

12 DEC 2014



## **Trecatti Landfill Site**

### **EPR Improvement Condition Response**

#### **Condition IP 7**

**Permit RP3733PC, variation V005, dated 12<sup>th</sup> February 2013**

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## **1.0 INTRODUCTION**

Biffa Waste Services Ltd has prepared the following Leachate Management Plan for Trecatti Landfill Site, Merthyr Tydfil, South Wales, in accordance with the requirements of Improvement Condition 7 of the Environmental Permit (Permit EPRIRP3733PC Variation No. V005 issued 12 February 2013).

Improvement Condition 7 of the Environmental Permit states:

Following reviews of the hydrogeological, and gas risk assessments undertaken as a result of Refs. 5 and 6, the Operator shall submit to the National Resource Wales for approval written proposed revised leachate level assessment criteria and compliance limits demonstrated to minimise emissions to groundwater, to prevent the input of hazardous substances to groundwater, to limit the inputs of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater, and to enable effective landfill gas management to take place.

Where the proposed revised leachate level compliance limits show that a further reduction in leachate levels within the landfill are required to prevent the input of hazardous substances to groundwater, to limit the inputs of non-hazardous pollutants to groundwater, the Operator shall submit in writing to the National Resource Wales for approval a revised leachate management plan.

The revised leachate management plan shall include (but need not be limited to) assessment of:

- Appraisal and selection of options and proposals for achieving the necessary reduction in leachate levels;
- A timetable for achieving that reduction in leachate levels as soon as possible;
- Appropriate monitoring techniques for monitoring leachate levels within the waste, including provision of monitoring points discrete from extraction wells;
- Capacity of existing extraction infrastructure;
- □ Well depth;
- Well yield;
- Provision of additional extraction infrastructure;
- Methods for minimising ingress of water into the waste body;
- Maintenance and replacement of extraction infrastructure during both operational and closure periods;
- Capacity of treatment infrastructure, and provision of additional capacity where necessary;
- Capacity of treated effluent disposal infrastructure, and provision of additional capacity where necessary, including by alternative means and application of best available techniques;
- Contingency measures to be undertaken if assessment criteria for leachate level exceeded.

The revised leachate management plan shall be prepared in accordance with relevant guidance contained with National Resource Wales guidance publications "How to comply with your environmental permit Additional guidance for: Landfill (EPR 5.02)", and "Guidance for the Treatment of Landfill Leachate (IPPC S5.03)".

On approval in writing by the National Resource Wales, the timetable for achieving reduction in leachate levels proposed in 8a above shall be implemented by the Operator.

### **1.1 Background and Objectives**

The improvement condition replicated above first appeared in Variation 004 of the PPC permit for Trecatti landfill site. At the time of writing the National Resource Wales were not satisfied that the HRA and the GRA provided in the PPC Application for the site did not fully justify the compliance limits of 5m in Phase 1 and 33m in Phase 2A. The decision document supplied with the permit Variation 004 stated :

*"The National Resource Wales is concerned that the original hydrogeological risk assessment is not reliable. We believe that the input*

*parameters into the numerical modelling exercise are unjustified or inappropriate. In addition to this, we believe that the conceptual model of the landfill and potential pollution pathways are inaccurate and some risks have unjustifiably been 'screened out' as insignificant.*

*We have also identified similar concerns regarding the landfill gas risk assessment submitted with the original Application, and modelled leachate quantities within the landfill. We cannot agree with confidence to the Operator's original proposed compliance limits for leachate heads within the site."*

As part of the improvement programme included in V004 of the permit, a requirement for a revised HRA and GRA were required. These have subsequently been completed and most importantly approved by the Agency. The decision document also highlights Agency concerns regarding non-compliance with the trigger limits, and doubts regarding the ability of the infrastructure both extraction and treatment at the site to remove sufficient leachate to achieve compliance with the limits. This submission aims to review the current circumstances on the site, future development, and contingency plans in place.

## **1.2 Site Setting**

The Site is a landfill located at NGR 60 082 077, immediately northeast of Merthyr Tydfil, and 3 km west of Rhymney, South Wales. The Site has been developed in a deep void created by historical mining of coal and ironstone. The total area of the Site is approximately 33 hectares.

The Site is currently permitted to accept non-hazardous and inert waste, with a maximum input per year of 625,000 tonnes. The Site is located within an area of historic mining and is immediately surrounded by common land, which includes vegetated colliery spoil tips and is used for rough grazing.

The main surface watercourses present in the vicinity of the Site are the River Taff and Rhymney River, which flow in a southerly direction and pass 3.5 km to the west and 2.1 km to the east of the Site, respectively. A number of tributary drains and streams drain the land immediately surrounding the Site.

The topography in the area of the Site falls towards the west and east, towards the Taff and Rhymney valleys respectively. The pre-development ground elevations at the Site range from approximately 380mAOD in the northwest to approximately 440mAOD on the south-eastern boundary.

## **1.3 Site Phasing and Operation**

The Site is an operational landfill managed by Biffa under Environmental Permit (Permit EPR/RP3733PC, Variation No. V007, issued 26 June 2013). It is anticipated that the Site may remain operational until at least 2022; however, this may change as waste input volumes vary in the future.

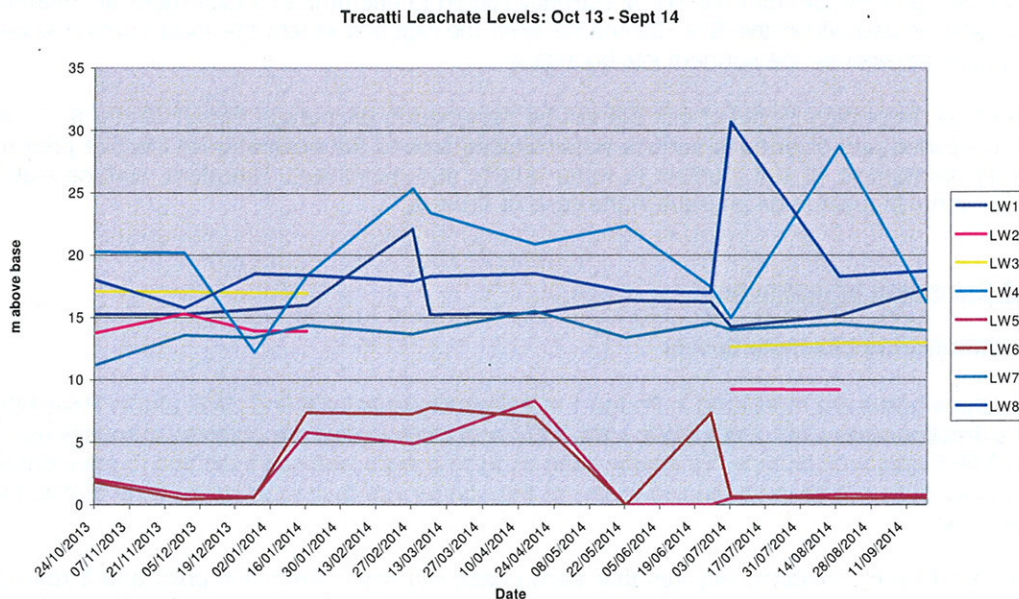
Prior to the original determination of Permit EPR/RP3733PC in March 2005, the Site was operated under Waste Management Licence 30105. Under that Licence, the Site could receive domestic, commercial and industrial waste including difficult and special wastes.

There are two areas of waste disposal at the Site. The Merthyr Waste Area, located in the north-eastern part of the Site, received waste from 1986 until 1992 when the management of the Site transferred from Merthyr Tydfil Borough Council to Biffa. The Merthyr Waste Area is not engineered, but is underlain by colliery backfill material, which acts as a low hydraulic conductivity layer in conjunction with the naturally occurring geological barrier. The second engineered part of the landfill is located to the west of the Merthyr Waste Area. This area is filled in phases from the base of the quarry void, upwards to the ground surface. It has two basal cells, Phase 1 and Phase 2A.



All other phases (Phases 2B to 8) are engineered as sidewall phases or as areas of tipping over existing phases.

#### 1.4 Current Leachate Levels



The graph above shows the progress that has been made at the site since the original improvement condition was included in V004 of the permit. This has been achieved by setting an internal target for the treatment plant, upgrade of the compressor system, alteration to the extraction system, addition of storage tanks and maintenance contracts for the leachate pumps.

With reference to the improvement condition requirement, it is considered that based on current levels and consistent improvements, the first two bullet points – options/proposals to reduce levels and a timetable for achieving a reduction are unnecessary.

#### 1.5 Leachate Generation

Previous leachate management plans have included a water balance calculation, and those conclusions will not be revisited in this document. The Site continues to utilise progressive temporary capping to increase gas capture, reduce odour and rainfall ingress, achieving on average a capped or temporary capped area of ~85%.

Effective rainfall is commonly the major input to a water balance. It is defined as the amount of rainfall available for infiltration after run-off and evapo-transpiration losses have been taken into account and any soil moisture deficit has been satisfied.

The effective rainfall through any temporarily capped areas of the Site will be less than the infiltration to open waste, but greater than that to a permanently capped site, which is usually estimated to be between 30mm/yr and 50mm/yr. The current permanently capped area is 23,959 which gives an indicative infiltration of approximately 1200m<sup>3</sup>/yr. On this basis, and that the temporary capping is constructed from low permeability plastic, the effective rainfall through any temporarily capped areas is estimated to be 200 mm per year.

However the material used for temporary capping at Trecatti is of a superior grade to that used by the generality due to the rainfall experienced in the region. For this reason it is believed that 200mm/yr is overly conservative and the figure is more likely to be in the order of 50mm/yr, in line with the infiltration rate for permanently capped areas.

Temporary Capping Material - 2mm smooth HDPE

Permanent Capping Material - 1mm LLPE – double rough HDPE

Surface water run-off from the Site is currently routed to one of the surface water attenuation lagoons located within the Site. Discharge from the lagoons enters the local surface water drainage network on the northern site boundary.

The final restoration profile of the Site will be designed to encourage run-off. Water flow will be controlled and diverted to surface water ditches around the perimeter for the Site prior to being discharged off site (subject to water quality and quantities). Therefore, surface water influx is not thought to be an issue in the case of Trecatti.

## **2.0 Extraction Infrastructure**

### **2.1 Monitoring Leachate Levels**

Leachate levels are monitored in Phase 1 at extraction wells LW5 and LW6, and in Phase 2A at extraction wells LW1, LW2, LW3, LW4, LW7 and LW8. Levels are obtained manually using an ATEX approved diptape. To enable ease of dipping each well has a diptube to ensure that the tape does not become tangled in any of the pumps and that an accurate level of liquid is recorded.

Current Agency guidance requires that each phase/cell has 1 extraction point and 2 remote monitoring points, however in many aspects Trecatti is not a typical landfill site, and this needs to be taken into account. The base of Phase 2A is a small area, and six leachate extraction wells occupy that footprint.

Provision of a remote leachate monitoring point is limited by operational practicalities, each leachate well or permanent gas well acts as an obstacle on the landfill that requires a stand off of several meters. In addition to this, typically a remote monitoring point would be installed into the drainage blanket to measure rest levels, however as with all the re-drills at Trecatti it has been deemed prudent by Biffa to drill to 5 meters above the base, and this view has been supported by National Resource Wales in the past.

It is proposed that a trial be undertaken in one of the current extraction wells whereby extraction is halted and recharge rates are recorded, along with any apparent reductions that may occur and indicate that the well is being influenced by adjacent extraction wells. Initially the trial will be undertaken over a two week period, and results will be forwarded to NRW.

### **2.2 Capacity of Extraction Infrastructure**

The extraction system is comprised of eight extraction wells. Wells LW1-LW4, LW7 and LW8 each have two "pods" of four pumps. In total the site has 38 pumps that can remove 0.5m<sup>3</sup>/hour, which means that the potential extraction rate is 19m<sup>3</sup>/hour or 432m<sup>3</sup>/day. Current extraction rates stand at 220m<sup>3</sup>/day.

Actual well yield in practice is dependent on the recharge of each individual well, and on site there are high performing wells such as LW1 and LW8, and wells that give a much lower yield such as LW5 and LW6. Each well has a flow meter to measure the flow per hour, with the exception of LW5 and LW6 which have such low flows that they share a flow meter, otherwise the flow is too low to register. The recharge rates can also be influenced by ingress of rainfall or surface water, capping and downtime of pumps.

As previously stated all leachate wells on the site have been drilled to 5m above base of site.

Measuring the length of leachate wells on site is difficult as the pump pods and air lines create substantial obstacles, for this reason plumbs are most reliably obtained when the pumps have been removed which is most likely to be conducted in line with a service regime.

Two additional extraction wells have been installed since the improvement condition was written. Leachate wells LW7 and LW8 were drilled in July 2012, and were connected up to the extraction system in October 2012. The current extraction infrastructure is considered to be sufficient. The basal area of the site is limited as is demonstrated in the Drawing included in the Appendix. The number of wells in the area above the base of the site already limits operational activities, and it is considered that any additional wells would be impractical. The value of the wells that have been installed is that they are within the footprint of the base of the site; any further infrastructure would be of limited value if not installed above the base of the site.

### **2.3 Maintenance and Replacement of Extraction Infrastructure**

Biffa Waste Services have agreed a preventative maintenance contract with a contractor, who adheres to a regime of removing, replacing and servicing the pumps in each well. They are targeted on achieving a set level of pump performance, and have an emergency call out response time to work within. Where pumps fail and are still required to manage leachate levels they will be replaced.

## **3.0 Treatment Infrastructure**

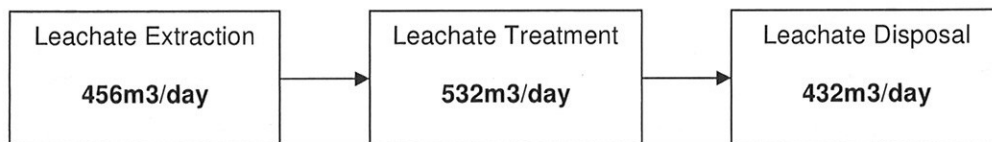
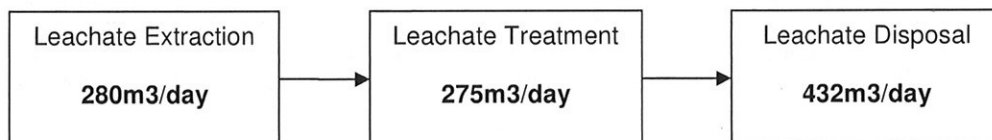
### **3.1 Capacity of treatment infrastructure**

Treatment of leachate at Trecatti is via two methods – SBR (Sequence Batch Reactor) and MBR (Membrane Batch Reactor), combined they are designed to treat 532m<sup>3</sup>/day of leachate at the strength of 1200mg/l of Ammoniacal Nitrogen. Current leachate concentrations of Ammoniacal Nitrogen are between 1200mg/l and 2500mg/l, however on average are 1800mg/l. In practice the ammonia loading means that the design capacity for Trecatti leachate is approximately 275m<sup>3</sup>/day (this was calculated using ammonia loading only, however other determinants within the leachate can also vary the capacity).

### **3.2 Capacity of Disposal Infrastructure**

The site has a sewer discharge consent, which permits disposal of 432m<sup>3</sup>/day of treated effluent to be discharged to the sewer network. Historic and recent discussions with Welsh Water regarding an increase in the disposal volume have proven unsuccessful. Current inputs indicate that the capacity of the disposal infrastructure is adequate to maintain leachate level compliance, as displayed below.



Theoretical CapacityActual Capacity**4.0 Contingency Measures**

The main contingency regarding removal of leachate from the site should the plant go down is tankering, and a commitment has previously been made to achieve 150m<sup>3</sup>/day of leachate removal, but the HRA gives 200m<sup>3</sup>/day.

The majority of the treatment plant system is automated, and sends out alarms should anything out of the ordinary occur. There is also an ability to view the system remotely, and make changes remotely should they be required. A maintenance contract is also in place for the software system in use at the plant, and includes call outs and response times.

There are a number of other contingencies in place:

Pump failure – the pump maintenance agreement provides for 48hour response times when an issue with the pumps or pipework is raised, and the contractors carry spare pumps to enable a straight swap to be made.

Plant failure – Site has a critical spares list, for items that have a long lead time, for these items spares are kept on site should a failure occur. Should the biology struggle in the plant environment we are able to transport sludge from one of our other treatment plants or buy in stock to regenerate the biology.

**4.1 Leachate Stabilisation**

Trecatti Landfill site will treat some strong leachate by stabilising the liquid and locking the contaminants in a concrete like mixture. This leachate is currently too strong for the primary treatment process of a SBR (Sequence Batch Reactor) and MBR (Membrane Batch Reactor) as detailed earlier in the management plan and will inhibit the treatment plants ability to treat the large percentage of standard strength leachate that is representative across the landfill, previously this liquid was tankered off site to the nearest treatment works for disposal and by adopting this new process we will be able to reduce the overall carbon footprint of Trecatti Landfill site.

This new technique of leachate stabilisation was successfully trialled and approved by National Resources Wales over a six month period. The trial proved there were no significant environmental effects as a result of the activity and scientific evidence confirmed the material produced did not release the leachate back out once dried, thus locking contaminants in the material preventing it leaching back out into the landfill.

It was therefore agreed that this would be used as a secondary leachate treatment process that compliments the primary method of treatment using the SBR & MBR methods.



The stabilisation process works by mixing leachate with material such as trommel fines; however other materials can be used. A binding agent is then added, such as Ordinary Portland Cement however substitutes can be used as long as they have similar characteristics and react in the same way without having any adverse effects on the process. These three materials are mixed together in pre-determined quantities using a mixing plant.

Once mixed, the material is then deposited into bays to cure for a set time. Once the material is dried to a state where it can be handled safely it will be loaded using heavy plant onto an articulated dump truck and transported for use as cover on the landfill site. Other methods to transport the material may be used depending on the physical state of the material. This material will then be applied to the exposed waste to form a cover material using a number of techniques such as a muck spreader, 360 degree excavator.

The applied cover material then sets forming a hard layer when left to dry, this aids in reducing surface emissions, scavenging pests, windblown litter and surface water penetration on the landfill site.

Depending on the consistency and blend of the mixes other applications may be used for this material such as construction of roads, pads, barriers and blocks however use of this material will be on lined areas only.

Although the site is currently using this process to treat the strong leachate from site, the process will be used as a backup process should the sites main treatment plant fail or be down for a period of time undergoing maintenance or repair, ensuring the continual treatment of leachate from the site.

The mixing process and plant operation has been designed to comply with all the sites environmental management plans (dust, noise, surface water and odour). Should any changes be made to the operation careful consideration will be made with regards to its effect on these plans. Reference is made in these plans to the leachate stabilisation process.

### **5.0 Leachate Level Compliance Limits**

When considering setting compliance limits the input parameters used for modelling the recent HRAR should be revisited. The 2013 HRAR submitted in January 2013, and approved by the National Resource Wales in letter received 27<sup>th</sup> February 2013, reference SE\EMRP3733PC\DG, used compliance limits for 5m in phase 1 and 33m in Phase 2A+.

It should be noted that the leachate levels currently used to monitor leachate level compliance and quality are retrodrills, and as a precaution to the liner system have been drilled to 5m from the base of the site. It is concluded for this reason that any compliance limit applied to the site should be above base of well. This is particularly pertinent when referring to the compliance limit for Phase 1, as the wells can never be compliant to 5m above base of the phase, when they are not drilled within 5m of the base of the phase.

It is proposed that the following compliance limits be inserted into table S3.1 of the permit:

**Table S3.1 Leachate Level Limits and Monitoring Requirements**

| <b>Monitoring point reference/<br/>Description</b>                       | <b>Limit</b>                                    | <b>Monitoring<br/>frequency</b> | <b>Monitoring method</b>                                                                                 |
|--------------------------------------------------------------------------|-------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------|
| 81703050 (LW5) and 81703060 (LW6) (Monitoring points located in Phase 1) | 5 metres<br>above the<br>base of Phase<br>1 (2) | Monthly                         | Unless otherwise agreed in writing with the National Resource Wales, monitoring methods used shall be in |

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|                                                                                                                                                           |                                                  |         |                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 81703010 (LW1), 81703020 (LW2),<br>81703030 (LW3) and 81703040<br>(LW4) 81703070 (LW7) and<br>81703080 (LW8)<br>(Monitoring points located in Phase<br>2) | 33 metres<br>above the<br>base of Phase<br>2 (2) | Monthly | accordance with National<br>Resource Wales document<br>„Guidance on monitoring of<br>landfill leachate,<br>groundwater and surface<br>water" (LFTGN02). |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

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## **6.0 Conclusion**

The current leachate infrastructure for extraction, treatment and disposal are sufficient to maintain compliant leachate levels. A further two leachate wells were installed in July 2012 and were connected to the extraction system several weeks later.

The HRA was approved by the National Resource Wales (now National Resource Wales) in February 2013, and it was based on leachate levels being managed during the operation phase of landfilling to 33m and 5m above the base of the well.