

NANTYCAWS LANDFILL SITE

ENVIRONMENTAL MANAGEMENT PLAN

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Prepared for:

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1.0 INTRODUCTION

Carmarthenshire County Council has the responsibility for the safe treatment and disposal of the leachate arising from a closed landfill site at Nantycaws, Carmarthen, UK.

Carmarthenshire County Council has contracted out the maintenance and operation of the leachate treatment plant to ExCAL Limited.

The leachate from the closed landfill section is dilute and so is only slightly contaminated with ammonia. It is being treated with a biological treatment plant prior to discharge to a local river under a discharge consent (EPR/PP3338CQ).

The treatment plant consists of 1 x SAF (Submerged Aerated Filter) and 4 MBBR (moving bed bio reactor) that are successively treating the leachate to enable the treated effluent to be discharged to the river.

The site also has 2 x SAF plants which act as a secondary treatment system when required.

The following is an Environmental Management Plan for the treatment plant.

1.1 Site Address

The site location and address is: -

Nantycaws Landfill Site
Phase 1
Nantycaws
Carmarthen
SA32 8BG

2.0 BIOLOGICAL TREATMENT PLANT

The biological treatment plant consists of the following main components: -

2.1 Inlet Pump Well

The inlet pump well receives the leachate from the closed landfill drainage system (Phase 1), as well as from a riverside drain of the landfill (French Drain).

For the river side drain, there is a small pump sump and submersible pump that pumps the leachate from the riverside drain to the main inlet pump well; or it can be discharged directly to river, depending on whether it is within the discharge consent limits.

If the leachate from this source is out of consent, then it is pumped to the inlet pump well. If it is within consent, then the leachate is discharged directly to river. There is a manual valve on the discharge pipe to river that can be opened or closed; when closed, the leachate is pumped to the inlet well; when open the leachate is discharged to river.

The ammonia level of the leachate from this source is checked daily.

2.2 Pre-Aeration/Primary Settlement

The leachate from the inlet well is pumped to an underground, pre-aeration and primary settlement tank (40.6 m³). The leachate can contain high levels of reduced iron (ferrous) and the aeration tank oxidises the iron to insoluble ferric by fully aerating the leachate with air diffusers connected to a blower.

The leachate then flows, by gravity, to the settlement tank. The settled solids settle within the base of the settlement tank and are removed, every month, by vacuum tanker.

2.3 Phosphoric Acid

The leachate is short of orthophosphate to enable full biological treatment.

A phosphoric acid dosing set consisting of a 25-l drum and dosing pump has been installed that constantly doses phosphoric acid into the inlet pump sump. The drum and dosing pumps are housed within a small cabinet.

2.4 MBBR and SAF

There are 4 MBBRs associated with the main plant.

Raw leachate enters the first MBBR located underground, which acts as a flood settlement tank. The leachate is then pumped to the 3 MBBRs located above ground for treatment.

From the above ground MBBRs, the leachate goes into the one SAF plant associated with the main plant

The above ground SAF plant is 40.6 m³ in size and is fed by a set of submersible pumps located in an underground pump sump.

The SAF plant is partially filled with neutral buoyancy floating media (Bio Blok) that act as support for the growth of nitrifying bacteria.

The SAF plant is aerated by a dedicated 1.5 kW rotary vane blower. The SAF plant has a grid of fine bubble diffusers mounted on the base of the tank that aerates the SAF plant and fluidises the media.

The outlet of the SAF plant leads to a settlement tank which contains a sludge recirculation system to direct sludge back to the start of the system. The treated water is discharged to the river.

The site also has a secondary treatment system comprising of two SAF plants which are used when required.

2.5 Drum Filter

A drum filter was previously installed, however as the final effluent has consistently met the TSS limit without filtration, the drum filter was not utilised and has since been decommissioned.

2.6 Discharge Pipe

The treated effluent is discharged to river by an above ground discharge pipe. A MCERTs flow meter is installed on the main treatment plant to monitor the instantaneous and totalised flow to river.

2.7 Secondary SAF

The leachate within the lagoon is further treated by 2 x 15m³ cylindrical SAF plants operated in series. These contain rigid packed media that is aerated by a dedicated blower and air diffusers, as for the main treatment plant. The solids in the outlet from the SAF plants are settled in a lamellar plate separator.

The settled effluent from the secondary SAF plant can either be discharged back to the front of the lagoon or directly to river via an existing reed bed. It is discharged directly to river if the plant is being run under storm flow conditions and the lagoon is full. The effluent is diverted by a set of manual valves on the outlet pipe of the lamellar plate separator.

2.8 Messing Facilities

The control panel is housed within a control room that has a small office and bench.

Toilet facilities are provided by a chemical toilet.

2.9 Security Fencing

The lagoon and raw sump has security fencing around the perimeter to ensure that the site is secure when unattended.

3.0 HOLDING LAGOON AND BUNDING

3.1 Holding Lagoon

There is a concrete lined holding lagoon on site: -

53m x 35m x 2.2 m (Approx.) water depth = 4,081 m³

The holding lagoon provides storage capacity in the event of surges of leachate following a storm. There is an overflow pipe from the main inlet pump station to the lagoon in the event of a sudden storm surge and the inlet flow rate exceeds the capacity of the inlet well pumps.

The holding lagoon also enables the storage of contaminated surface water collected in the bunded area of the treatment plant.

3.2 Bunding

The concrete plinth upon which the tanks are mounted are bunded with a 210 mm, impermeable, concrete bund wall. The slab area is 18m x 11.5m, so the containment volume will be approximately 43m³ – sufficient to contain a complete tank failure of one of the largest tanks.

4.0 TANK AND MEDIA LIFE EXPECTANCY

The life expectancy of the above ground SAF tanks is quoted as 20 years and the media would have a similar life expectancy.

5.0 CONSENT LIMITS

The present consent limits for the site are: -

Daily Flow: 250 m³/day

BOD: 20 mg/l

TSS: 30 mg/l

N-NH₄: 4.0 mg/l

Total Fe: 3.0 mg/l

pH 6-9

6.0 FLOW MONITORING

There is a MCERTS Magflo meter on the discharge pipe from the treatment plant.

Daily, totalised, 24 - hour flows will be recorded in the results spreadsheet.

In the future, a flow meter will be installed on the discharge of the secondary SAF plant.

7.0 PLANT OPERATION

7.1 Plant Operator

The site is attended, daily, to ensure the plant is fully operational and meeting the final discharge consent limits. The following mechanical checks are undertaken daily.

7.1.1 Daily Mechanical Checks

Check the operation of the inlet pumps of the river side drain, as well as the main inlet pumps from the landfill drainage system.

Check that the blowers are aerating all four MBBR and SAF plants.

Check the sludge level in the primary settlement tank. The settlement tank is desludged, monthly, by a vacuum tanker.

Check the pumps and floats in the inlet pump sump, to the MBBRs, are fully operational.

Check that all 5 of the blowers of the main treatment plant are operational.

Ensure the blower for the secondary SAF plant is fully operational.

Monitor and record the lagoon level.

7.1.2 Daily Operational Parameters

Conduct an ammonia test, using a field test kit, to ensure that the final effluent is meeting the 4.0 mg/l discharge limit.

Record the daily, totalised, flow discharged to river.

Record the Turbidity of all discharges to the river.

7.2 Supervisor

The supervision of the plant is undertaken, by phone and e mail, to provide process advice on the operation of the plant to ensure consent compliance.

The Supervisor attends site at least once per month, and:

Measures the pH and temperature of the raw leachate, French drain, lagoon and final effluent.

Collects samples for off-site analysis, by a UKAS accredited laboratory, of the raw leachate, French drain, lagoon and final effluent for COD, BOD, TSS, N-NH₄, Fe and pH.

Maintains a spreadsheet of the daily flows and monthly results.

Provides a monthly report to Carmarthen County Council and to Natural Resources Wales (NRW) on the monthly results and any pertinent operation and maintenance issues to be addressed.

Liaise with the NRW and maintain the results and information required to maintain the PPC permit and any variation notices.

8.0 STORM EVENTS

Phase 1 of the landfill site has not been capped nor is there a liner on the base of the landfill. During periods of heavy rainfall there are very high levels of water ingress to the drainage system. It is suspected that there is also ground water ingress into the drainage system. The combined effect leads to leachate flows that cannot be treated in the existing waste water treatment plant.

The raw inlet pumps have been found to pump the high volumes of flow, but the hydraulics of the treatment plant are such that it cannot be pumped through the plant and the plant becomes overloaded. A Storm Event is defined as when the holding lagoon reaches a high level and is on the point of overflowing.

During "Storm Events", the following is the agreed course of action.

- The Council and NRW are informed that the treatment plant is in a period of storm flow;
- The treatment plant is operated at the maximum flow rate possible;
- The lagoon is analysed for the ammonia level to establish the level of contamination. Usually this is in the range of 5 to 10 mg/l;
- If the flow rate increases and the lagoon still rises, the leachate would be pumped directly from the lagoon to the reed bed, by passing the secondary SAF plant.

8.1 Frequency

- Storm events usually occur in the winter period, the last one was 2012/2013. They are expected every 2 to 3 years.

Flow Estimates

- When the plant is being operated under storm flow conditions, the estimated flows being discharged to river would be recorded. This would be the totalised daily flow being discharged to river by the main treatment plant, in addition to the estimated flow being pumped directly to river via the secondary SAF and reed bed. The additional flow being pumped from the lagoon would be estimated from the rating of the submersible pump being used.
- From previous storm events, storm conditions would be considered when the flow to the inlet well reaches 500 m³/day and ends when the flow rate < 200 m³/day.
- A record would be kept in the operator log book and the monthly report, of the:
 - o Start of a storm event and when the Council and NRW were informed;
 - o The discharge route when pumping out of the lagoon (via secondary SAF and reed bed, or directly from the lagoon to the reed bed);
 - o The combined, estimated, daily volumes being discharged to river;
 - o The end of the storm event and when the plant is being run under normal conditions and when the notification was made to the Council and NRW that the storm period has ended.

River Impact

- During a storm event, samples would be taken upstream and downstream of the discharge point to river. The samples would be taken daily and analysed for BOD, N-NH₄, TSS, pH and Fe.

The lagoon would be pumped down until it reaches a point where there is no risk of the lagoon overflowing, at which point the outlet from the SAF plant would be diverted to the top of the lagoon and the plant reverted normal operation.

There would be the option of tankering off-site the excess volume of leachate, although this would incur an excessive cost with a minimal environmental benefit.

9.0 POWER DRAWN

The upgraded plant will have the following, estimated, power drawn: -

Table 1, Estimated power drawn for the treatment plant

	No	Rating	kWh/day
French Drain Pump	1	0.7	16.8
Tip Pump	1	1.5	36
SAF Feed Pump	1	1.5	36
Blowers	4	2.5	240
Final Effluent Pump	1	0.7	16.8
Total			345.6

The estimated power drawn is 345 kWh per day giving an annual power drawn of 126 MWh.

10.0 MAINTENANCE AND WELFARE

The operator undertakes any minor mechanical and electrical repairs to the plant in order to keep the plant operational. Critical spares are kept on site for the pumps, blowers and control panel.

Any major repairs will be contracted out to a nominated, council approved, contractor.

The grass and undergrowth on top of Phase 1, the banks of the lagoon and the French drain will be trimmed and maintained as part of the future maintenance contract.

Removal of excess leachate, or other effluents from the site, will be arranged by the site operator once agreement has been obtained from the Council of the disposal costs.