaning procedures only. There is no separate water meter or private supply to the MSP.

3.13.2 To minimise the risk of contamination of surface waters or groundwater by fugitive released of liquids or solids, the MSP will be Integrally bunded plant.

3.13.3 As the methane stripping plant and operations are an enclosed process, it is not envisaged that there will be a need for regular cleaning and washing down of process equipment. Water usage for cleaning and washing down can be further minimised by:

- Vacuuming, scraping or mopping in preference to hosing down;
- Re-using wash water (or recycled water) where practicable; and,
- Using trigger controls on all hoses, hand lances and washing equipment.

3.14 Waste handling

3.14.1 A system will be in place and maintained that records the quantity, nature and origin of waste and describes the measures for waste management, storage and handling. At Yanley Landfill Site Methane Stripping Plant, the main waste type produced from the treatment process is the treated leachate that will be disposed directly to the sewer connection in line with the trade effluent consent. For any solid wastes generated, the operator will operate a system for maintaining records of all waste transfer in line with the Duty of Care for Waste. None of the waste types generated at site are likely to generate emissions, any waste types will be segregated and stored in suitable containers on an area of impermeable hardstanding.

3.14.2 It is anticipated that there will be no incompatible wastes, however, in the event that wastes are generated (e.g. spillage of process chemicals) which may be incompatible with other materials, it will be kept segregated and the container clearly labelled with regards to its contents.

3.15 Waste Recovery or Disposal

3.15.1 Waste production will be avoided wherever possible, all process materials will be stored in suitable containers and on surfaces with impermeable surfacing and bunded.

3.15.2 In line with the Waste Framework Directive, the Operator will review recovery options for each waste and will, as far as practicable, choose the recovery or disposal options which is highest in terms of the waste hierarchy. Leachate will be disposed of directly to the Avonmouth sewage treatment works, this is via a public foul sewer network and then final discharge to sea. Recovery and re-use have been considered but are currently technically and economically impossible. Disposal is undertaken while avoiding or reducing any impact on the environment. For all other waste streams, recovery and disposal options will be considered in line with the waste hierarchy of the Waste Framework Direction. When no recycling/recovery option is available or practicable, wastes will be disposed of.

3.16 Contaminated containers

3.16.1 Any containers or drums for the storage and usage of antifoam/antiscaling agents will be returned to the supplier for reuse. In the event that the supplier cannot accept any empty containers for reuse, opportunities for reconditioning will be considered.

3.17 Sludges

3.17.1 It is anticipated that sludge removal will only be necessary very infrequently. In the event that sludge removal is necessary, sludge will be analysed and assessed and transferred off site to a suitable facility. Records and detail of sludge removal will be

made and stored in the site office and online copies saved to Viridor's database systems.

3.18 Any other activities

3.18.1 The following is not applicable to the treatment activity:

- Treatment to concentrate leachate by reverse osmosis.
- Waste carbon from activated carbon usage;
- Use of ion exchange resin
- Use thermal destruction of gases.

3.19 Energy

3.19.1 In terms of basic energy requirements, any details of energy consumption information will be collated and reported in accordance with the permit. The system will be operated and controlled by an electronic system providing basic low-cost physical techniques with programmes such as alarms, sensors and timers as recommended in BAT Conclusions and BREF guidance. This is a new plant that has been designed with energy minimisation in mind. Energy efficiency measures identified at design stage have been incorporated as part of the design. The use of this plant to enable leachate treatment offers considerable energy savings, where Viridian Systems are guaranteeing maximum annual power consumption of 30MW.

3.19.2 The main energy use at the plant will be an electric supply used to power the air blowers and a discharge pump. The control panel will record periods when particular equipment is in use and the power consumption of each unit is known. This will provide the ability to accurately monitor and report on the use of energy from different parts of the operation within the plant. This information can be used for periodic reviews of energy use in order to identify potential energy reduction opportunities.

3.19.3 In addition, the Specific Energy Consumption (SEC) information has been provided in Table 7 below which calculates the SEC activity for leachate treatment. Note, there is no combustion associated with the proposed treatment.

Table 7: Specific Energy Consumption activity for leachate treatment.

Emissions/ energy source	CO_2 emission factor [t/MWh]	Energy consumption		Primary energy [MWh]	GWP [tonnes CO_2]
		Delivered	Conversion factor		
Electricity from public supply	0.166 t/MWh	0.30MWh	2.4 (3)	0.72MWh	0.12t

(3) Conversion factor from delivered energy to primary energy.

3.19.5 A Planned Preventative Maintenance programme will be in place which will cover all equipment. This includes operating, maintenance and housekeeping measures for the following:

- leaks, seals, temperature control, evaporator/condenser maintenance;
- operation of motors and drives;
- compressed gas systems (leaks, procedures for use);
- lubrication to avoid high-friction losses
- other maintenance relevant to the activities within the installation.

3.19.6 The BAT Conclusions and BREF guidance recommends that energy-efficient building services should be in place to deliver the requirements of the Building Services section of the guidance note H2 Energy efficiency for IPPC. The control room for the MSP will be within a container that will not be manned other than for regular checks and inspections, there will be no requirement to heat the control room except for a frost heater, therefore electricity usage in the control room will be minimal.

3.20 Accidents

3.20.1 An emergency action plan will form part of the plant operational procedures, ensuring that all foreseeable accidents are mitigated against and action plans prepared which should be followed by site staff in the event of an accident occurring. The emergency plan will identify the hazards and assess the risks of each and set out control measures to reduce the risk of a potential accident occurring on site.

3.20.2 The emergency action plan will cover the following aspects:

- transfer of substances (e.g. filling or emptying of vessels);
- overfilling of vessels;
- emissions from plant or equipment (e.g. leakage from joints, over pressurisation of vessels, blocked drains);
- failure of containment (e.g. physical failure or overfilling of bunds or drainage sumps);
- failure to contain fire waters;
- wrong connections made in drains or other systems;
- incompatible substances allowed to come into contact;
- unexpected reactions or runaway reactions;
- release of an effluent before adequate checking of its composition;
- failure of main services (e.g. power, steam, cooling water);
- operator error
- vandalism.

3.20.3 Following an assessment of the risks of the hazards identified, the emergency actions plan will identify the techniques and control measures in place necessary to reduce the risks, including:

- There will be an up-to-date inventory of substances, present or likely to be present, which could have environmental consequences if they escape. This will include apparently innocuous substances that can be environmentally damaging if they escape. The permit will require the regulator to be notified of any significant changes to the inventory.

- Procedures will be in place for checking and handling raw materials and wastes to ensure compatibility with other substances with which they may accidentally come into contact.

- Storage arrangements for raw materials, products and wastes designed and operated to minimise risks to the environment.

- Automatic process controls backed-up by manual supervision, both to minimise the frequency of emergency situations and to maintain control during emergency situations. Instrumentation will include, where appropriate, microprocessor control, trips and process interlocks, coupled with independent level, temperature, flow and pressure metering and high or low alarms.

- Physical protection in place where appropriate (e.g. barriers to prevent damage to equipment from the movement of vehicles).

- Appropriate secondary containment providing 110% capacity (e.g. bunds, catchpits, building containment).

- Techniques and procedures in place to prevent overfilling of tanks - (e.g. high-level alarms and high-level cut-off).

- Security systems to prevent unauthorised access should be provided where appropriate.

- Formal systems for the logging and recording of all incidents, near-misses, abnormal events, changes to procedures and significant findings of maintenance inspections.

- Procedures for responding to and learning from incidents, near-misses, etc.

- The roles and responsibilities of personnel involved in incident management formally specified.

- Clear guidance available on how each accident scenario might best be managed (e.g. containment or dispersion, to extinguish fires or to let them burn).

- Procedures in place to avoid incidents occurring as a result of poor communications between staff at shift change or during maintenance or other engineering work.

- Safe shutdown procedures in place.

- Communication channels with emergency services and other relevant authorities established, and available for use in the event of an incident. Procedures will include the assessment of harm following an incident and the steps needed to redress this.

- Appropriate control techniques in place to limit the consequences of an accident, such as isolation of drains, provision of oil spillage equipment, alerting of relevant authorities and evacuation procedures.

- Personnel training requirements will be identified and training provided.

- Spill contingency procedures will be in place to minimise accidental release of raw materials, products and waste materials and then to prevent their entry into water.

- Process waters, potentially contaminated site drainage waters, emergency firewater, chemically contaminated waters and spillages of chemicals will be contained and, where necessary, routed to the effluent system and treated before emission to controlled waters or sewer. Sufficient storage will be provided to ensure that this can be achieved. Any emergency firewater collection system will take account of the additional firewater flows and fire-fighting foams.

- Consideration will be given to the possibility of containment or abatement of accidental emissions from vents and safety relief valves/bursting discs. Where this may be inadvisable on safety grounds, attention should be focused on reducing the probability of the emission.

3.20.4 The following techniques are more specific to leachate treatment.

- Provision of alarm systems and failsafe cut outs on e.g. aerators and pumps.

- Hardwired interlocks on key process valves, e.g. to prevent aeration operation when certain valves are open.
- The use of fail-safe 'closed' valves
- Consideration of stand-by power generation.

3.21 Noise

3.21.1 The methane stripping plant will be situated adjacent to a gas compound and will be powered from an electric supply which will not create additional noise emissions above that already experienced within the gas compound. Any additional noise inputs from the methane stripping plant are considered to be of very low/negligible magnitude against existing background noise levels currently operating at the site. The Viridian Systems MSP guarantees performance levels on noise as detailed in Table 2.

3.21.2 As part of the site management systems, the Operator will employ good practice measures as part of their planned preventative maintenance programme (PPMP) to ensure that noise emissions do not have a nuisance impact on nearby receptors. The PPMP will also be in place for the maintenance and services of parts that could give rise to increase in noise. Noise and vibrations have been considered in the Amenity and Accidents Risk Assessment document ref: 4898-CAU-XX-XX-RP-V-0301 which concludes that noise impacts are likely to be of very low impact to sensitive receptors.

3.22 Environmental & Emissions Monitoring

3.22.1 As per BAT Conclusions and BREF guidance, the Operator should consider the need for environmental monitoring to assess the effects of emissions to controlled water, groundwater, air or land of emissions of noise or odour. Environmental monitoring of controlled water and nuisance monitoring (odour) will be carried out at site.

3.22.2 Monitoring of effluent discharge will also be carried out and will provide environmental monitoring data required for the management of the site and ensure the effluent quality is as per the trade effluent consent. The location of the trade effluent discharge and monitoring point is indicated as 'YN/501' in the Yanley Landfill MEPP Monitoring & Extraction Point Plant, drawing ref: YAN3000.

3.22.3 Monthly discharge effluent monitoring will monitor and record that the treatment process is operating efficiently. Parameters (as listed below) will be sampled and sent to an MCERTS accredited laboratory who will carry out testing and produce of result reports accredited to MCERTS standards. The flow meter where effluent discharges from the MSP will also be compliant to MCERTS standards when recording and monitoring flow.

3.22.4 As per the trade effluent discharge consent, the following parameter shall not exceed any of the composition of quality standards set out below:

- Suspended Solids: 500mg/l
- Chromium (Cr): 2.5mg/l
- Nickel: 2.5mg/l
- Copper (Cu): 2.5mg/l
- Zinc: 2.5mg/l
- Lead (Pb): 2.5mg/l
- Total sulphate (SO4): 1000mg/l
- Total sulphide (S): 5mg/l
- pH: 6-10
- Temperature: no higher than 43°

3.22.5 The MSP is able to provide a maximum treated leachate discharge for dissolved methane that will not exceed 0.11mg/l.

3.22.6 A Surface Water Pollution Risk Assessment has been prepared under document reference: 4898-CAU-XX-XX-RP-V-0309 which assesses the environmental impact of the proposed bespoke application in accordance with the "Environment Agency Surface Water Pollution Risk Assessment for Environmental Permits". The assessment considered that the chemical quality of the treated leachate proposed to be discharged to sewer under the trade effluent agreement with Southern Water, is considered to meet the requirement of assessment. The assessment has demonstrated that the average quality of the leachate together with the concentrations in the trade effluent discharge consent are acceptable in accordance with the Surface Water Pollution Assessment methodology.

3.22.7 Due to the nature of the plan, it is considered that the monitoring and reporting of emission to air and waste emissions is not applicable to this application.

3.23 Closure

3.23.1 The site will have in place a closure plan so that at the time of decommissioning, any pollution risk to the environment is avoided and the site of operation returned to a satisfactory state. During the life of the permit, the MSP will be designed and operated so that it will not lead to any deterioration of the site, this will include in place a system for recording of any incidents, such as spillages that may have led or could lead to ground contamination, and the actions taken. The closure plan will take account of the following:

- Removal or the flushing out of pipelines and vessels where appropriate and their complete emptying of any potentially harmful contents;
- Methods of dismantling buildings and other structures, which gives guidance on the protection of surface and groundwater at construction and demolition-sites; and,
- If required, the testing of the soil to ascertain the degree of any pollution caused by the activities and the need for any remediation to return the site

to a satisfactory state as defined by the initial site report. If a desk study report on site closure confirms that there has been no potential pollution risk, intrusive monitoring and/or testing is not required.

3.23.2 During decommissioning at site closure, care will be taken to ensure that there are provisions for the draining and clean-out of vessels and pipework prior to dismantling. There are no proposals for underground tanks or pipework – therefore their decommissioning is not considered. All tanks and pipework will be above ground where they can be regularly inspected. Having regard for both operational and environmental objectives, tanks proposed to be installed at site will be fully recyclable (dependant on state and conditions at time of decommission).

4. REFERENCES

1. The Environmental Permitting (England and Wales) Regulations 2016.

2. Environment Agency (2013): Understanding the meaning of regulated facility. RGN 2 version 3.0.

3. UK Landfill Industry Code of Practice (2017) The Establishment of Appropriate Containment Standards for Leachate Storage Infrastructure.

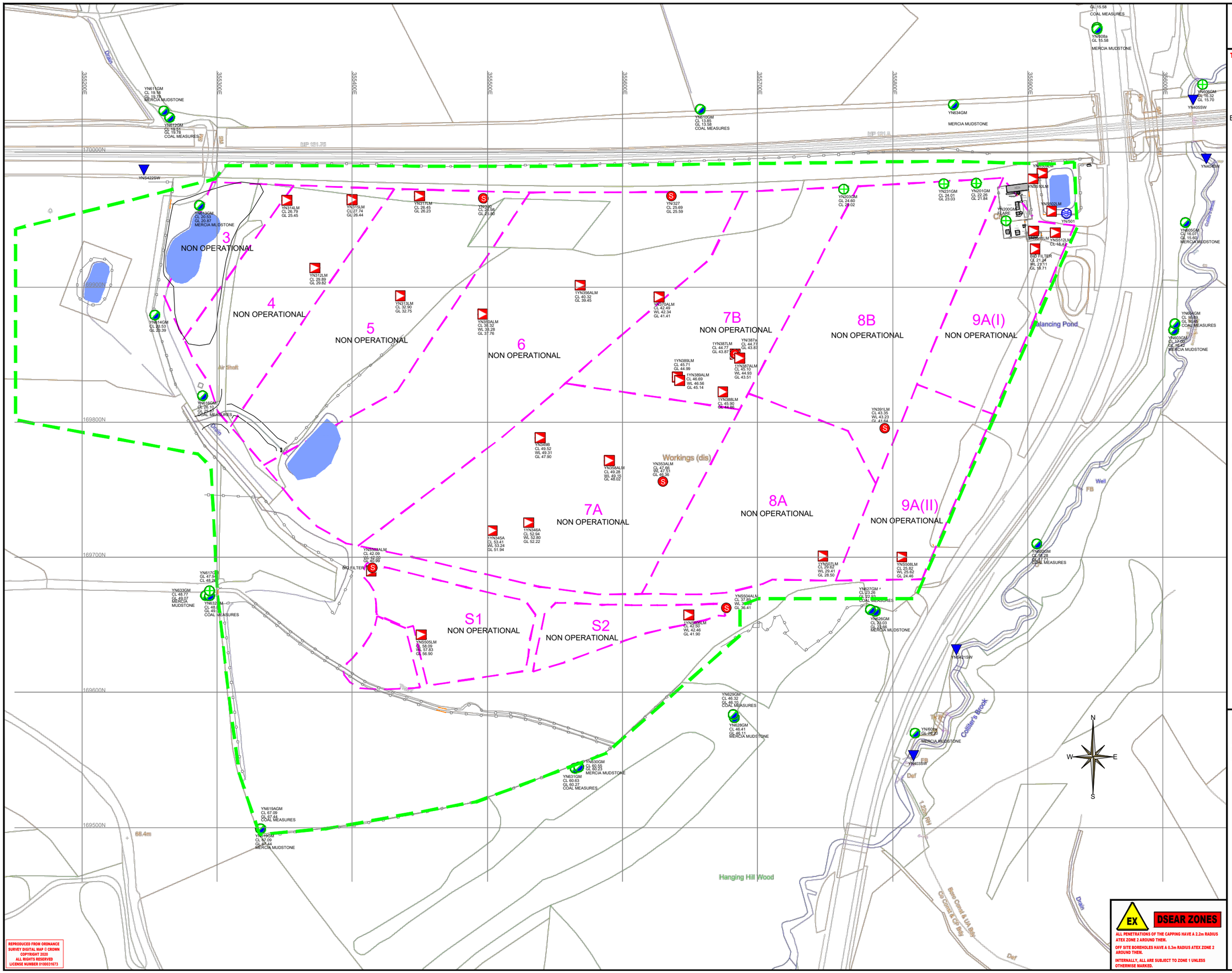
4. Establishing best available techniques (BAT) Conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and of the Council, (August 2018).

5. Integrated Pollution Prevention and Control, The BAT (Best Available Techniques) Reference Document (BREF), Waste Treatment Industries, under Articles 16(2) of Council Directive 96/61/EC (IPPC Directive).

6. The Environment Agency (2016- Updated March 2021) Risk assessments for your environmental permit.

7. UK Landfill Industry Code of Practice (2017) The Establishment of Appropriate Containment Standards for Leachate Storage Infrastructure.

DRAWINGS



TO BE READ IN CONJUCTION WITH MEPP TABLES FOR IN WASTE GAS MONITORING WELLS SEE THE SITE 4000 STANDARD LAYOUT

BUILDINGS WATER ROAD FENCES

- LEACHATE MONITORING POINT
- LEACHATE SUMP
- PERIMETER GAS MONITORING POINT
- DUAL GAS / GROUND WATER MONITORING
- GROUND WATER MONITORING POINT
- SURFACE WATER MONITORING POINT
- AIR EMISSIONS MONITORING POINT (AE)
- DEPOSITIONAL DUST GAUGE (DG)
- AIR QUALITY MONITORING POINT
- F.I.D MONITORING POINT
- EFFLUENT MONITORING POINT
- BASAL CELL BOUNDARY
- EP BOUNDARY
- (UG) UP GRADIENT
- (DG) DOWN GRADIENT
- (CG) CROSS GRADIENT
- (US) UP STREAM
- (DS) DOWN STREAM
- DIRECTION OF FLOW

EX **DSEAR ZONES**

ALL PENETRATIONS OF THE CAPPING HAVE A 2.2m RADIUS ATEX ZONE 2 AROUND THEM.

OFF SITE BOREHOLES HAVE A 0.3m RADIUS ATEX ZONE 2 AROUND THEM.

INTERNALLY, ALL ARE SUBJECT TO ZONE 1 UNLESS OTHERWISE MARKED.

viridor.co.uk viridorTV viridorUK /viridor

1st Floor Riverside House, Sir Thomas Longley Road, Medway City Estate, Rochester, Kent. ME2 4FN

Tel : 01732 229200
Fax : 01732 229280

THIS DRAWING IS UNCONTROLLED CONTACT D.O. FOR LATEST ISSUE

SITE NAME
YANLEY LANDFILL

DRAWING TITLE
MONITORING & EXTRACTION POINT PLAN

DRAWING NUMBER
YAN3000

TASK NUMBER 16378

SCALE	1:2500@A0	REVISION	
O/DRN	S.Robinson	R/DRN	
O/DATE	15/12/2020	R/DATE	
O/APP	D.O.Approved	R/APP	
O/A/DATE	16/12/2020	R/A/DATE	

INFORMATION TAKEN FROM

SURVEY	YAN066s-Feb'2020 Rev A
SERVICES MASTER FILE	
OTHER DRAWINGS	YAN12000-Mar'2010

Yanley MEPP Tables Permit Variation 008 dated 8th November 2016

Permit Schedule 3, Revised Table S3.1

Table S3.1 Leachate level limits and monitoring requirements			
Monitoring Point Ref/Description	Limit	Monitoring frequency	Monitoring standard or method
Operational Cells or Phases[1]			As specified in Environment Agency Guidance TGN02 (February 2003) or such other guidance as may be agreed in writing with the Environment Agency. Or as otherwise agreed with the Agency as part of a leachate monitoring plan.
N/A			
Non Operational Cells or Phases[2]			
Leachate compliance points: YN/312, YN/313, YN/315, YN/317, YN/320, YN/327, YN/332, YN/349B, YN/350A, YN/356A, YN/370A As shown on Drawing YAN3000	5 metres above cell base	Quarterly – spot reading	
YNS505LM, YNS506LM As shown on Drawing YAN3000	2 metres above cell base		
YN/345A, YN/358A, YN/387A, YN/383A, YN/389A, YN/391 As shown on Drawing YAN3000	5 metres above cell base	Quarterly – average	
YNS503LM, YNS504LM As shown on Drawing YAN3000	2 metres above cell base		

[1] Any cells or phases that do not have a final engineered cap agreed in accordance with the existing 'landfill engineering' condition 2.4
[2] Any cells or phases that have a final engineered cap agreed in accordance with the existing 'landfill engineering' condition 2.4

Permit Schedule 3, Revised Table S3.9

Table S3.9 Leachate – other monitoring requirements				
Monitoring Point Ref/Description	Parameter	Monitoring frequency	Monitoring standard or method	Other specifications
Operational Cells or Phases[1]			At leachate compliance point as listed in Table S3.1. As specified in Environment Agency Guidance TGN02 (February 2003) and Horizontal Guidance Note H1 – Environmental Risk Assessment for permits, Annex J3, version 2.1, December 2011,with one sampling point per cell / phase or such other subsequent guidance as may be agreed in writing with the Environment Agency.	None
N/A				
Non Operational Cells or Phases[2]				
YN/320, YN/327, YN/332, YN/391, YN387A, YN/383A, YNS503LM, YNS504LM As shown on drawing YAN3000	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		
YN/320, YN/327, YN/332, YN/391, YN387A, YN/383A, YNS503LM, YNS504LM As shown on drawing YAN3000	Hazardous substances	Once every four years		
YN/320, YN/327, YN/332, YN/391, YN387A, YN/383A, YN/391, YNS503LM, YNS504LM As shown on drawing YAN3000	Depth to base (mAOD)	Annually		

[1] Any cells or phases that do not have a final engineered cap agreed in accordance with the existing 'landfill engineering' condition 2.4

[2] Any cells or phases that have a final engineered cap agreed in accordance with the existing 'landfill engineering' condition 2.4

Permit Schedule 3, Revised Table S3.4

Table S3.4 Groundwater – emission limits and monitoring requirements					
Monitoring Point Ref /Description	Parameter	Limit (including unit)	Reference Period	Monitoring Frequency	Monitoring Standard or Method
YN/605, YN/608A, YN/634 As shown on drawing YAN3000	Ammoniacal nitrogen	2.0 mg/l	Spot sample	Quarterly	Unless otherwise agreed in writing with the Agency monitoring methods used shall be in accordance with Agency guidance document 'Guidance on monitoring of landfill leachate, groundwater and surface water' (LFTGN02)
	Chloride	250 mg/l			
	Mecoprop	0.1 µg/l		Annually	
	Toluene	4.0 µg/l			
	m.p-xylene	3.0 µg/l			
	Mercury	0.4 µg/l			

Permit Schedule 3, Revised Table S3.7

Table S3.7 Groundwater – other monitoring requirements			
Monitoring Point Ref /Description[1]	Parameter	Monitoring frequency	Monitoring standard or method
Mercia Mudstone *Up gradient:* YN/619, YN/630, YN/633 **Coal Measures** *Up gradient:* YN/619A, YN/629, YN/631	Water level, electrical conductivity, chloride, ammoniacal nitrogen, pH	Quarterly	As specified in Environment Agency Guidance TGN02 'Monitoring of Landfill Leachate, Groundwater and Surface Water' (February 2003), risk assessments for your environmental permit (www.gov.uk) or such other subsequent guidance as may be agreed in writing with the Environment Agency.
	Total alkalinity, magnesium, potassium, total sulphates, calcium, sodium, chromium, copper, iron, lead, nickel, zinc, manganese	Annually	
	Hazardous substances	Annually for first six years of operation	
Mercia Mudstone *Down or cross gradient:* YN/603, YN/605, YN/608A, YN/634 **Coal Measures** *Down or cross gradient:* YN/607A, YN/610, YN/612	Water level, electrical conductivity, chloride, ammoniacal nitrogen, pH	Quarterly	As specified in Environment Agency Guidance TGN02 'Monitoring of Landfill Leachate, Groundwater and Surface Water' (February 2003), risk assessments for your environmental permit (www.gov.uk) or such other subsequent guidance as may be agreed in writing with the Environment Agency. After the initial 6 year monitoring period for hazardous substances, if the results of quarterly or annual monitoring suggest an increase in contamination, the operator shall also undertake a full leachate hazardous substances screen.
	Total alkalinity, magnesium, potassium, total sulphates, calcium, sodium, chromium, copper, iron, lead, nickel, zinc, manganese	Annually	
	Hazardous substances detected in leachate	Annually for first six years of operation then every two years	

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INTERNALLY, ALL ARE SUBJECT TO ZONE 1 UNLESS OTHERWISE MARKED.

Viridor

TO BE READ IN CONJUCTION WITH MEPP TABLES FOR IN WASTE GAS MONITORING WELLS SEE THE SITE 4000 STANDARD LAYOUT

BUILDINGS WATER ROAD FENCES

LEACHATE MONITORING POINT
LEACHATE SUMP
PERIMETER GAS MONITORING POINT
DUAL GAS / GROUND WATER MONITORING
GROUND WATER MONITORING POINT
SURFACE WATER MONITORING POINT
AIR EMISSIONS MONITORING POINT
DEPOSITIONAL DUST GAUGE
AIR QUALITY MONITORING POINT
F.I.D MONITORING POINT
EFFLUENT MONITORING POINT
BASAL CELL BOUNDARY
EP BOUNDARY
(UG) UP GRADIENT
(DG) DOWN GRADIENT
(CG) CROSS GRADIENT
(US) UP STREAM
(DS) DOWN STREAM
DIRECTION OF FLOW

viridor.co.uk viridorTV viridorUK /viridor
1st Floor Riverside House, Sir Thomas Longley Road, Medway City Estate, Rochester, Kent. ME2 4FN
Tel : 01732 229200 Fax : 01732 229280

SITE NAME: YANLEY LANDFILL
DRAWING TITLE: MEPP TABLES SHEET 1 OF 2
DRAWING NUMBER: YAN3000
TASK NUMBER: 16378

SCALE	NTS	REVISION	
O/DRN	S.Robinson	R/DRN	
O/DATE	15/12/2020	R/DATE	
O/APP	D.O.Approved	R/APP	
O/A DATE	16/12/2020	R/A DATE	

INFORMATION TAKEN FROM
SURVEY: YAN066s-Feb'2020 Rev A
SERVICES MASTER FILE:
OTHER DRAWINGS: YAN12000-Mar'2010

Table S3.7 Groundwater – other monitoring requirements			
Monitoring Point Ref /Description[1]	Parameter	Monitoring frequency	Monitoring standard or method
Mercia Mudstone *Groundwater monitoring points:* YN/619, YN/630, YN/633, YN/603, YN/605, YN/608A, YN/634 **Coal Measures** *Groundwater monitoring points:* YN/619A, YN/629, YN/631, YN/607A, YN/610, YN/612	Base of monitoring point (mAOD)	Annually	

[1] As shown on drawing YAN3000

Permit Schedule 3, Revised Table S3.3

Table S3.3 Point source emissions to water (other than sewer) – emission limits and monitoring requirements						
Monitoring Point Ref /Description	Parameter	Source	Limit (including unit)	Reference Period	Monitoring Frequency	Monitoring Standard or Method
YNS421, YNS422, YN/404, As shown on drawing YAN3000	Suspended Solids	Surface Water	100 mg/l	Spot sample	Monthly	Unless otherwise agreed in writing with the Agency monitoring methods used shall be in accordance with Agency guidance document 'Guidance on monitoring of landfill leachate, groundwater and surface water' (LFTGN02)

Permit Schedule 3, Revised Table S3.10

Table S3.10 Surface water – other monitoring requirements				
Monitoring Point Ref /Description	Parameter	Monitoring Frequency	Monitoring Standard or Method	Other specifications
Surface water monitoring points: YN/403, YN/404, YN/405, YNS421, YNS422 As shown on drawing YAN3000	Ammoniacal nitrogen Chloride Suspended solids Visual Oil and Grease pH Electrical conductivity	Monthly	Spot sample	Unless otherwise agreed in writing with the Agency monitoring methods used shall be in accordance with Agency guidance document 'Guidance on monitoring of landfill leachate, groundwater and surface water' (LFTGN02)

Viridor

TO BE READ IN CONJUCTION WITH MEPP TABLES
FOR IN WASTE GAS MONITORING WELLS SEE
THE SITE 4000 STANDARD LAYOUT

BUILDINGS WATER ROAD FENCES

- LEACHATE MONITORING POINT
- LEACHATE SUMP
- PERIMETER GAS MONITORING POINT
- DUAL GAS / GROUND WATER MONITORING
- GROUND WATER MONITORING POINT
- SURFACE WATER MONITORING POINT
- AIR EMISSIONS MONITORING POINT
- DEPOSITIONAL DUST GAUGE
- AIR QUALITY MONITORING POINT
- F.I.D MONITORING POINT
- EFFLUENT MONITORING POINT
- BASAL CELL BOUNDARY
- EP BOUNDARY
- (UG) UP GRADIENT
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viridorUK /viridor
1st Floor Riverside House, Sir Thomas Longley Road, Medway City Estate, Rochester, Kent. ME2 4FN.
Tel : 01732 229200
Fax : 01732 229280

SITE NAME
YANLEY LANDFILL

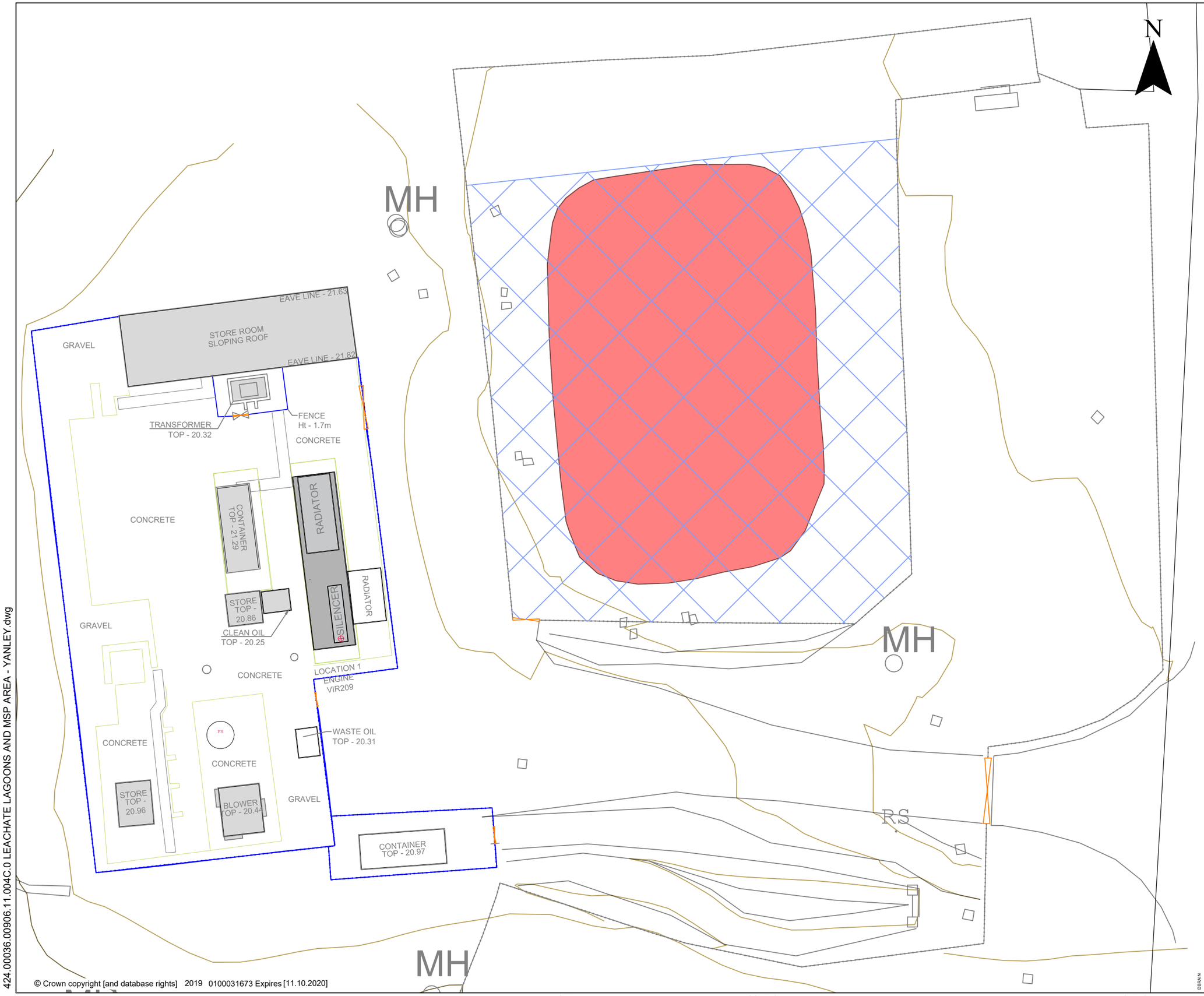
DRAWING TITLE
MEPP TABLES SHEET 2 OF 2

DRAWING NUMBER
YAN3000

TASK NUMBER 16378

SCALE	NTS	REVISION	
O/DRN	S.Robinson	R/DRN	
O/DATE	15/12/2020	R/DATE	
O/APP	D.O.Approved	R/APP	
O/ADATE	16/12/2020	RA/DATE	

INFORMATION TAKEN FROM
SURVEY YAN066s-Feb'2020 Rev A
SERVICES MASTER FILE
OTHER DRAWINGS YAN12000-Mar'2010



NOTES

MAPPING LICENSED UNTIL 11.10.2020.

DRAWING BASED UPON FILE REF: 'YAN065s JAN'18 REV B - NB.DWG'.

LEGEND

AREA AVAILABLE FOR MSP

EXISTING LEACHATE STORAGE TANK

Viridor

SLR global environmental solutions
UNIT 2, NEWTON BUSINESS CENTRE
THORNCLIFFE PARK ESTATE
NEWTON CHAMBERS ROAD
CHAPELTOWN
SHEFFIELD, S35 2PW
T:+44 (0)114 2455153
www.slrconsulting.com

YANLEY LANDFILL SITE

YANLEY
METHANE STRIPPING PLANT

LEACHATE LAGOONS AND MSP AREA

DRAWING 04C

Scale	Date
1:250 (A3)	OCTOBER 2019

DBRAIN

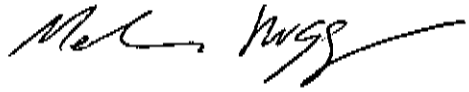
424.00036.00906.11.004C.0 LEACHATE LAGOONS AND MSP AREA - YANLEY.dwg

APPENDIX 1

Viridor

APPROVAL FORM

DOCUMENT TITLE :	*YANLEY TRADE EFFLUENT CONSENT*		
ISSUE NUMBER :	One	ISSUE DATE :	8 December 2000
NEXT REVIEW DATE :	N/A	NO OF PAGES (EXCLUDING THIS ONE)	N/A
PROCEDURE & SECTION NO :	N/A		

APPROVED	SIGNATORY ONE	SIGNATORY TWO
SIGNED :		N/A
NAME :	M D Huggins	N/A
POSITION :	EMS Co-ordinator	N/A
DATE :	8 December 2000	N/A

NB : WHERE FIELD IS NOT APPLICABLE - INSERT N/A
IS DOCUMENT ATTACHED A CONTROLLED DOCUMENT? YES/NO (Please Delete)
IF YES, REGISTRATION STAMP (Including Binder Number) :

ENVIRONMENTAL DOCUMENT: DC2

MASTER COPY

Wessex Water

WESSEX WATER AUTHORITY

PUBLIC HEALTH ACT, 1936

PUBLIC HEALTH (DRAINAGE OF TRADE PREMISES) ACT, 1937

PUBLIC HEALTH ACT, 1961

WATER ACT, 1973

CONTROL OF POLLUTION ACT, 1974

CONSENT TO THE DISCHARGE OF TRADE EFFLUENT

TO:

Terry Adams Ltd
Beech Cottage
Old Rydon Lane
EXETER
EX2 7JR

WHEREAS:

I. You have served on us the Wessex Water Authority (hereinafter referred to as 'the Authority') a Trade Effluent Notice, in pursuance of the provisions of the Public Health (Drainage of Trade Premises) Act, 1937, dated the twenty fifth day of January 1988 in respect of trade premises situate at Yanley No 3 Landfill, Bridgwater Rd., BRISTOL, Avon

II. In pursuance of the provisions of the Public Health (Drainage of Trade Premises) Act, 1937, the discharge of trade effluent in accordance with the said trade effluent notice would not be lawful without the consent of the Authority.

III. The Authority is prepared to give such consent but subject to the conditions hereinafter set forth and to be observed by you.

IV. Any connection of your drain to the public sewer necessitated by this consent shall be made at your own expense and to the satisfaction of the Authority.

NOW THEREFORE WE HEREBY GIVE YOU NOTICE that the Authority's consent to the discharge of trade effluent from the above mentioned premises is subject to the following condition and not otherwise. –

Sewers Affected	1.	The public sewer into which the trade effluent may be discharged is the foul sewer. west of Colliter's Brook at Grid Ref: ST560 700
Provision of drains for trade effluent only	2.	If required by the Authority drains, sampling and testing points shall be provided through which trade effluent and nothing else shall pass.
Change in the point(s) of discharge	3.	No change shall be made in the point or points at or through which the trade effluent is to be discharged to the public sewer except with the consent in writing of the Authority.

ENVIRONMENTAL DOCUMENT: DC2

MASTER COPY

Matters to be eliminated prior to discharge to the sewer

4. Apart from the substances specified in this consent, the trade effluent shall not include any substances of a nature, composition or quantity likely, either alone or in combination with the contents of the sewer, to –

(a) injure the public sewers into which it is discharged or by which it is conveyed, or,

(b) interfere with the free flow of the contents of the public sewers aforesaid, or,

(c) injure the sewage treatment works or any machinery or equipment installed thereat, or

(d) interfere with any processes of purification of sewage or trade effluent, or,

(e) cause a nuisance or give off a vapour or harmful substance, or

(f) affect prejudicially the quality of the watercourse receiving the purified sewage effluent.

Condensing water

5. If required by the Authority condensing and cooling water shall be eliminated from the effluent.

Changes in composition and cessation of discharge

6. THE AUTHORITY SHALL BE NOTIFIED FORTHWITH IN WRITING OF ANY CHANGES IN CONDITIONS AND OR PROCESSES WHICH ARE LIKELY TO ALTER THE NATURE OR COMPOSITION OF THE EFFLUENT AND ALSO THE PERMANENT CESSATION OF THE DISCHARGE IN WHICH LATTER CASE THIS CONSENT BECOMES VOID.

Nature or composition

7. The trade effluent to be discharged under this consent shall consist of waste water specified in the said trade effluent notice and derived from, leachate from Landfill site

pH Value

8. The pH of the trade effluent to be discharged under this consent shall not be less than pH 6 or greater than pH 10

Temperature

9. The temperature of the trade effluent to be discharged under this consent shall not exceed 43.3°C (110° F).

Conditions of acceptance

10. The effluent shall not contain the substances listed in the Appendix in proportions greater than those stated.

Maximum amount to be discharged in any day

11. The maximum quantity of trade effluent which may be discharged into the public sewer on any one day of 24 hours shall not exceed 100 cubic metres (m^3).

Maximum rate of discharge

12. The rate of discharge of trade effluent to the public sewer shall not exceed 12.0 litres per second (l/s).

Inspection Chamber

13. You shall, if required by the Authority at your own expense:–

(a) provide and maintain suitable inspection chambers or manholes in a position and of a type to be approved by the Authority in connection with each pipe or channel through which the trade effluent is discharged into the public sewer, so as to enable a person readily to take at any time a sample of the trade effluent passing into the public sewer,

Measurement and determination of discharge

(b) provide and maintain in connection with every such pipe or channel either a notch gauge and continuous recorder or some other meter or other apparatus of a type approved by the Authority suitable and adequate for measuring and automatically recording the volume and rate of discharge of the trade effluent discharged into the public sewers, and for the testing of such apparatus.

ENVIRONMENTAL DOCUMENT: DC2

MASTER COPY

13. Cont/...

(c) provide and maintain apparatus to be approved by the Authority for determining the nature and composition of the trade effluent being discharged from the premises into the public sewer, and for the testing of such apparatus.

(d) provide and maintain suitable and adequate treatment plant for the trade effluent if it is shown to be necessary.

(e) keep to the satisfaction of the Authority records of the volume, rate of discharge, nature and composition of any trade effluent discharged and records of readings of meters and other apparatus provided in compliance with the conditions of this consent.

Payment 14. (a) Subject to Section 59 (1) (c) of the Public Health Act, 1961 or any amendments, variations or modifications thereof, the occupier of the said premises shall pay to the Authority such charges as determined by the charging rates as the Authority may so prescribe.

(b) A Schedule of charging rates including the methods by which, and the principles on which the charges are made, may be inspected during normal business hours at the Divisional Office of the Authority as designated in paragraph d below or at the Principal Offices of the Authority, namely Wessex House, Passage Street, Bristol.

(c) All payments arising from the charges as levied by the Authority in respect of such Trade Effluent consents shall be paid on demand.

(d) All sums due in respect of charges should be remitted (unless otherwise specified by the Authority) to the Authority's Divisional Offices at
1 Clevedon Walk
Nailsea
BRISTOL BS19 2QR

(e) The granting of time or any indulgence of any nature by the Authority shall not affect or invalidate the rights of the Authority or affect, reduce or mitigate the liability of the Occupier.

Failure of recording apparatus 15. If any notch gauge or recorder or other apparatus installed for the purpose of complying with conditions imposed by this consent ceases to measure or record or is suspected of not measuring or recording correctly, the quantity of trade effluent discharged on each day into the public sewer during the period from the date on which the records of the volume of trade effluent discharged into the public sewer were last accepted by the Authority as being correct, up to the date when the gauge or recorder or other apparatus again registers correctly, shall be deemed for the purpose of any payment to be made to the Authority to be the same quantity as the average daily volume of trade effluent discharged during the period of one month preceding the date on which the said records were last accepted as aforesaid, or during the period of one month immediately after the gauge or recorder or other apparatus has been correct, whichever is the greater.

Charging information 16. All information, figures and records, including those relating to water consumption, required by the Authority for the assessing of their charge for reception, conveyance and disposal of the effluent must be given on request.

Dated this day of August 19 99

Divisional General Manager

For and on behalf of the Authority

Your attention is drawn to the right of appeal to the Secretary of State for the Department of the Environment which is conferred by Section 3 of the Public Health (Drainage of Trade Premises) Act, 1937, (as amended by Section 86 of the Fifth Schedule of the Public Health Act, 1961) on any person who is aggrieved by a condition attached to a consent.

Your attention is also drawn to Section 61 of the Public Health Act, 1961, which provides that, on such an appeal, the Minister may review all the conditions attached to the consent, whether appealed against or not, and may substitute for them any other set of conditions, whether more or less favourable to the appellant, or may annul the conditions. The Minister may include provision as to the charges to be made in pursuance of any condition attached to a consent for any period before the determination of the appeal. He may also give a direction that no trade effluent shall be discharged in pursuance of the trade effluent notice in question until a specified date, or vary such a direction by the local authority by substituting either an earlier or a later date specified in the direction.

ENVIRONMENTAL
DOCUMENT: DC2

MASTER COPY

Terry Adams Ltd - Yanley

Wessex Water

WATER INDUSTRY ACT 1991

NOTICE OF DIRECTION

TO: Terry Adams Limited
Greendale Court
Clyst St Mary
Exeter EX5 1AW

WHEREAS:

Trade effluent is now discharged from the premises situate at Yanley No. 3 Landfill, Bridgwater Road, Bristol

(hereinafter referred to as 'the said premises') under a Consent by Wessex Water Services Limited *(hereinafter recorded as 'the Company')*

NOW THEREFORE the Company HEREBY GIVE NOTICE OF THEIR DIRECTION pursuant to Section 124 of the Water Industry Act 1991

that as from the 26th day of October 1994

the said Consent shall be varied to the extent set out in the Schedule overleaf.

Dated this 18 day of August 1994

For and on behalf of Wessex Water Services Ltd

.....

Richard Lacey
Divisional Manager

DC2ENVIRONMENTAL
DOCUMENT: DC2

SCHEDULE

MASTER COPY

The Technical Appendix to the Consent shall be in accordance with the attached conditions of discharge which replaces any previous Technical Appendix.

NOTE

Your attention is drawn to the right of appeal to the Director General of Water Services which is conferred by Section 126(1) of the Water Industry Act 1991.

"The owner or occupier of any trade premise may -

(a) within two months of the giving to him under subsection(5) of Section 124 of a notice of direction under that section, or

(b) with the written permission of the Director, at any later time, appeal to the Director against the direction."

ENVIRONMENTAL
DOCUMENT: DC2

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COPY

CONSENT APPENDIX 1

The effluent shall not at any time include the following substances:

a Volatile petroleum products producing an inflammable vapour at a temperature of less than seventy three degrees Fahrenheit when tested in accordance with the Petroleum (Consolidation) Act 1928

b Chlorinated hydrocarbons and related compounds

c. Calcium carbide

CONSENT APPENDIX 2

1. Suspended solids shall not exceed 500 milligrams per litre (mg/l) of effluent.

2. The metals listed below shall not individually exceed the concentration stated in milligrams per litre (mg/l) of effluent of soluble or insoluble salts of compounds expressed as the metal:

a. Chromium (Cr) shall not exceed 2.5 mg/l of effluent

b. Nickel (Ni) shall not exceed 2.5 mg/l of effluent

c. Copper (Cu) shall not exceed 2.5 mg/l of effluent

d. Zinc (Zn) shall not exceed 2.5 mg/l of effluent

e. Lead (Pb) shall not exceed 2.5 mg/l of effluent

3. The total sulphate content of the effluent expressed as SO_4 shall not exceed 1000 milligrams per litre (mg/l) of effluent.

4. The total sulphide content of the effluent expressed as S shall not exceed 5 milligrams per litre (mg/l)

CONSENT APPENDIX 3

The effluent shall not contain materials which may be retained by a screen having perforations of 6mm in diameter.

MASTER COPY

Terry Adams - Yanley No. 3

Wessex Water Services Limited

WATER INDUSTRY ACT 1991

NOTICE OF DIRECTION

TO: Terry Adams Limited
Greendale Court
Clyst St Mary
Exeter
EX5 1AW

WHEREAS:

Trade effluent is now discharged from the premises situate at Yanley No. 3 Landfill, Bridgwater Road, Bristol

(hereinafter referred to as 'the said premises') under a Consent by Wessex Water Services Limited *(hereinafter recorded as 'the Company')*

NOW THEREFORE the Company HEREBY GIVE NOTICE OF THEIR DIRECTION pursuant to Section 124 of the Water Industry Act 1991

that as from the 18th day of December 1995

the said Consent shall be varied to the extent set out in the Schedule overleaf.

Dated this 17th day of October 19 95

For and on behalf of Wessex Water Services Ltd

S.M. Allen

S M Allen
Divisional Manager

APPENDIX 2

Viridor Waste Management Ltd.

Tender submission:

Methane Stripping Plants for 4 sites

1st June 2020

Viridian Systems Ltd.
Unit 39
Wirral Business Centre
Dock Road
Birkenhead
CH41 1JW
0151 – 639 8666
www.viridiansystems.com
info@viridiansystems.com

1. Introduction

Viridor Waste Management Ltd has invited Viridian Systems Ltd to tender for design, construction and commissioning of treatment plants to strip dissolved methane (DM) from landfill leachate at four of their sites, specifically Poole, Wootton, Yanley and Beddingham landfill sites.

2. Proposal

Although there are different methods for driving DM out of solution in leachate, aeration is most widely employed in the UK and is considered BAT. Aeration is the method we will be offering in this proposal.

Discussion on utilising existing infrastructure:

We do not believe it to be efficacious or cost-effective to install aeration systems in existing leachate storage tanks or lagoons. We would not provide any process guarantees for methane stripping in existing tanks or lagoons that are not designed for that purpose. Moreover, the operating costs of aeration systems for methane stripping in large tanks and lagoons is prohibitively expensive. The lagoon aeration system at Beddingham is a prime example of this: the system comprises of very inefficient course bubble diffusers and 7.5kW blowers and does not achieve the trade effluent consent (TEC) limit in respect of DM. The plants we are proposing will be more cost-effective to operate and maintain. In the case of Beddingham, our plant will use perhaps 1/10th of the electrical energy of the current arrangement whilst achieving the TEC limit for DM.

We have considered the information provided to us within Table 1-3: Summary of Daily Leachate Discharge Volumes within the tender document and have sized the plants to treat the 95th %ile daily flows in each case. Similarly, our design considers the 95th %ile values for DM. Our design values are as follows:

Site	m^3/day	m^3/hour	DM (mg/l)
Poole	177	7.38	4.3
Wootton	24.6	1.03	6.3
Yanley	142.3	5.93	7.2
Beddingham	103.7	4.32	1.6

Based on the information provided, we are proposing 4 self-contained, fully bunded, skid-mounted plants, 3 of the of the same size and a smaller plant for Wootton. In addition to process chemicals, these plants will only require supply of electrical power and leachate and as they are skid-mounted, they can be placed on a level, compacted stone base.

The MSP's for Poole, Yanley & Beddingham will generally comprise:

- Duty/standby raw leachate progressing cavity feed pumps, mounted on a concrete plinth
- Electromagnetic flow meter on feed to MSP
- Prefabricated steel skid and bund arrangement, approximately 10.9m long x 3.0m wide, with a bund depth of 0.7m to provide CIRIA C736 compliant bunding in respect of hydraulic containment, jetting and surge. The bund will have a small sump, pump c/w level controls and a hi-hi float switch
- Steel access gantry and stairs to 1m below the top of the reaction tanks to enable access for viewing, sampling and maintenance
- Enclosure with MCC/SCADA and telemetry, mounted externally to the bund on the skid
- 4 x 1.8m^3 HDPE reaction tanks, 455mm diameter top access and vent, tanks connected in series at high level
- 1 x 1.8m^3 HDPE degassing tank fitted with a top-mounted agitator
- 1 x 1.8m^3 discharge pumping tank
- Duty/standby progressing cavity discharge pumps
- MCERTS Electromagnetic flow meter on discharge to sewer
- Each reaction tank will be fitted with two easy-to-remove Jaeger TD63 x 750mm long, fine-bubble tube diffusers, capable of accepting 2 - 9 m_N^3/hour of air
- Enclosure mounted at high level within the bund, housing duty/standby blowers capable of delivering 43 m^3/hour @ 200mBars for Poole and 25 m^3/hour @ 200mBars for Yanley and Beddingham

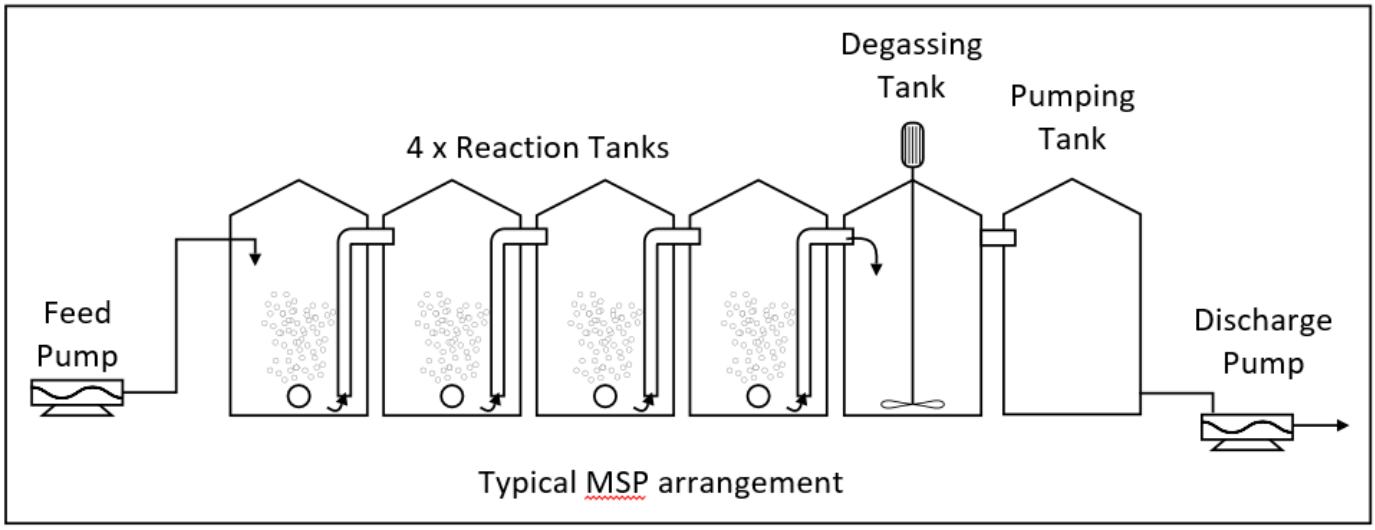
- Dosing pump enclosure housing a duty only antifoam and antiscalant dosing pumps. The dosing pump enclosure incorporates bunded storage for 1 x 25 litre drums of antifoam and antiscalant. The dosing pump enclosure is also mounted on the skid, externally to the bund for easy access to exchange 25 litre drums
- 210 litre carbon filter to capture odorous off-gas from each reaction tank and the de-gassing tank

The MSP for Wootton will be as described above except for the following:

- Prefabricated steel skid and bund arrangement, approximately 8.0m long x 2.5m wide, with a bund depth of 0.7m to provide CIRIA C736 compliant bunding in respect of hydraulic containment, jetting and surge. The bund will have a small sump, pump c/w level controls and a hi-hi float switch
- 4 x 0.7m^3 HDPE reaction tanks, 455mm diameter top access and vent, tanks connected in series at high level
- 1 x 0.7m^3 HDPE degassing tank fitted with a top-mounted agitator
- 1 x 0.7m^3 discharge pumping tank
- Each reaction tank will be fitted with two easy-to-remove Jaeger TD63 x 500mm long, fine-bubble tube diffusers, capable of accepting 1 - 6 m_N^3/hour of air
- Enclosure mounted at high level within the bund, housing duty/standby blowers capable of delivering 5.5 m^3/hour @ 200mBars

Note: As our proposed MSP's are skid-mounted, they could be placed onto a compacted stone base overlain with free-draining gravel, no concrete base needed.

3. Process description:



Typical MSP arrangement

Raw leachate will be pumped from the existing raw leachate tanks on each site via duty/standby progressing cavity (PC) feed pumps. PC pumps are more suited to this application because they can be readily speed controlled to achieve reliable flow rates and they are much less prone to calcification because they don't agitate the leachate to the same degree a centrifugal pump would. Raw leachate will enter each reaction tank at the top and flow downwards, exiting via a pipe carrying liquid up to the top of the next tank. This will provide counter-current flow to the aeration system which is by far the most efficient system for removing dissolved methane. In the third tank there will be a similar pipe exiting the tank at the liquid height of 1.6m. There will be removable lids on each tank to facilitate maintenance, de-scaling and de-sludging as required. The lids can also be used as an inspection point to enable the operator to check on foam level or aeration pattern.

Air to the diffusers will be supplied by duty/standby Elmo Rietschle, oil-free sliding vane blowers. The blower models will be as follows:

- Poole: V-DTN 41, capable of delivering 43 m_N^3/hour @ 200 mBars, 1.5 kW
- Yanley: V-DTN 26, capable of delivering 25 m_N^3/hour @ 200 mBars, 0.75 kW

- Beddingham: V-DTN 26, capable of delivering 25 m_N^3/hour @ 200 mBars, 0.75 kW
- Wootton: V-DTE 6 capable of delivering 5.5 m_N^3/hour @ 200 mBars, 0.25kW motor.

These blowers are energy efficient at the duty point. Air-flow measurement to each reaction tank will be via 4 variable area flowmeters.

On exiting the third reaction tank, leachate will enter a degassing tank which, like the aerated reaction tanks, remains constantly full and is stirred with an agitator to encourage liberation of residual micro-bubbles of gases.

From the degassing tank, leachate then passes to the pumping tank allowing treated leachate to be discharged to sewer by pump or gravity – we have assumed discharge to sewer by pump. Gravity discharge can be continuous, pumped discharged would be in batches to achieve self-cleansing velocity in the rising main.

Aeration and/or agitation of leachate will, in most cases, result in the formation of foam, we have therefore included for antifoam dosing.

Calcification:

Aeration or agitation of raw leachate can induce calcification; this is inevitable because dissolved carbon dioxide is also driven out of solution with methane, thus destabilising the calcium bicarbonate equilibrium which automatically readjusts by precipitating calcium carbonate. However, it is possible to reduce calcification by controlling the aeration rate to the minimum required whilst still achieving compliance with the methane tender limit of 0.11 mg/litre. There are a number of methods for achieving this. One of these is to use a methane monitor (typically a membrane device) to control the aeration rate. We have found such methane monitors to be unreliable and prohibitively expensive. Our preference is to adjust air flow rate manually and rely on regular laboratory methane analyses to ensure the optimum airflow rate is achieved.

We were recently commissioned by a client to carry out trials which included trialling antiscalants. The trials were successful. Calcification can be reduced markedly by dosing antiscalant at very low dosage rates, perhaps 5 – 50ml/m^3 of leachate. Operational experience with each plant will determine the need for and dosing rate of antiscalant. We have included for an antiscalant dosing system for each plant.

Discharge mains:

There is a risk that the existing discharge pipelines could become blocked with calcium carbonate scale over time. The beneficial effect of antiscalants can be time limited in any system. It may prove necessary or beneficial to dose antiscalant into the raw leachate feed to the MSP and into the degassing tank to help protect the discharge main.

Aeration:

Aeration in an MSP is a continuous process when the plant (flow present) is operational. The airflow is regulated via an airflow regulator situated on each separate air feed to the aeration vessels. This ensures an evenly distributed supply of air to each tank. The airline to each tank is then connected to the vessels via a sealed HDPE plate and the connected inside the vessel via threaded hose which in turn is connected to a manifold with two fine bubble diffusers.

We use fine bubble tube or disc diffusers because they are (a) more effective at methane stripping than course bubble diffusers and (b) they are significantly more energy efficient than course bubble diffusers. We have specified tube-type fine bubble diffusers for the following reasons: -

- They provide an excellent fine bubble stream
- When used in parallel in a circular vessel they provide excellent coverage of the vessel plan area, ensuring very efficient aeration and mixing.
- Despite being ballasted so that the manifold/diffuser assembly readily sinks in the reaction tank, they are light and easy to remove for servicing or cleaning.
- Long life-expectancy – we anticipate 5-10 years at least and they are inexpensive to replace.
- Air pressure can be increased for short periods to flex-off scale deposition.
- The micro slits do not allow water in.

- The rubber (EPDM) sleeve is easy and cheap to replace although the whole diffuser is also cheap to replace.

Bubble size and tank depth are very important factors:
As liquors flow through the aeration chambers the fine bubble diffusers release air in the form of micro-bubbles in each of the tanks. Despite being fine bubble diffusers, the upward flow of air is quite vigorous, causing the necessary agitation to drive the dissolved methane out of solution. The transit time to surface for a fine bubble is very much longer than that of a course bubble and therefore has more time to be effective. Bubble size and water depth are key factors in both the effectiveness of methane stripping and the efficient use of energy. The longer the bubbles are held within the liquor the more efficacious they will be in removing methane.
We believe the key factors to efficient, effective methane stripping are: -

- Fine bubbles
- Large aggregated surface area of bubbles
- Water depth
- Residence time in each aeration chamber; the plant we propose for all 4 sites provides in excess of 1 hour of residence time in the reaction tanks. Moreover, the operating cost of our MSP's is very low due to the relatively small blower sizes.

4. Civils, bunding & secondary containment

We have included for groundworks in preparation for placement of the MSP skid. As previously noted, as our plant is skid mounted and can be placed on a level, stable and free-draining surface.

We have included for a concrete plinth for transfer pumps, i.e. the pumps that would transfer raw leachate to the MSP at a controlled rate.

We have included for a suitable tanker bay to contain spillages and direct such spillage into a sump with a float-controlled pump, discharging into the raw leachate tank.

Bunding of the MSP will comply with CIRIA C736. The bund floor will incorporate a sump c/w sump pump for rainwater control. Rainwater to be discharged into the first reaction tank.

Secondary containment:

- Antifoam is not a hazardous chemical and does not need secondary containment.
- Antiscalant is an irritant, the delivery pipes will be double contained.
- Where appropriate, pipework will be trace-heated, lagged and clad with rodent/bird proof cladding.

5. Level control

All tanks will have Hi and Hi/Hi float switches to provide alarms in the first instance and to inhibit feed.

The bund sump pumps will have integral float switches.
The bund will have a float switch for alarm purposes and to inhibit the leachate feed pumps and the recycling pad sump pumps.

We will install Radar level sensors in the following tanks:

- Raw leachate tank – level indication and pump control
- Discharge pumping tank – pump control

6. Calcification

We have allowed for an antiscalant dosing system to inhibit formation of calcium carbon scale. This is because all leachates contain calcium bicarbonate - $Ca(HCO_3)_2$ which is a soluble equilibrium. The action of methane stripping by aeration causes agitation and it is the agitation that drives methane out of solution, but it should be noted that it also drives CO_2 out of solution. This destabilises the $Ca(HCO_3)_2$ equilibrium. The equilibrium must re-stabilise itself and does so by precipitation of calcium carbonate - $CaCO_3$ and this typically forms a hard scale. Scaling ions attach themselves to any particles (grit, fibres etc.) and surfaces (pipes, tank walls, diffusers), utilising them as crystal nucleation sites which then grow and aggregate. In an MSP Scaling is not caused by the presence of oxygen, it is simple agitation by aeration.

Minimal energy is required to achieve the agitation required to drive methane out of solution and it is important that aeration is not excessive as this could exacerbate scaling. Dosing the antiscalant which contains phosphonate, changes leachate chemistry very slightly and the resulting calcium phosphonate is much more soluble than calcium carbonate and should not precipitate out in MSP. However, with continuous dosing of the antiscalant at a controlled rate in the MSP, we think the effect of the antiscalant is unlikely to diminish in the discharge main to the Thames Water WwTW, provided self-cleansing velocity is maintained. Despite the addition of antiscalant, the effluent discharged to sewer will be fully compliant with the Trade Effluent Consent. The quality of effluent from the sewage works to controlled waters will not be affected by the antiscalant in our discharged effluent.

7. Sludge/solids

It is inevitable that solids will accumulate in all the tanks containing leachate and recycling pad water and in particular, the MSP and de-gassing tank. The tube diffusers are easy to remove by one person and are easy to clean and/or inexpensive to replace. The de-gassing tank will be fitted with an agitator which will be run continuously to prevent settling of solids and to actively disperse entrained gas. The access gantry provides a safe working platform for a vacuum tanker operator for suction and jetting to clean the tanks out.

We have also provided access to the de-gassing and discharge tanks for jetting and suction clean out.

8. Instrumentation

We have allowed for 2 MCERTS electromagnetic flow meters, one for the feed pump and one on the final effluent.

We have allowed for VEGAPULS WL S 61 Radar level monitoring and control sensors which are widely used for applications in the water and wastewater industry. They are particularly suitable for level measurement in water treatment, in pump stations as well as water overflow tanks. The flood-proof IP 68 housing ensures maintenance-free permanent operation. In addition to the normal hard-wired connection to our system, an integrated Bluetooth module enables the wireless communication with smartphone, tablet or PC.

9. Electrical and control systems

All design, factory assembly and installation shall conform to a relevant recognised British, European or US standard. All switchgear to be Schneider equipment, all outdoor enclosures are to be IP66 GRP Enclosures Built to EN 62208:2011. The installation will be tested in accordance with BS7671:2018. All of the electrical installation shall be in accordance with BS7671:2018 with the rated voltage of the installation being 415v/230v/50Hz.

The PLC will be a Siemens S7, the PLC program will be provided to VWM. It will require Siemens STEP 7 software which can be downloaded from the internet to read the program and SCADA will be "Point of View" (POV), Windows-based software which is a feature-rich industrial HMI with SCADA

The status of all electrical pumps, all level sensors in storage tank, flow meters, and float switches, limit switches can be viewed on the SCADA system. The SCADA system will be provided with the facilities for remote access to Viridor's "Voice" system and connection to Viridor's Monitoring Pro for the exporting of CSV. data files. The SCADA system will include screen mimic diagrams and means for adjusting parameters, the system will also record operational data and display historical data and trends and have the means of exporting the logged data by the means of USB.

The SCADA system will have the following Functions

- Graphical Overview of whole plant
- Individual Graphic Screens
- Information display for each of the plant items e.g. running status, flow rate, levels, motor run hours, faults status.
- Facility to change setpoints
- Process parameters
- Alarm History
- Historic Trends for each of the levels and Flow rates
- Data logging, Emailing of CSV reports and downloading
- Telecommunications Link
- All Software and Licencing keys along with drawings will be provided to Viridor to enable full independent access to all software.

10. Trace-heating and lagging

We have allowed for trace-heating, lagging and cladding of exposed pipework and pumps. Cladding to be rodent and bird proof.

11. CDM Principal Contractor

We have assumed that we would be Principal Contractor under the CDM regulations and have allowed for suitable welfare facilities and accommodation on site and that there is a suitable location on site for these facilities.

12. Testing & Commissioning

We have included for cold-commissioning, electrical testing & certification and biological commissioning. We have not allowed for laboratory analyses. We have allowed for first-fill chemicals. We have not allowed for supply of water to fill the tanks for hydrostatic testing and commissioning.

13. BAT Compliance

We realise the sector guidance note on MSP's has been withdrawn and we cannot readily find any guidance that replaces it. We still consider the old guidance to be relevant and so in order to demonstrate that our proposed treatment system constitutes the Best Available Technique (BAT) for the treatment of this wastewater we have used the BAT Reference Document (BREF) issued by the Environment Agency in February 2007 entitled "Sector Guidance Note IPPC S5.03.

This BREF refers to the use of a Methane Stripping Plant (MSP) for removal of methane in Section 2.1.3.1.1. The plant it suggests achieving "optimum performance":

- Is based on air stripping,
- recommends three or four reactors in series and
- suggests that a small non-aerated tank can provide additional methane removal.

Our proposed plant includes all of these factors and is based on four reactors.

The BREF also mentions potential concerns as discussed below together with our proposals to combat these.

The BREF refers to potential odour problems although it suggests that these are usually very minor. We agree that there is not likely to be any major odour problems but have included a Granular Activated Carbon (GAC) filter in our proposal which will adsorb any traces of odorous compounds in the off-gases.

It also mentions the possibility of foaming and we have included for an antifoam dosing system

Precipitation of inorganic scale is also a common problem with MSP's and we have included an antiscalant dosing system which we have developed successfully in previous plants.

14. Process Guarantees:

See schedules

Flexibility of process:

- The feed pumps for raw leachate are controllable between 0.4 and 1.7m^3/hour.
- The MSP has been sized to accommodate at least 40m^3/day as continuous flow and can operate in batch mode to accommodate discontinuous demand.
- Air flow rate is manually adjustable which can help to reduce over-aeration and hence calcification
- When sizing an MSP, we assume 4 reaction tanks providing ≥1 hours' residence time and 4 times air flow to leachate flow.

15. Commercial

[redacted]

[redacted].

16. Conditions and clarifications to offer

If we need to excavate soils and dispose of them on each site, we have assumed that we can do so at no cost to Viridian Systems Ltd.

Beddingham lagoon cover:

We are declining to offer a cover for the lagoon at Beddingham. We believe such a cover is a potential liability in several regards that we are not prepared to accept.

We have offered an auto-backwash filter on the discharge side of the MSP feed pumps but this will require very regular maintenance because it is likely to suffer from carbonate scaling.

We would like to suggest an alternative storage solution be considered that is not prone to wind borne debris entry, i.e. an enclosed tank. Depending on size, a new tank would obviously be more expensive than a lagoon cover or pump inlet strainer, but it would have considerably lower maintenance costs than a lagoon cover. We are keen to discuss options.

17. Maintenance

The need for maintenance will be very site specific and dependent on flows through each plant. We would be pleased to quote for a maintenance agreement for each plant but would suggest the plants be operated for a year before any such commitment is made by Viridor. We would be pleased to provide support on an ad-hoc basis in the interim.

We trust our offer is of interest to Viridor, if you have any questions or need clarification, please do not hesitate to contact us.

2.0 FORM OF TENDER

[redacted]

[redacted]

[redacted] [redacted]

[redacted]

[redacted]

[redacted]

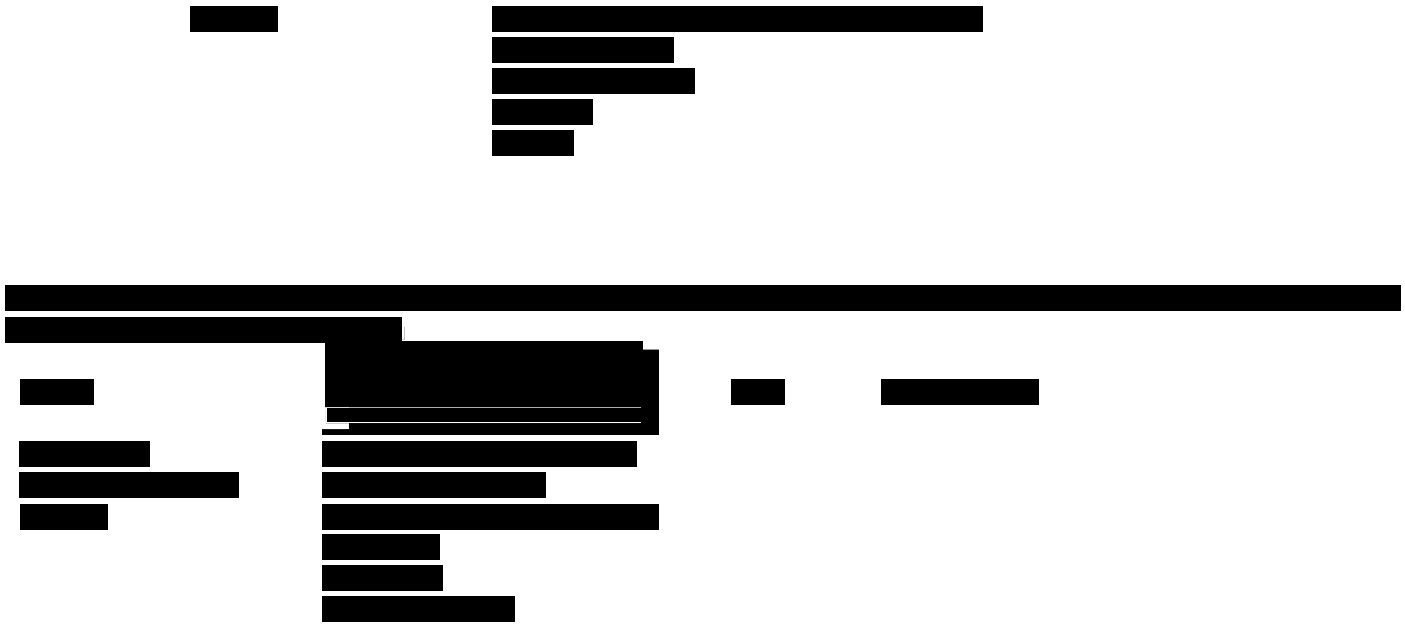
[redacted]

[redacted]

[redacted]

[redacted]

[redacted]



1. Has your company been prosecuted or been issued with an Improvement Notice or Enforcement Notice or Order, by Scottish Environmental Protection Agency, the Environment Agency, or any other enforcement body responsible for protecting the environment (including a Planning Authority in respect of a breach of Planning Control)?

   NO

   Please provide details of your company's environmental policy.

Viridian Systems Ltd Environmental Policy

Environmental management within Viridian Systems Ltd is operated in conjunction with our Health and Safety Policies. The Company undertakes continuous review of all environmental management procedures.

Viridian Systems Limited is committed to continual improvement of its environmental performance, including regulatory compliance, prevention of pollution and effective resource management and achieves this by setting clear environmental objectives and regularly monitoring progress against them by the implementation of environmental management programs, audits and reviews.

In particular, Viridian Systems Limited will:

- Consider the efficient use of energy, water and raw materials, the sustainable use of renewable resources and the reduction of adverse environmental impacts so far as is reasonably practicable.
- Contribute to the conservation and protection of the natural and built environment wherever possible in the course of our work.
- Wherever reasonably practicable, adopt pollution-reducing technologies, processes and practices, employing environmentally sound waste management techniques such as source reduction and improved specification, re-use, re-cycling and safe disposal.
- Ensure that we comply with all relevant European, national and local environmental regulations, working closely and positively with the regulatory agencies and other interested parties as appropriate.
- Identify areas of particular environmental risk and, in co-operation with our clients, the relevant external agencies and local community prepare measures to mitigate those risks and respond to any emergency.
- Regularly measure key aspects of our environmental performance.
- Have particular regard to this policy in the procurement, operation, maintenance and disposal of our vehicles, machinery and other plant.
- Promote environmental awareness among all our staff and encourage their involvement and suggestions regarding environmental performance.
- Provide staff with appropriate levels of environmental training, through staff induction procedures and environmental awareness training, in order to create an environmentally aware workforce with an interest in environmental issues and performance.
- Expect our business partners, sub-contractors and suppliers to share our concern for the environment and to work with us in identifying and applying best practice.
- Influence the environmental performance of our business partners, subcontractors and suppliers by working with them to achieve the same environmental standards as ours, and to exchange environmental concerns to our mutual benefits.

Responsibilities

Responsibility for implementation of this policy and the necessary resource allocation rests with the Managing Director supported by the Board of Directors. Further responsibilities are designated to environmental monitors through the company, who report to the Board.

Communication and Review of the Environmental Policy

The latest revision of this policy will be displayed on notice boards or otherwise brought to the attention of all employees. It will also be brought to the attention of other stakeholders, including business partners and major suppliers.

This policy is revised from time to time to reflect operational needs, regulatory issues, and to accommodate constructive input from members of our staff.

TENDER SCHEDULE 5: HEALTH AND SAFETY QUESTIONNAIRE

1. Who is the source of competent Health and Safety assistance or your organisation?

   Philip Dabner (Finance Director) is currently the acting H&S Manager. He has been in the industry for 19 years.

2. If your organisation employs 5 or more employees attach a copy of your most recent Health and Safety Policy Statement and details of the organisation which ensures this policy is implemented (e.g. an organisational chart).

   Attachment: VSL H&S Policy 2020
   Company Organisation Structure included within VSL H&S Policy 2020

3. What is your system for investigating, recording and reporting accidents, diseases, and dangerous occurrences?

   Accident reporting book together with a Line Manager incident report.

   A works Health and Safety committee is also in place to ensure all members of staff have the opportunity to discuss and H&S issues with Viridian Management. Viridian operates an open door policy on H&S and welcomes suggestions for improvement of H&S from all members of staff and others.

4. What use does your organisation male of accident records and reports?

   Any accident records and reports are reviewed by Senior Management and by the works Health and Safety committee. Information will be disseminated to members of staff via toolbox talks and employee notice boards.

   Details of the number and nature of annual accidents are tabulated and displayed on employee notice boards.

5. Do employees receive instruction and /or training before undertaking work tasks, with scheduled refreshers?

   YES

   All Viridian installation teams have the relevant training to carry out tasks efficiently and safely. Such training includes but is not limited to:

   - Abrasive Wheels
   - Breathing Apparatus
   - Butt Welding
   - CDM Duties (designer and main contractor)
   - CompEX training
   - Confined Spaces
   - Dumper
   - Electro-fusion welding
   - Excavator (CPCS)
   - Full First aid and Emergency First Aid
   - Harness Awareness
   - IEE 17th Edition Wiring Regulations
   - IPAF Training (safe use of MEWP's – mobile vertical and mobile boom)
   - Site Management Safety Training Scheme

   All construction staff have passed the Construction Skills Certificate Scheme (CSCS) Operative H&S test.
   We also undertake full inductions and on-going training for the dangers related to hazards specific for work on operational and closed landfill sites.

- Attachment: Folder- Training records

6. Has your organisation been awarded any safety performance awards?

   YES

   Member of SSIP – Alcumus SafeContractor Scheme

7. Has your organisation been served with an Improvement Notice or a Prohibition Notice or been prosecuted for any health and safety matter within the last 3 years?

   NO

8. As part of the evaluation process and at contract stage you will be required to provide site/project specific, risk assessments, method statements, COSHH assessments, etc. (as appropriate).
   Please confirm that you are able to provide these if so required.

   YES

Signed [redacted] Finance Director

For and on behalf of Viridian Systems Ltd

Date 01 June 2020

TENDER SCHEDULE 6: CONTRACTOR'S EXPERIENCE IN SIMILAR PROJECTS

[redacted]

TENDER SCHEDULE 7: MANAGEMENT STRUCTURE AND SUPERVISORY STAFF

The Contractor is to provide details of the management structure he proposes to use for the execution of the project and roles, resumes and CV's of the proposed staff on the contract:

- Attachment: VSL H&S Policy 2020 – Management Organisation Structure included
- Attachment: Folder – Staff CV's

TENDER SCHEDULE 8: METHOD STATEMENTS

The Contractor is to provide outline (site specific) Method Statements for the main items of work on the contract:

- Attachment: Folder – Outline Method Statements

TENDER SCHEDULE 9: CONTRACTOR'S QUALITY ASSURANCE STATEMENT

The Contractor is to supply details of all Quality Assurance Systems they operate:

- Viridian Systems Ltd operates under ISO9001 : 2015
- Attachment: VSL ISO9001 Certificate 2019 – 2020 (expired 30th May 2020, awaiting audit which has been delayed due to COVD-19)

Completed Contract Schedules

COMPLETED CONTRACT SCHEDULE 7: SUB-CONTRACTING

No Sub-Contractors are intended to be used for works that are of a critical nature, or are projected to account for more than 5% of the total Contract Value.

COMPLETED CONTRACT SCHEDULE 8: CONTRACTOR'S NAMED PERSONNEL

Schedule of Key Personnel:

Name	Title	Function/Responsibility
Roger Dixon	Project Designer	Overall responsibility for design
Dave Robinson-Todd	Treatment Manager	Design of treatment process
Alejandro Londoño	Project Manager	Implementation of Contract
Kevin Hannaway	Electrical Designer	Design and Implementation of electrical & control systems

COMPLETED CONTRACT SCHEDULE 10: PARTS WITH LIMITED WORKING LIFE

Key Components Mechanical Items – Anticipated Life Schedule

Item	Anticipated Life (years)	Estimated Replacement Cost (£)
Diffusers	5	[redacted]
Blowers x 2	5	[redacted]
Transfer pump	Subject to process	[redacted]
Dosing pumps x 2	5	[redacted]
MSP tank	25 (subject to process)	[redacted]

(a) Includes cost to empty tank, labour and parts.

Key Components Electrical Items – Anticipated Life Schedule

Item	Anticipated Life (years)	Estimated Replacement Cost (£)
Level control floats x 6	5	[redacted]
Level transducers x 3	5 (Subject to process)	[redacted]
Control panel	15	[redacted]

Key Components Process/Consumable Items – Anticipated Life Schedule

Item	Anticipated Life (years)	Estimated Replacement Cost (£)
Antifoam	Consumable	[redacted]
Antiscalant	Consumable	[redacted]
Vane Set	6 Months	[redacted]
Blower Air Filter	6 Months	[redacted]

COMPLETED CONTRACT SCHEDULE 17: PERFORMANCE GUARANTEES

The Contractor guarantees that the completed facility will process leachate as a minimum in accordance with the data contained in the tables below:

Performance Guarantees - Equipment

Item Description	Units	Guaranteed Figure
MSP Flow Volume Poole	m^3/day	200
MSP Flow Volume Wootton	m^3/day	50
MSP Flow Volume Yanley	m^3/day	150*
MSP Flow Volume Beddingham	m^3/day	150*
MSP Flow Volume Poole	l/s	2.3
MSP Flow Volume Wootton	l/s	0.58
MSP Flow Volume Yanley	l/s	1.74
MSP Flow Volume Beddingham	l/s	1.74
Maximum annual power consumption	MW/hr	30
Maximum instantaneous power consumption	kW	10
Maximum noise (internally located equipment)	(dB at 1 metre from outside of enclosure)	45
Maximum noise (externally located equipment)	(dB at 1 metre from equipment)	4

*can be increased if blower is upsized to same as Poole

Performance Guarantees – Maximum Treated Leachate Discharge Concentration Limits

Determinand	Unit	Value
COD	Kg/day	No greater than influent quality on same day
COD	mg/l	
pH	unit	
Suspended Solids at 105 °C	mg/l	
Copper (total)	mg/l	
Chromium (total)	mg/l	
Nickel (total)	mg/l	
Lead (total)	mg/l	
Zinc (total)	mg/l	
Dissolved Methane	mg/l	0.11

Table M – 1: Activity Schedule

Type	Item	Element	Number	Unit	Unit Cost	Total	Subtotal
Enabling, Design, Installation and Commissioning	1.1	Site Visits	4	#	[redacted]	[redacted]	[redacted]
	1.2	Process and M&E Design Costs	1	#	[redacted]	[redacted]	[redacted]
	1.3	Attendance at 1 day HAZOP meeting per site	4	#	[redacted]	[redacted]	[redacted]
	1.4	Project Management (Contractor) manpower	16	£/week	[redacted]	[redacted]	[redacted]
	1.5	Insurances	4	#	[redacted]	[redacted]	[redacted]
	1.6	O&M manual production (allow for 3 iterations) and as-built drawings	4	#	[redacted]	[redacted]	[redacted]
	1.7	Welfare Facilities	16	£/week	[redacted]	[redacted]	[redacted]
	1.8	Site establishment (Office, Store, Fencing, etc.)	16	£/week	[redacted]	[redacted]	[redacted]
							[redacted]
Poole	2.1	Mobilisation	1	#	[redacted]	[redacted]	[redacted]
	2.2	Mechanical materials **& Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	2.3	Electrical / comms materials	1	#	[redacted]	[redacted]	[redacted]
	2.4	Mains electrical connection	1	#	[redacted]	[redacted]	[redacted]
	2.5	Control systems and SCADA **+ Telemetry**	1	#	[redacted]	[redacted]	[redacted]

	2.6	Odour control systems - **Included in Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	2.7	Supply of tanker bay (all costs, including manpower)	1	#	[redacted]	[redacted]	[redacted]
	2.8	Installation manpower costs (excluding tanker bay)	1	#	[redacted]	[redacted]	[redacted]
	2.9	Commissioning and testing **(Including NICEIC and MEICA FATS)**	1	#	[redacted]	[redacted]	[redacted]
	2.10	Training	1	#	[redacted]	[redacted]	[redacted]
	2.11	Access and lifting equipment	1	#	[redacted]	[redacted]	[redacted]
	2.12	General site works, concreting etc.	1	#	[redacted]	[redacted]	[redacted]
							[redacted]
Wootton	3.1	Mobilisation	1	#	[redacted]	[redacted]	[redacted]
	3.2	Mechanical materials **& Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	3.3	Electrical / comms materials	1	#	[redacted]	[redacted]	[redacted]
	3.4	Mains electrical connection	1	#	[redacted]	[redacted]	[redacted]
	3.5	Control systems and SCADA **+ Telemetry**	1	#	[redacted]	[redacted]	[redacted]
	3.6	Odour control systems - **Included in Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	3.7	Supply of tanker bay (all costs, including manpower)	1	#	[redacted]	[redacted]	[redacted]
	3.8	Installation manpower costs (excluding tanker bay)	1	#	[redacted]	[redacted]	[redacted]

	3.9	Commissioning and testing **(Including NICEIC and MEICA FATS)**	1	#	[redacted]	[redacted]	[redacted]
	3.10	Training	1	#	[redacted]	[redacted]	[redacted]
	3.11	Access and lifting equipment	1	#	[redacted]	[redacted]	[redacted]
	3.12	General site works, concreting etc.	1	#	[redacted]	[redacted]	[redacted]
							[redacted]
Yanley	4.1	Mobilisation	1	#	[redacted]	[redacted]	[redacted]
	4.2	Mechanical materials **& Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	4.3	Electrical / comms materials	1	#	[redacted]	[redacted]	[redacted]
	4.4	Mains electrical connection	1	#	[redacted]	[redacted]	[redacted]
	4.5	Control systems and SCADA **+ Telemetry**	1	#	[redacted]	[redacted]	[redacted]
	4.6	Odour control systems - **Included in Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	4.7	Supply of tanker bay (all costs, including manpower)	1	#	[redacted]	[redacted]	[redacted]
	4.8	Installation manpower costs (excluding tanker bay)	1	#	[redacted]	[redacted]	[redacted]
	4.9	Commissioning and testing **(Including NICEIC and MEICA FATS)**	1	#	[redacted]	[redacted]	[redacted]
	4.10	Training	1	#	[redacted]	[redacted]	[redacted]
	4.11	Lagoon liner inspection and repair	1	#	[redacted]	[redacted]	[redacted]

	4.12	Access and lifting equipment	1	#	[redacted]	[redacted]	[redacted]
	4.13	General site works, concreting etc.	1	#	[redacted]	[redacted]	[redacted]
							[redacted]
Beddingham	5.1	Mobilisation	1	#	[redacted]	[redacted]	[redacted]
	5.2	Mechanical materials **& Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	5.3	Electrical / comms materials	1	#	[redacted]	[redacted]	[redacted]
	5.4	Mains electrical connection	1	#	[redacted]	[redacted]	[redacted]
	5.5	Control systems and SCADA **+ Telemetry**	1	#	[redacted]	[redacted]	[redacted]
	5.6	Odour control systems - **Included in Process Equipment**	1	#	[redacted]	[redacted]	[redacted]
	5.7	Supply of tanker bay (all costs, including manpower)	1	#	[redacted]	[redacted]	[redacted]
	5.8	Installation manpower costs (excluding tanker bay)	1	#	[redacted]	[redacted]	[redacted]
	5.9	Commissioning and testing **(Including NICEIC and MEICA FATS)**	1	#	[redacted]	[redacted]	[redacted]
	5.10	Training	1	#	[redacted]	[redacted]	[redacted]
	5.11	Cover system for Lagoon 2 (settlement) (all costs including installation manpower)	0	#	[redacted]	[redacted]	[redacted]
	5.12	Screen / filter system for **discharge** pumps (all costs including installation manpower)	1	#	[redacted]	[redacted]	[redacted]
	5.13	Lagoon liner inspection and repair	1	#	[redacted]	[redacted]	[redacted]

	5.14	Access and lifting equipment	1	#	[redacted]	[redacted]	[redacted]
	5.15	General site works, concreting etc.	1	#	[redacted]	[redacted]	[redacted]
							[redacted]
General	10.1	Other (please provide details) – add additional if necessary					
	10.2	Other (please provide details) – add additional if necessary					
Grand Total							[redacted]

Table M-2: Operating Budget Template

Notes:
We have allowed for an annual cost increase of 3.5% in the operating budget costs.
We have assumed the 95th%ile for daily flow rate in each case to calculate the operating budget costs.

Process Item	Element	Yr1	Yr2	Yr3	Yr4	Yr5	Total	Subtotal
Poole	Power (X.XkWh/m^3 @ £0.16/kWh),	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Chemicals (assume £0.06/m^3 of treated leachate for '**Antifoam**' and assume £0.03/m3 of treated leachate for '**Antiscalant**'	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Planned maintenance/calibration (blower service, flowmeters calibration, plant de-sludging)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Ad-hoc maintenance	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Manpower (26 days per year share of salary @ £30k/yr)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Consumables such as PPE, cleaning chemicals, lab chemicals etc (please provide detail of main items)						[redacted]	
	Monitoring and off-site lab-analysis costs						[redacted]	
								[redacted]
Process Item	**Element**	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Total**	**Subtotal**
Wootton	Power (X.XkWh/m^3 @ £0.16/kWh),	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Chemicals (assume £0.06/m^3 of treated leachate for '**Antifoam**' and assume £0.03/m3 of treated leachate for '**Antiscalant**'	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

	Planned maintenance/calibration (blower service, flowmeters calibration, plant de-sludging)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Ad-hoc maintenance	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Manpower (26 days per year share of salary @ £30k/yr)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Consumables such as PPE, cleaning chemicals, lab chemicals etc (please provide detail of main items)						[redacted]	
	Monitoring and off-site lab-analysis costs						[redacted]	
								[redacted]
Process Item	**Element**	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Total**	**Subtotal**
Yanley	Power (X.XkWh/m^3 @ £0.16/kWh),	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Chemicals (assume £0.06/m^3 of treated leachate for '**Antifoam**' and assume £0.03/m3 of treated leachate for '**Antiscalant**'	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Planned maintenance/calibration (blower service, flowmeters calibration, plant de-sludging)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Ad-hoc maintenance	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Manpower (26 days per year share of salary @ £30k/yr)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Consumables such as PPE, cleaning chemicals, lab chemicals etc (please provide detail of main items)						[redacted]	
	Monitoring and off-site lab-analysis costs						[redacted]	
								[redacted]
Process Item	**Element**	**Yr1**	**Yr2**	**Yr3**	**Yr4**	**Yr5**	**Total**	**Subtotal**
Beddingham	Power (X.XkWh/m^3 @ £0.16/kWh),	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

	Chemicals (assume £0.06/m^3 of treated leachate for '**Antifoam**' and assume £0.03/m3 of treated leachate for '**Antiscalant**'	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Planned maintenance/calibration (blower service, flowmeters calibration, plant de-sludging)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Ad-hoc maintenance	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Manpower (26 days per year share of salary @ £30k/yr)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Consumables such as PPE, cleaning chemicals, lab chemicals etc (please provide detail of main items)						[redacted]	
	Monitoring and off-site lab-analysis costs						[redacted]	
								[redacted]

ENVIRONMENTAL (Construction) – Site Specific Management Plans

Viridian will ensure that the project is designed and constructed to minimise its environmental impact and to ensure that wastes delivered to the Site can be dealt with in a safe and proper manner, having regard to all guidance relating to the management of waste.

Viridian will be responsible for the control of all emissions during the construction and commissioning stages of the project and will set out how these will be managed during the construction and commissioning stages of the project in the Site Environmental Management Plan.

Viridian will also be responsible for the management of all wastes arising from the project and the Site Environmental Management Plan will include a protocol for the removal and safe disposal of all construction waste products and/or materials resulting (including recycling/reuse where possible) from the construction of the project.

As part of the site induction, all site personnel will be instructed on appropriate separation, handling, recycling/reuse and disposal of waste materials.

The Viridian Site Manager will be responsible for the following:

- Ensuring the site is kept clean and safe
- The collection of waste from a central point
- Segregation of waste on site
- Ensuring that all access routes are kept clear of debris on a regular basis

Site Boundary:
The Construction (Design and Management) area will be cordoned off for the duration of the construction phase.

Final restoration:
On completion of the works, Viridian will clean the site and remove all debris, rubbish and accumulated materials relating to the works.
Viridian will maintain and protect any public roads and footpaths, including statutory services and similar undertakings, and will make good any damage thereto.

APPENDIX 3

Site	Sample Point	Methane Dissolved (mg/l)
Yanley	YN/501	3.9
Yanley	YN/501	0.89
Yanley	YN/501	1.9
Yanley	YN/501	0.3
Yanley	YN/501	4.1
Yanley	YN/501	<0.010
Yanley	YN/501	0.62
Yanley	YN/501	7.5
Yanley	YN/501	2.3
Yanley	YN/501	6.8
Yanley	YN/501	0.32
Yanley	YN/501	6.1
Yanley	YN/501	0.035
Yanley	YN/501	1.5
Yanley	YN/501	0.25
Yanley	YN/501	5.4
Yanley	YN/501	0.94

Caulmert
engineering environmental planning

Registered Office: Intec, Parc Menai, Bangor, Gwynedd, LL57 4FG
Tel: 01248 672666
Fax: 01248 672601
Email: contact@caulmert.com
Web: www.caulmert.com