

Report: *WR7351/03*
Date: *September 2018*

**PEN-Y-BONT LANDFILL SITE,
PENTRE, CHIRK, WREXHAM,
LL14 5AR**

ENVIRONMENTAL PERMIT VARIATION APPLICATION

**Prepared for
FCC Waste Services (UK) Limited**



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**Project Quality Assurance
Information Sheet**

**ENVIRONMENTAL PERMIT VARIATION APPLICATION
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ENVIRONMENTAL PERMIT VARIATION APPLICATION

SUPPORTING STATEMENT

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1.0 INTRODUCTION

1.1 Scope

1.1.1 Sirius Environmental Limited (Sirius) has been appointed by FCC Waste Services (UK) Limited to assist with the preparation of an Environmental Permit Variation Application (EPVA) for Pen-y-bont Landfill Site, situated near Chirk, Wrexham. This Supporting Statement provides a summary as to the Permit Variation Application required as a result of the aforementioned request. Supporting drawings and appendices are included towards the rear of this documentation. Principally, this application seeks 'Definite Closure' of the site following the cessation of waste inputs and capping of the site from late 2016.

1.2 Background

1.2.1 Pen-y-bont Landfill Site is located at Pentre, Chirk, Wrexham LL14 5AR at approximate National Grid Reference 329254, 341680.

1.2.2 Planning permission was granted by Wrexham County Borough Council for the landfilling of Controlled Wastes at Pen-y-bont Landfill in 1993. A Waste Management Licence (EAWML/37123) was subsequently granted to Shanks & McEwan (Northern) Limited on 4th of December 1994. This licence was subsequently transferred to Shanks & McEwan (Midlands) Limited on 8th September 1997. Landfilling operations commenced at the site on 16th November 1997.

1.2.3 An application for a Pollution Prevention Control (PPC) Permit was made in October 2004 and was subsequently issued in November 2005. As a result, the Waste Management Licence was re-referenced and updated to PPC Permit Number GP3830BG. At this time, the WML was transferred to the Waste Recycling Group (now FCC Waste Services UK Limited) who took over the management of the site in 2004.

1.2.4 The PPC Permit (Permit Number GP3830BG), dated 9th November 2005 authorised the receipt, handling and disposal of 270,000 tonnes per annum of non-hazardous wastes and up to 30,000 tonnes per annum of inert wastes for deposit into the landfill void.

1.2.5 An Environment Agency (now Natural Resources Wales) led variation to the permit was issued in June 2007. The result of this variation was to update the Environmental Permit in line with the (then) new PPC template permit for landfill. There were no substantial changes to the Installation as a result of this variation.

1.2.6 There have been several variations to the Environmental Permit since 2007, which have predominantly been associated with variations to specified conditions, the implementation of the Industrial Emissions Directive (IED), as well as an administrative variation in December 2012 to account for a change in operator name from WRG to FCC Waste Services (UK) Limited. The latest variation to the Environmental Permit (EPR/GP3830BG/V007) was issued in November 2014 and related to a change in requirements for emissions monitoring, for both leachate and landfill gas.

1.2.7 The site comprises three fully engineered cells (Cell 1, Cell 2 and Cell 3) as shown on **Drawing Reference Number WR7351/5/02**. Each individual cell is hydraulically contained.

1.2.8 A Closure Plan for Pen-y-bont Landfill Site has recently been submitted to Natural Resources Wales (NRW); in March 2018, which identified the area of the site for which the closure application relates to, considered the stability of the waste mass, confirmed that the infrastructure and procedures are in place for management and monitoring (of landfill gas, leachate, groundwater, surface water and stability/settlement) during the aftercare phase (including maintenance and inspection of infrastructure) and detailed the procedures that are in place for reporting any significant environmental effects. All phases of the landfill are considered stable with appropriate leachate, groundwater, surface water and landfill gas monitoring and management infrastructure in place to enable ongoing, effective management during the aftercare phase.

1.3 Proposed Variation Application

- 1.3.1 As stipulated above, the existing Environmental Permit for the site (EPR/GP3830BG) allows for the operation of a landfill accepting both non-hazardous and inert waste streams. The Environmental Permit stipulates conditions and schedules relating to a landfill that is in operation, including site management techniques, permitted operations, site engineering, waste acceptance procedures, emissions and monitoring etc. Waste acceptance ceased at the site in October 2016 and therefore the site has now entered definitive closure. Given this, it is considered appropriate to vary the Environmental Permit to reflect the fact that the landfill is no longer operational and the subsequent reduction in risk to the environment due to the termination of operations.
- 1.3.2 This Environmental Permit Variation Application (EPVA) will allow NRW to remove any unnecessary conditions from the Permit (i.e. those in relation to waste acceptance, incorporate the aftercare plan, assign (as discussed in **Section 3.0**) appropriate Emission Limit Values for use going forward, amend the monitoring frequency requirements and undertake a final site inspection.
- 1.3.3 In light of the recent submission of a Closure Plan for Pen-y-bont Landfill to the local area officer for the site (Stuart Ross), NRW have completed an overview of the Closure Plan and subsequently informed the operator that, in principle, they approve the proposed management of the site during the aftercare phase. The authorised approval of the Closure Plan, as well as final site inspection will be conducted as part of the determination of this application. Acknowledging this, the Environmental Permit Variation Application (EPVA) details the resultant required modifications to the Environmental Permit, to allow for effective management and control during the aftercare phase, which were discussed and proposed as part of the previously mentioned Closure Plan. The Closure Plan for the site is included within **Appendix 1** to this document.
- 1.3.4 Article 13 of the Landfill Directive sets out the requirements and procedures for the closure and aftercare phases of a landfill. This includes (within Annex III) proposals for control and monitoring requirements during the aftercare phase, which are significantly reduced from that required during the operating phase of the landfill. The proposed monitoring frequencies for leachate, landfill gas, groundwater and surface water during the aftercare phase (which were detailed in the previously mentioned Closure Plan) have been devised with cognisance to both the Landfill Directive and site-based risk assessments. The amount and design of monitoring required at the site has been based on an assessment of the risk the site poses to the local environment. In all cases, monitoring frequency requirements have been reduced from those stipulated within the current Environmental Permit, however, (based on perceived risk) they have not always been reduced to the minimum allowable by Article 13 of the Landfill Directive.
- 1.3.5 It has also been considered appropriate to reduce the number of boreholes which are monitored for leachate and groundwater at the site, which has been formulated with cognisance to the Environment Agency's Technical Guidance Note (LFTGN) 02 (which is utilised by NRW) - "*Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water*".
- 1.3.6 Where appropriate, the analytical suites for leachate and surface water have also been reduced. Several trigger levels/compliance limits have also been revised/removed as part of this Variation, which are detailed in **Section 3.0**.
- 1.3.7 It is considered that the operator has taken a conservative approach to the reduction in monitoring frequency and monitoring suites, which will minimise any risk to the surrounding area from the previous landfilling operations. The details of the relevant risk assessments and corresponding reduction in monitoring requirements (both frequency, analytical suite and in some case number of boreholes monitored) is detailed in **Sections 3.0** and **4.0** of this Supporting Statement.
- 1.3.8 In addition to the above, it is considered appropriate to vary the Environmental Permit conditions to reflect the completion of both infilling and capping operations, which therefore necessitates the revision of the EWC code list to include only EWC codes for

inert waste that is used from restoration purposes and allows for a reduction in site attendance time of Technically Competent Management at the site.

- 1.3.9 The operator has also recently updated the restoration proposals, in relation to the retainment of several surface water ponds to the north east of the site and the reduction in final contours of the site. These elements, as well as the corresponding revised stability of the final landform are discussed and assessed in **Sections 3.0** and **4.0** of this Supporting Statement.
- 1.3.10 Following on from extensive pre-application discussions with the client and the regulator (Natural Resources Wales), a clear picture was formulated regarding the most appropriate approach to the required variation.
- 1.3.11 Applications that seek Definite Closure of a landfill facility typically incur a 'Normal' Variation charge. A Normal Variation Application fee would usually be calculated via the use of the variation multiplier and the current OPRA score for the site. This attracts an application fee of the 110 x £57 which equates to £6,270.
- 1.3.12 A summary of the elements of the existing permit to be varied are given below;
- Modification of monitoring frequencies relating to leachate, landfill gas, groundwater and surface water
 - Modification of monitoring suite relating to leachate and surface water
 - Amendment of leachate head compliance limits
 - Reduction in the number of leachate monitoring boreholes to be sampled
 - Removal of action limits associated with gas monitoring borehole T11
 - Reduction in the number of groundwater boreholes which are monitored around the perimeter of the site
 - Amendment to groundwater compliance limits (in line with the recent HRAR)
 - Clarification of monitoring frequencies for surface water discharge points WP4 and WP5
 - Modification to site restoration plans, with reference to surface water management and reduction in final level contours
 - Reduction in attendance time requirements for Technically Competent Management at the site
 - Removal of unnecessary conditions from the Environmental Permit e.g. those in relation to waste acceptance, reference to EWC codes etc
- 1.3.13 This application consists of the following documents;
- Application Forms and Fee;
 - Non-Technical Summary;
 - Supporting Statement;
 - Appendices
 - Drawings

2.0 SITE DESCRIPTION

2.1 Site Setting

- 2.1.1 Pen-y-bont Landfill Site is located c. 500m North of the village of Pentre, c. 525m to the east of the village of Newbridge and c. 8.8km to the south west of the town of Wrexham at National Grid Reference 329254, 341680. The landfill is located within a former mineral (clay) extraction quarry, which was historically excavated into reddish brown mudstone/marl strata (Ruabon Marl) of the Upper Carboniferous Coal Measures. The landfill extends over an area of approximately 18ha and is situated within a meander of the River Dee, which generally flows west to east in the locality of the site
- 2.1.2 Pen-y-bont Landfill comprises 3 landfill cells, which are situated in a roughly west to east alignment. The boundary to which the Environmental Permit for the site applies as well as the corresponding landfill cell boundaries are presented on **Drawing Reference Number WR7351/5/02**.
- 2.1.3 The landfill is located within a relatively rural setting, interspersed with small villages situated in all directions. It is bounded to the east and south by agricultural land, while to the west is a narrow band of woodland area which lies adjacent to the B5605 road. Several residential dwellings (situated near the landfill entrance), as well as woodland, a field and Pen-y-bont Farm are also located along this boundary and to the north/north west. As previously mentioned, the site is situated within a meander of the River Dee and is therefore encompassed by the River Dee to the North, East and West, at a minimum distance of c. 40m from the Environmental Permit boundary.
- 2.1.4 As indicated above, the nearest residential receptors (a series of houses, including Pen-y-bont Cottage) are situated adjacent to the site's entrance alongside the site boundary to the south west. To the north west, between c. 95m and 120m from the site boundary lies Pen-y-bont Farm, Waterside Barn and Hayside.
- 2.1.5 In terms of statutory designations, the River Dee and Bala Lakes Special Area of Conservation (SAC) and the River Dee Site of Special Scientific Interest (SSSI) is situated at its closest point c. 40m to the North of the site. The River Dee is notified for its nationally important transition through a range of river types from mesotrophic to eutrophic. It is also notified for Atlantic salmon, otter, club-tailed dragonfly and fluvial geomorphology. In addition to this, the Nant-y Belan and Prynella Woods SSSI is situated c. 600m to the south/south east of the site. The area is of special interest botanically, representing a significant area of largely semi-natural woodland, which has not been affected by large scale replanting by conifers and non-native hardwoods.
- 2.1.6 The River Dee is the main surface water feature present near the site which passes within a minimum distance of 40m of the northern permit boundary as well as within close proximity of the western and southern site boundaries. There are also a number of small tributaries of the River Dee situated within the large woodland area beyond the northern banks of the river to the north of the site as well as to the east. A larger tributary, the Afon Eitha is situated to c. 700m to the east of the site.
- 2.1.7 There are no Public Rights of Way (PRoW) within the immediate vicinity of the site.
- 2.1.8 The site itself is not located within a Flood Zone where the risk of flooding is less than 0.1%. Notwithstanding this, the banks of the River Dee are attributed with a high risk of flooding, with an area of "low risk" of flooding situated to the North East of the site, beyond the site boundary.
- 2.1.9 The site is not located within a Nitrate Vulnerable Zone (NVZ) for either surface water or groundwater.
- 2.1.10 The boundary of the landfill site is securely fenced with a 2.0m and 1.2m wire and barbed wire stock-proof fence. There are also 2.0m high steel gates at the entrance to the site.
- 2.1.11 The superficial geology at Pen-y-bont landfill comprises deposits of alluvium (with sands and gravels) or made ground due to the various historical industrial activities which have

taken place in the area. The made ground varies in thickness between 1m to 5m but is known to be as great as 15m in places on the floodplain to the East. It is known that colliery waste was tipped towards the south and east of the site between 1977 and 1988 which may have contributed to the presence of the made ground. The alluvial deposits are generally between 2m and 10m thick with some localised glacial till.

- 2.1.12 The underlying bedrock geology at the site comprises mudstones of the Etruria Formation (also known as Ruabon Marl) which is between 2m and 50m thick. It is a sedimentary bedrock which formed approximately 308 to 319 million years ago in the Carboniferous Period, where the local environment was previously dominated by rivers.
- 2.1.13 According to the Groundwater Vulnerability Map for the area, (Sheet 16 1:100,000 Scale 'West Cheshire'), the installation is located on strata classified by the Natural Resources Wales (NRW) as a Secondary A aquifer of variable permeability. The classification of 'Secondary A aquifer' refers to the whole of the Upper (and Middle) Carboniferous Group from which large abstractions of water can be locally abstracted from sandstone horizons, but yields can be variable both spatially and temporally. At the site, Ruabon Marl (mudstone) predominate within which permeability would be low and intergranular/fracture flow would be expected to be modest. Accordingly, the Ruabon Marl strata themselves could be classified as unproductive strata.
- 2.1.14 Pen-y-bont Landfill is not situated within a Groundwater Source Protection Zone.
- 2.1.15 The site will be restored to a mixture of woodland, hedges, pasture areas and grassland, with the hardstanding, office and industrial units located to the southwest of the site being retained. The restoration details for the facility are further discussed in **Section 3.0**.

2.2 Site Infrastructure Summary

2.3 Leachate Management Infrastructure

- 2.3.1 The management of leachate at the site is facilitated by engineered capping of the site surface, lining systems and active extraction from in-waste leachate extraction wells.
- 2.3.2 The leachate collection and extraction system in Cell 1 consists of a herringbone drainage pattern of leachate collection pipes falling at a gradient of no less than 1:50 to individual vertically extended leachate collection sumps/extraction chambers.
- 2.3.3 Within Cell 2, leachate collection/drainage system comprises a continuous 300mm blanket of 20mm clean-graded non-calcareous drainage stone within which are lain 160mm diameter drainage pipes falling at a gradient of no less than 1:50 to vertically extended individual leachate collection sumps/extraction chambers.
- 2.3.4 Within Cell 3, the leachate collection system comprises a 300mm thick continuous drainage blanket constructed out of 20mm clean-graded non-calcareous drainage stone within which 160mm diameter leachate collection pipes have been lain falling at a gradient of 1:50 to 2 individual sidewall riser leachate extraction points. These structures are made of 450mm non-perforated HDPE pipe, rising at an angle of 26 degrees from the cell base, again against the cell side wall. The risers are protected by surrounding leachate drainage stone lain up to a height to 1500mm above the cell base and are for leachate abstraction only.
- 2.3.5 The site is provided with leachate pumping, storage and disposal infrastructure. Leachate is removed from the cells by pumping, utilising electric submersible pumps installed within the leachate collection/extraction wells, side slope risers and if necessary, the leachate monitoring points. This is then discharged to the 2 tanks (with a capacity of 80m³ each), situated near the gas compound, prior to transfer to 2 additional tanks (150m³ capacity) situated at the site entrance. The leachate storage capacity is sufficiently sized to maximise the continual removal of leachate from the site. Please note, at the current time there are no plans to change the location or the capacity of the leachate storage tanks at the site. However, if receipt of planning permission pertaining to the future development of the site necessitates an alteration in capacity and location of said tanks, this will be fully discussed with NRW and relevant CQA

details will be provided as appropriate. All leachate is then tankered offsite for disposal at a suitably licenced treatment facility. The Leachate Management Plan for the site is included within **Appendix 1**.

Basal Lining and Capping Systems

2.3.6 The landfill has been operated as a fully engineered containment site since its initial development. Each landfill cell is comprised of individual hydraulically isolated containment cells utilising a 1m thick engineered basal clay liner possessing a specified permeability of $< 5.5 \times 10^{-10}$ m/s. The engineered clay liner has been constructed out of reworked Ruabon Marl which was previously excavated from the quarry. There is also a 2mm HDPE artificial sealing liner installed within Cell 3.

2.3.7 The capping has been completed at the site on a phased basis, utilising (working from waste side up) a 0.3m thick waste regulation layer, lower protector geotextile (if required), a geomembrane liner of minimum 1mm thickness, a geocomposite drainage layer and 1000mm of restoration soils.

2.4 Landfill Gas Infrastructure

2.4.1 Gas management and control is achieved by:

- The operation of an internal gas monitoring system
- The operation of an external gas monitoring system
- A permanent active gas extraction system and;
- The low permeability lining system installed across the base, perimeter side-slopes and final capping of the site surface.

2.4.2 The landfill gas extraction system comprises a combination of horizontal, vertically extended and retro-drilled wells. All types of extraction well are connected to a gas extraction gas main. Optimal well spacing has been defined through site-based knowledge and in line with NRW/EA guidance, Industry Codes of Practice and operational experience.

2.4.3 The site ring main is located along the boundary of the site connecting to a gas compound. In addition to this, condensate management within the gas system comprises a series of pumped knock-out pots.

2.4.4 The active gas extraction system also incorporates a Gas Utilisation Plant. The Landfill Gas Utilisation Plant comprises two Caterpillar engines, each capable of generating 1,150kW. In addition to this, there is also a 2,500m³ capacity high temperature flare situated on site, capable of sufficient gas control in the event of gas engines being unavailable. The system was initially installed and commissioned in 2003. The gas utilisation plant will be kept under review during the closure phase to ensure that it remains appropriate for the volume of gas being produced.

2.4.5 The lateral migration of landfill gas is routinely monitored for in 30 perimeter gas boreholes installed at the locations illustrated on **Drawing Reference Number WR7350/5/03**. The Gas Management Plan for Pen-y-bont Landfill Site is contained within **Appendix 1**.

2.5 Groundwater

2.5.1 There is a total of 27 groundwater boreholes (some of which are combined groundwater and gas monitoring boreholes) situated around the periphery of the permit boundary. Please note, it is now proposed to reduce the number of groundwater monitoring boreholes from 27 to 13, as discussed in **Section 4.3**. Given the sites locality, within a meander of the River Dee, it can be considered that groundwater flow is towards the River in a north, east and west direction.

2.5.2 The site is considered to be in hydraulic containment, with groundwater flow in the immediate proximity to the landfill flowing towards the site. It is also assumed that a groundwater divide encircles the site, beyond which groundwater flow is away from the site towards the River Dee as stated above.

2.5.3 There is no pumped groundwater management system. However, groundwater flows into the installation are minimised by the presence of a 1m thick mineral basal and side slope liner constructed to a permeability of $<5.5 \times 10^{-10}$ m/s in addition to a composite 2mm HDPE membrane liner across the basal and side slope area in Cell 3 (and side slope area in Cell 2 and most of Cell 1).

2.6 Surface Water Infrastructure

2.6.1 Surface water runoff from the closed landfill will discharge via perimeter surface drains and be directed towards the north east of the site. To the northeast of the landfill is the surface water treatment area in the form of three settling lagoons. Each settling lagoon is unlined and is connected by a 1m wide channel. Each settling lagoon is surrounded by a 0.5m high bund which is suitable for ensuring the necessary water retention. The connecting pipes are fitted with valves which allow lagoons to be isolated in emergency situations. Surface water from the landfill site is directed to the first settling lagoon within which suspended solids are settled out before being directed to the second settling lagoon for further settling of suspended solids. Final suspended solid settlement is achieved within a third lagoon.

2.6.2 The outlet system for the site (from the settling lagoons) discharges to 3 filtration/infiltration basins (comprising reed beds), situated to the north of the surface water lagoons. The discharge is fed via overland pipework and can be controlled by the use of an isolation gate valve. Surface water from the settling lagoon (when discharged) naturally infiltrate and soak away through the reed bed plots into natural soils and drift strata to enter the local groundwater systems. An appropriate discharge consent (ref CGG0385601) is held for this activity. The final basin is fitted with 200mm overflow to provide a method of controlled discharge to the River Dee in the event of an emergency, in which the surface water volume exceeds the capacity of the basins. This discharge is also permitted via an appropriate consent (CM0094101).

3.0 RISK ASSESSMENT REVIEWS

3.1 Introduction

3.1.1 As part of the Application to Vary the Environmental Permit the following Risk Assessments were reviewed, and revised where appropriate, to determine whether any of the proposed changes would have an unacceptable impact on the environment:

- Leachate Management Risk Assessment
- Gas Risk Assessment
- Hydrogeological Risk Assessment
- Hydrological Risk Assessment
- Stability Risk Assessment

3.2 Leachate Management

3.2.1 Leachate management was first discussed within the Environmental Setting and Installation Design Report submitted in support of the original PPC Permit application in 2004. This report was completed by Encia Consulting and presented the key leachate collection/management systems within the cells at the Pen-y-bont Landfill Site.

3.2.2 Leachate management is reviewed annually as specified in the PPC permit, number GP3830BG and was most recently reviewed in both the Annual Monitoring report submitted in April 2017 and the second Hydrogeological Risk Assessment review; completed and approved by NRW in February 2016 (v3).

3.2.3 Within both reviews it is stated that current leachate quality remains largely as modelled and that the leachate extraction systems are effectively maintaining leachate head levels below compliance limits. Additionally, the leachate generation potential of the landfill will decrease due to the cessation of tipping operations and final capping in 2016.

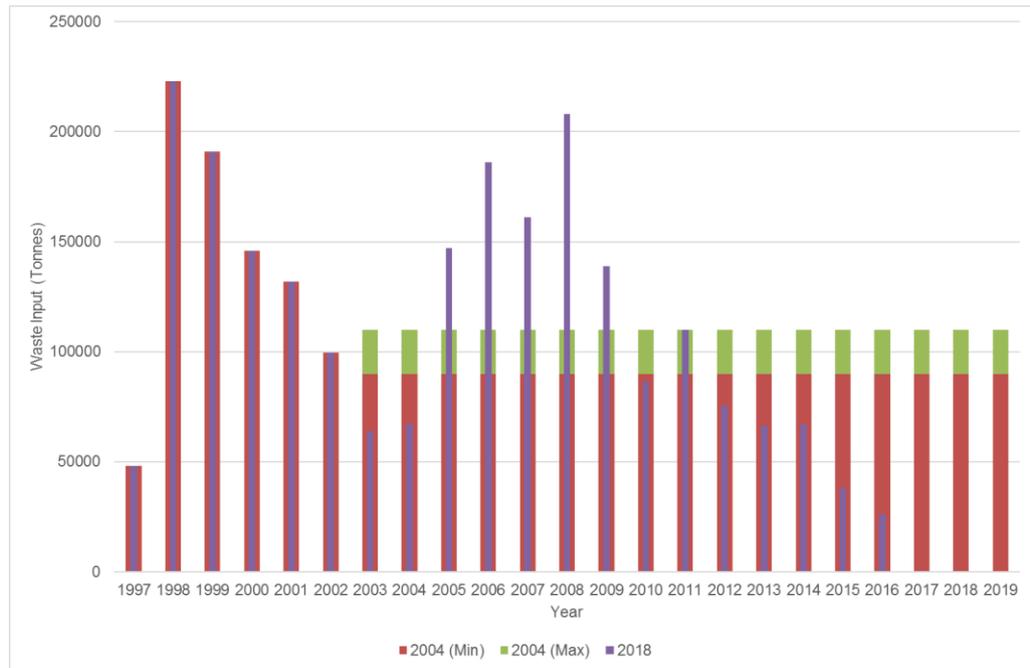
3.2.4 It is therefore proposed that since the most recent environmental monitoring report was submitted in 2017 and that the Hydrogeological Risk Assessment review was completed c. 2 years ago, it is not considered necessary to complete another full review.

3.3 Landfill Gas Risk Assessment

3.3.1 The Gas Risk Assessment submitted in support of the original PPC Permit Application completed by Encia Consulting in 2004 is included in **Appendix 4**. As with leachate management landfill gas is subject to an annual review and submitted to NRW. The latest annual environmental report; submitted in April 2017.

3.3.2 Accounting for the recent review it is proposed that as part of this variation application a qualitative Tier 1 assessment of landfill gas generation was undertaken. This qualitative assessment comprised of re-running the GasSim2 models presented in the 2004 Gas Risk Assessment after updating the waste inputs and source fractions using waste returns and weighbridge data from 2003 and 2016. A comparison of waste input rates included in the 2004 PPC application models to actual input rates is presented in **Figure 1**. This comparison demonstrates that waste inputs during for 2003 and 2004 were approximately 60 and 75% of the modelled range. Between 2005 and 2009 the rates of input to the site were greater than originally modelled in the 2004 PPC application, peaking at approximately twice the original maximum modelled input rate in 2008. From 2010 to 2016 input rates were largely less than the rate originally models.

Figure 1 - Comparison of waste input figures from 2004 PPC application GasSim model and actual input records



- 3.3.3 The 2004 PPC application models were also based on user defined waste compositional data, with input fraction apportioned between domestic, commercial, inert, sewage sludge, composted organic materials and incinerator ash wastes streams only. Waste input source fractions have been analysed to also consider industrial sources for the period 2003-2016, with compositional details based on GasSim Default values derived for Wales, on the understanding from the data analysed that the majority of wastes deposited at the site were derived from the Welsh counties (principally Wrexham CBC), with only a smaller fraction derived from adjoining English counties such as Shropshire and Merseyside. Nonetheless, to determine the significance of these changes sensitively analysis has been carried using the original waste compositional data¹ and the GasSim default values for wastes streams derived from England. Copies of the model files are included in **Appendix 5**.
- 3.3.4 The 2004 PPC application model predicted landfill gas generation to peak at ~2,230 m³/hr in 2020, although a re-run of this model using GasSim 2.5 released in 2011 predicts peak generation of ~2,210 m³/hr in 2020 (**Figure 2**). The inclusion of actual input rates into the 2004 model returns a peak generation rate of ~2,450 m³/hr in 2009, reducing to ~1,830 m³/hr by 2016 (**Figure 3**). When the waste compositions are revised to the GasSim default values for waste streams for England and Wales the peak generation is reduced to ~1,830 m³/hr (**Figure 4**) and ~1,800 m³/hr (**Figure 5**) respectively, with each peak generation predicted to have occurred in 2010. By 2016 the predicted gas generation for these models was predicted to have reduced to ~1,070 m³/hr and ~1,120 m³/hr respectively.
- 3.3.5 It was reported in the Annual Monitoring Report for 2016 that average gas flow to the utilisation plant was 972 m³/hr, which increased to an average of 1,063 m³/hr following completion of the capping for the entire site in November 2016, with no laterally migrating gases being detected. Based on the 2016 post-capping completion flow rate the 2004 models suggest a collection efficiency of 60%. In contrast, the efficiency of the collection system equates to ~95% when considered against the results of the models derived using the GasSim default waste compositional values. This suggests that the revised models present a more representative assessment of gas generation at the site, whereby the original 2004 PPC risk assessment can be considered to present a conservative assessment of the risks posed by the site.

¹ No composition details were presented in the 2004 PPC application models. Consequently, all industrial sources figures have been modelled as commercially wastes streams, as it is understood to be the case in the 2004 models.

Figure 2 - Predicted Landfill gas generation: 2004 PPC application model rerun with GasSim 2.5

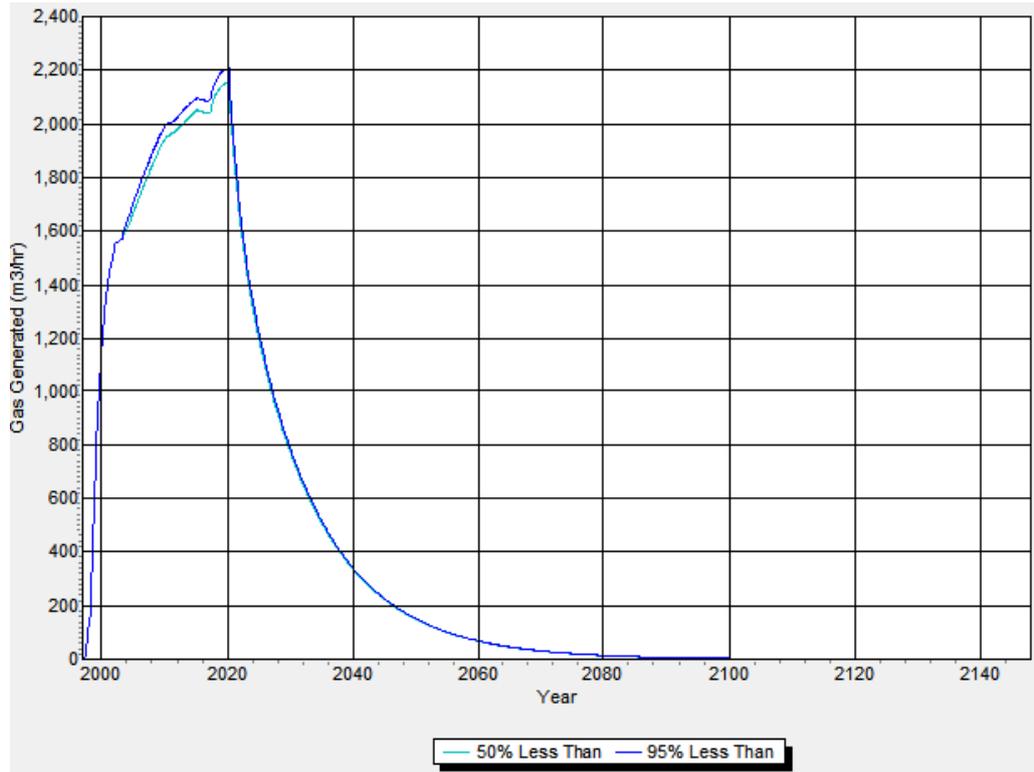


Figure 3 - Predicted Landfill gas generation: actual waste input with 2004 waste stream composition

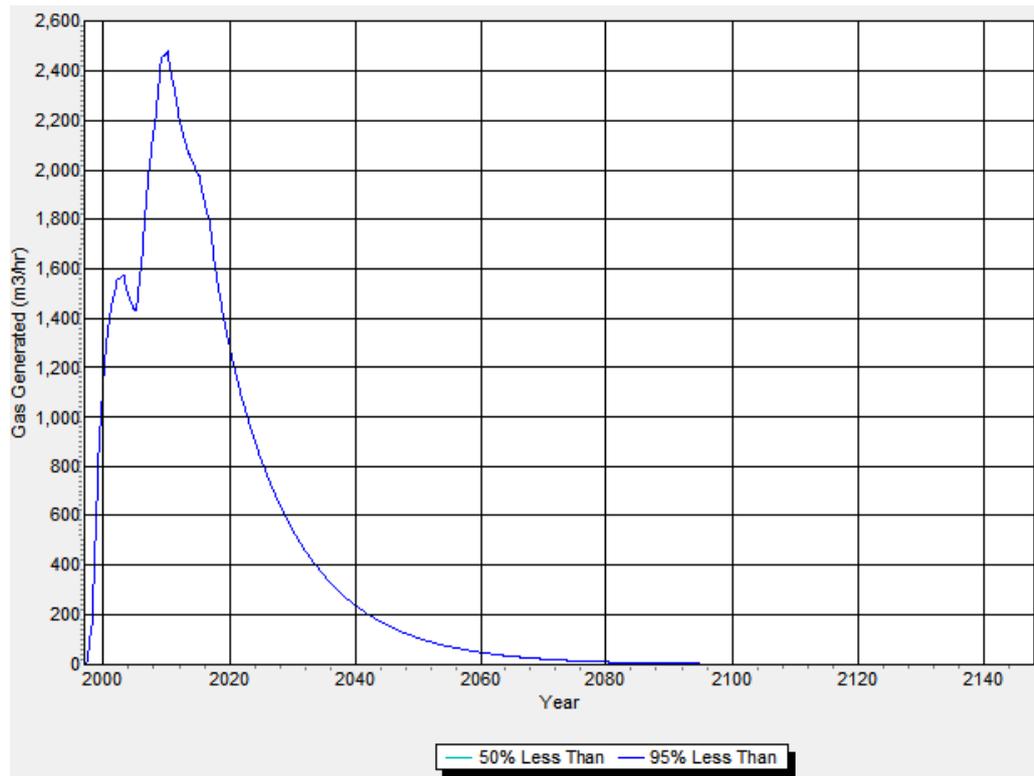


Figure 4 - Predicted Landfill gas generation: actual waste input with waste stream compositional data for England

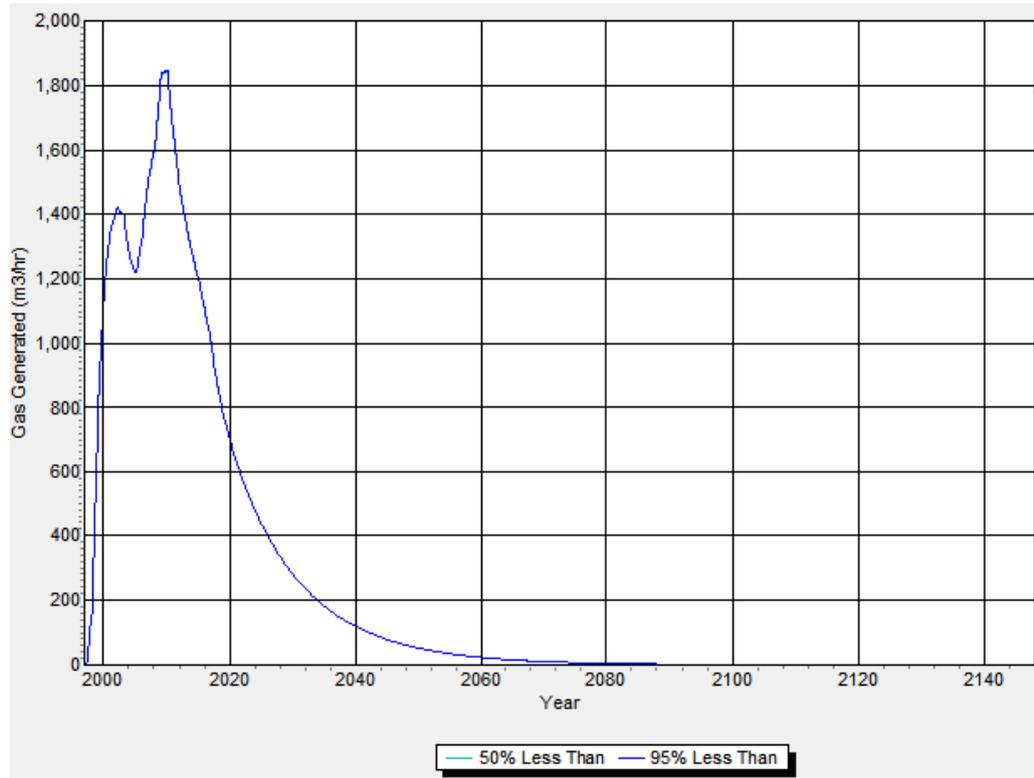
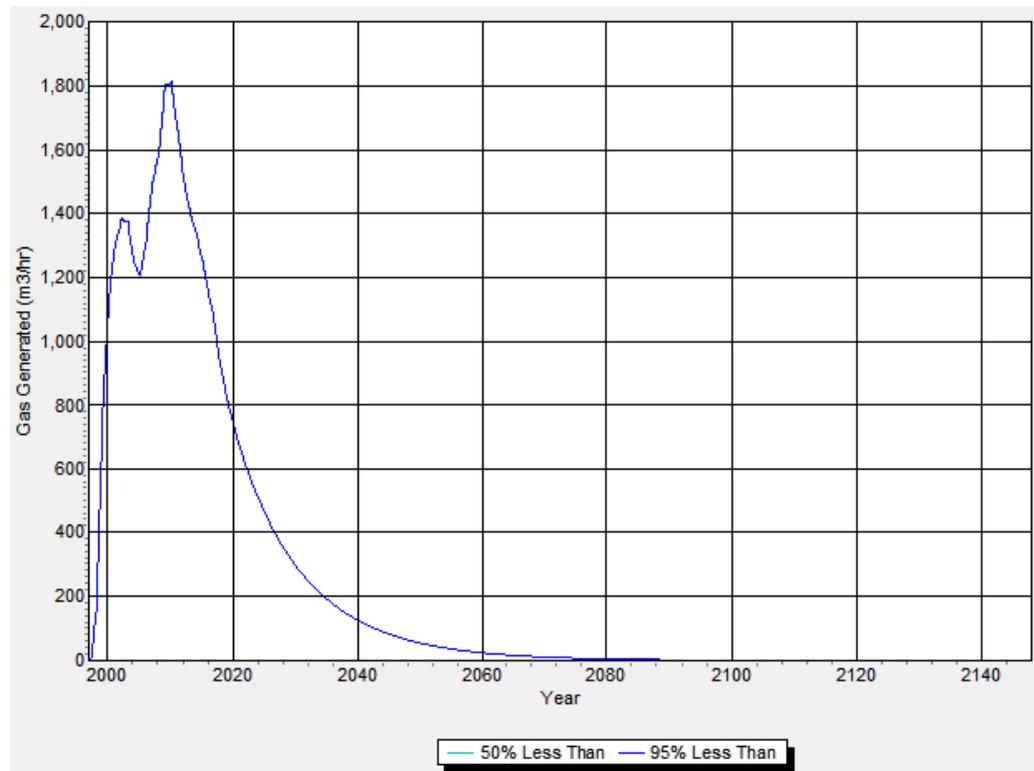


Figure 5 - Predicted Landfill gas generation: actual waste input with waste stream compositional data for Wales



3.3.6

The gas management system at Pen-y-Bont Landfill site currently consists of a utilisation capacity of 1,400 m³/hr with a total flare capacity of between 300 and 2,500 m³/hr. Replacement of the flare will need to be considered when gas flow falls below 300 m³/hr, which is predicted in the updated model to occur between 2025-2030.

3.4 Hydrogeological Risk Assessment

3.4.1 The Hydrogeological Risk Assessment submitted in support of the original PPC Permit application was prepared by Encia Consulting in 2004. The PPC permit, number GP3830BG, was issued on 9th November 2005. The Permit contains a requirement for periodic review of the Hydrogeological Risk Assessment, with the first review completed by Golders Associates in March 2009. The second review was completed and approved by NRW in February 2016 (v3) and is included within **Appendix 3** of this Permit Variation Application. Given that this review was completed c. 2 years ago, it is not considered necessary to complete another full review. The Environmental Permit Variation has detailed relevant changes to monitoring requirements and trigger levels which has been risk assessed and approved as part of the aforementioned HRAR (**Appendix 3**).

3.5 Hydrological Risk Assessment

3.5.1 The Hydrological Risk Assessment was first discussed in the Hydrogeological Risk Assessment submitted in support of the original PPC Permit application in 2004. Similarly, hydrological risk is reviewed and presented annually in Environmental Monitoring Reports as specified in the PPC Permit, number GP3830BG and within the Hydrogeological Risk Assessment review submitted in 2016. Within both reviews it was stated that there is no significant change in surface water quality of the River Dee as it passes the site.

3.5.2 Additionally, given that the most recent environmental monitoring report was submitted in 2017 and that the Hydrogeological Risk Assessment review was completed c. 2 years ago it is not considered necessary to complete another full review.

3.6 Stability Risk Assessment

3.6.1 The Stability Risk Assessment Review (SRAR) undertaken in 2004 has addressed stability and integrity issues arising from the reduction in proposed final contour levels at Pen-y-bont Landfill Site.

3.6.2 Additionally, in light of suggestions made by NRW following a site visit on 16th February 2018 **Drawing Reference Number WR7351/5/05** and a summary report detailing the depth and additional loading of landfill cap top soils respectively are included within this Permit Variation Application in **Appendix 6**. The inclusion of this information is to demonstrate that soil depths present above the landfill cap are within the maximum permitted soils depths agreed with NRW in 2013.

4.0 VARIATION REQUIREMENTS

4.1 Introduction

4.1.1 Given that the landfill site at Pen-y-bont is entering the Definitive Closure phase, it is appropriate to vary the Environmental Permit to reflect the reduction in risks and operational practice at the site. The proposed elements of the Environmental Permit to be varied are described in the following sections.

4.2 Leachate Management

4.2.1 During the aftercare phase of the landfill, Table S4.1 (Leachate Level Limits and Monitoring Requirements) and Table S4.8 (Leachate – Other Requirements) in Environmental Permit EPR/GB3830BG/V007 will be updated and replaced with that stipulated in **Tables 1** and **2** below. Acknowledging this, the EPVA is seeking a reduction in the leachate sampling frequency, the analytical sampling suite, the number of monitoring points assessed and an amendment to leachate head compliance levels.

Leachate Sampling Frequency and Leachate Quality

4.2.2 Table 6.9 of the Environment Agency's Technical Guidance Note 02 (which is utilised by NRW) – "*Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water*" recommends that once initial characterisation of leachate quality is complete, the frequency of monitoring can be reduced for routine indicators, with annual monitoring allowing for ongoing characterisation. Given that, the leachate composition is well established at Pen-y-bont and the final engineered cap has been installed, it is appropriate to reduce the sampling frequency (to 6 monthly, from quarterly) and to reduce the number of parameters to a more basic suite of 'indicator' substances as detailed in **Table 1**. The annual analytical suite remains in line with those detailed in Table S4.8 of Environmental Permit EPR/GB3830BG/V007. This approach has been previously outlined in correspondence between the operator and Natural Resources Wales (NRW), a copy of which is contained within **Appendix 2**.

Number of Leachate Monitoring Points

4.2.3 Table 6.2 of the Environment Agency's Technical Guidance Note 02 (which is utilised by NRW) – "*Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water*" recommends that in terms of the number of monitoring points, one appropriate quality point per 5ha cell is appropriate. Given this, in terms of the leachate quality, the reduction in monitoring points (in terms of assessing for leachate quality) in **Table 1** complies with the guidance, in that at least one installation will be monitored per cell. All leachate monitoring points will be checked for leachate level at the appropriate frequency.

4.2.4 With the above in mind, it is considered appropriate to replace Table S4.8 in Environmental Permit EPR/GB3830BG/V007 with **Table 1** below.

Table 1 – Aftercare phase leachate monitoring schedule

Monitoring Point	Parameter	Frequency
LC03, LC01D, LC04B, LC05B, LM04B, LM05B, LM06B & LM07B	Leachate Level	Monthly
LC01D, LC04B, LC05B, LM07B	pH, EC, Ammoniacal Nitrogen, Chloride, COD and BOD.	6-monthly
LC01D, LC04B, LC05B, LM07B	pH, Electrical Conductivity, Ammoniacal Nitrogen, Temperature, Chloride, Sulphate, BOD, Total Alkalinity (CaCO ₃) (tot alk), Total Phenols, COD, TOC, TON, Sodium, Potassium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Cadmium, Mecoprop, Naphthalene, Nickel, Zinc, Mercury, Total Cyanide, Hazardous Substances (List I) screen	Annual

Leachate Head Compliance Limits

- 4.2.5 Details of the leachate head compliance levels are presented in **Table 2**. Table S4.1 of Environmental Permit EPR/GB3830BG/V007 sets the leachate level at 1m above the base of the cell. Leachate level compliance was maintained at 100% compliance within the specified trigger limit of 1m above the cell base in 2016, according to the annual report. However, in line with the Natural Resources Wales approved HRAR (dated February 2016, v3, contained within **Appendix 3**), it is now considered appropriate to vary the leachate head compliance limit at the site to allow for additional operational flexibility going forward.
- 4.2.6 Pen-y-bont Landfill is operated under the principal of hydraulic containment and therefore leachate levels are maintained below surrounding groundwater levels. Based on modelling conducted as part of the 2009 and 2016 HRAR (contained in **Appendix 3**), going forward a compliance limit of 43mAOD is to be adopted (which is considered to represent a conservative approach). This represents a c.3m head difference between leachate level and groundwater level (assuming minimum groundwater level of 46mAOD). Given that the site has ceased operation (waste acceptance ceased on 28th October 2016), and capping of the site was completed on 16th November 2016 (which provides further precaution should leachate control be lost for a short period of time), it is considered that the variation to the leachate head is now appropriate. This has been discussed and approved via previous correspondence between the operator and the regulator (contained within **Appendix 2**).
- 4.2.7 In addition to the above, the operator is proposing the removal of compliance limit for LC03 (in line with the HRAR dated February 2016, V3 contained within **Appendix 3**) as it is located on a bench level with a basal elevation of 64mAOD close to the sidewall and as such does not monitor leachate levels acting on the base of the site.
- 4.2.8 With the above in mind, it is considered appropriate to replace Table S4.1 in Environmental Permit EPR/GB3830BG/V007 with **Table 2** below.

Table 2 – Leachate Head Trigger Levels

Reference Point	Cell	Basal Level (mAOD)	Compliance Level (mAOD)
LC01D	1	40.64	43
LM05B	2	40.58	43
LC05B	2	41.23	43
LC04B	2	40.82	43
LM04B	2	40.63	43
LM06B	3	40.47	43
LM07B	3	39.60	43

4.3 Landfill Gas Management

Source Emissions

- 4.3.1 In terms of management of landfill gas source emissions at Pen-y-bont, the landfill gas utilisation and flare system will be managed in accordance with Table S4.2 of Environmental Permit EPR/GP3830BG/V007. Therefore, no changes will be required as part of the EPVA.

Lateral Emissions

- 4.3.2 In terms of lateral emissions of landfill gas at Pen-y-bont, there are 30 perimeter gas monitoring boreholes installed at the site. However, monitoring results from borehole T11 (which is installed into colliery shale) has consistently showed high levels of methane, which were indicated within the 2015 and 2016 annual monitoring reports submitted by FCC to have been present prior to the commencement of waste management tipping operations at the site. That is, when the gas from borehole T11 was sampled it indicated a chemical signature pointing to a source other than landfill as its origin. Given this, it can be considered that there are 29 perimeter gas monitoring boreholes which have been installed around the perimeter of the landfill to monitor lateral migration of landfill gas, that are attributed with relevant action limits.

- 4.3.3 In addition to this, with regards to the frequency of gas monitoring at the site, based on the annual reports for the site for 2015 and 2016, as well as the proximity of receptors to the site, it is considered appropriate to continue with monthly gas monitoring along the southern and western boundaries of the site (in line with the Environmental Permit). However, the operator is seeking to vary the Environmental Permit to reduce the frequency of gas monitoring at the boreholes situated along the eastern and northern boundaries to quarterly. This is based on proximity of sensitive receptors to the boundaries and with cognisance to gas monitoring results from recent annual reports. This is considered to be a conservative approach as the Landfill Directive suggests that the frequency of monitoring can indeed be reduced to 6-monthly during the aftercare phase.
- 4.3.4 With the above in mind, it is considered appropriate to replace Table S4.5 (Landfill Gas in External Monitoring Boreholes – Limits and Monitoring Requirements) in Environmental Permit EPR/GP3830BG/V007 with **Table 3** below. That is, with the action limit for gas monitoring borehole T11 removed and with an amendment to the monitoring frequency based upon proximity to relevant receptors and recent annual reports.
- 4.3.5 The proposed monitoring frequencies presented in **Table 3** will enable for characterisation of any potential future risk to the new potential receptors i.e. the proposed residential properties which will be constructed in the south eastern area of the site currently occupied by the hardstanding area and vehicle sheds.

Table 3 – Perimeter Borehole Monitoring Requirements

Monitoring Point Reference	Frequency	Parameter	Compliance Limit (%v/v)	Action Limit (%v/v)
G1, G2, G3, G4, G5, G6, G7, G8, G9, G10, G11, G12, G13, G14, G15, G16, G17,	Monthly	Oxygen	N/A	-
		Atmospheric Pressure & Meteorological Conditions	N/A	-
		Methane	1% v/v	-
T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T12, T13	Quarterly	Oxygen	N/A	-
		Atmospheric Pressure & Meteorological Conditions	N/A	-
		Methane	1% v/v	-
G1	Monthly	Carbon Dioxide	-	3.22
G2	Monthly	Carbon Dioxide	-	3.21
G3	Monthly	Carbon Dioxide	-	2.91
G4	Monthly	Carbon Dioxide	-	2.57
G5	Monthly	Carbon Dioxide	-	2.53
G6	Monthly	Carbon Dioxide	-	2.77
G7	Monthly	Carbon Dioxide	-	3.36
G8	Monthly	Carbon Dioxide	-	3.62
G9	Monthly	Carbon Dioxide	-	3.48
G10	Monthly	Carbon Dioxide	-	2.76
G11	Monthly	Carbon Dioxide	-	2.72
G12	Monthly	Carbon Dioxide	-	3.33
G13	Monthly	Carbon Dioxide	-	2.28
G14	Monthly	Carbon Dioxide	-	2.82
G15	Monthly	Carbon Dioxide	-	2.27
G16	Monthly	Carbon Dioxide	-	2.18
G17	Monthly	Carbon Dioxide	-	3.19
T1	Quarterly	Carbon Dioxide	-	2.86
T2	Quarterly	Carbon Dioxide	-	2.90
T3	Quarterly	Carbon Dioxide	-	3.49
T4	Quarterly	Carbon Dioxide	-	4.99
T5	Quarterly	Carbon Dioxide	-	3.85
T6	Quarterly	Carbon Dioxide	-	3.69
T7	Quarterly	Carbon Dioxide	-	2.91
T8	Quarterly	Carbon Dioxide	-	3.50
T9	Quarterly	Carbon Dioxide	-	3.90
T10	Quarterly	Carbon Dioxide	-	2.40

T11	Quarterly	Carbon Dioxide	-	-
T12	Quarterly	Carbon Dioxide	-	2.71
T13	Quarterly	Carbon Dioxide	-	2.96

Surface Emissions

4.3.6 The operator is not proposing to vary any of the conditions pertaining to the monitoring requirements of surface emissions of landfill gas at the site.

4.4 Groundwater Management

Reduction in Groundwater Monitoring Boreholes

4.4.1 The operator is proposing to vary the Environmental Permit in order to reduce the number of groundwater monitoring boreholes from 27 boreholes to 13 boreholes at Pen-y-bont Landfill Site. This is considered to be in line with the Environment Agency's Technical Guidance Note (LFTGN) 02 (which is utilised by NRW) – "*Guidance on Monitoring of Landfill Leachate, Groundwater and Surface Water*" which stipulates that that three groundwater monitoring boreholes are required for each groundwater system surrounding the landfill site; one upgradient and two downgradient and should be spaced at a maximum of 100m apart on the down gradient site boundary of a landfill, with no minimum spacing stipulated. As a response to an improvement condition imposed by the Environment Agency Wales (now NRW) dated 9th February 2006, the operator was required to design, install and monitor additional groundwater monitoring boreholes which should be at a "minimum of 100m spacing around the perimeter of the Installation". The spacing of the additional groundwater monitoring boreholes was agreed with the Environment Agency Wales (now NRW). Currently, in terms of compliance with the guidance, there is an excess of groundwater monitoring boreholes at the site, particularly along the northern, eastern and most of the western boundary of the site. Given this, it is considered appropriate to reduce the number of groundwater monitoring points which are therefore monitored and sampled to 13. The positions of the groundwater monitoring points are illustrated on **Drawing Reference Number WR7351/5/03**.

Reduction in Groundwater Monitoring Frequency

4.4.2 Table S4.10 in the Environmental Permit stipulates that several parameters (groundwater level, temperature, pH, Chloride, Electrical Conductivity, Ammoniacal Nitrogen, Dissolved Oxygen, COD, BOD and Suspended Solids) are monitored on a monthly basis. However, Table 6.9 in LFTGN 02 indicates that, in the case of groundwater level, the monitoring frequency can be reduced to quarterly or six-monthly if normal seasonal fluctuations have been established. From analysis of the results presented in the HRAR (included within **Appendix 3**), it can be considered that the groundwater level has been stable in many of boreholes analysed during the assessment period (2009-2014). Given this, as part of this Environmental Permit Variation Application it has been considered appropriate to amend the groundwater monitoring frequency level to quarterly.

4.4.3 With regards to the monthly monitoring of groundwater composition, Table 6.9 in LFTGN 02 indicates that, in terms of monitoring routine indicators, this can be reduced to 6 monthly or annually (from quarterly) if stable conditions are proved. It also stipulates that frequencies should be increased where groundwater flow velocities are high. Given that the composition of the surrounding groundwater has been well characterised at Pen-y-bont through monthly monitoring since the site opened, this Environmental Permit Variation is seeking the following:

- All parameters which were previously monitored monthly to be monitored quarterly
- Those parameters which were monitored quarterly to be monitored on a 6-monthly basis
- Those parameters which were monitored on a 6-monthly basis should now be monitored on an annually and;

- Monitoring for hazardous substances should be reduced to 2 yearly (which is considered standard practice for closed landfill sites).

4.4.4 Given the above, as part of this Environmental Permit Variation, **Table 4** below will replace Table S4.10 (Groundwater – other Monitoring Requirements) of the Environmental Permit.

Table 4 – Aftercare Phase Monitoring Schedule for Groundwater

Locations	Frequency	Measurement and Analytical Suite
BH4, BH7, BH8, BH9, BH10, BH12, BH13, BH14, T2, T4, T6, T12, & T13.	Quarterly	Groundwater Level
	Quarterly	Temperature, pH, Chloride, Electrical Conductivity, Ammoniacal Nitrogen, Dissolved Oxygen, COD, BOD, Suspended Solids
	6 monthly	Calcium, Magnesium, Potassium, Alkalinity, TOC, TON, Sulphate, Chromium, Lead
	Annually	Copper, Iron, Manganese, Zinc, Toluene, Orthophosphate, Nickel, Mecoprop, Cadmium, Naphthalene, TPH, Total Phenols, Mercury
	Every 2 years	Hazardous substances in leachate

Groundwater Compliance Levels

4.4.5 The 2016 annual review of groundwater quality indicates that there were no breaches of any substances (listed within the Environmental Permit) tested during that year. The trigger levels for emissions to groundwater for some boreholes pertaining to Ammoniacal Nitrogen, Cadmium and Mecoprop levels have been amended in accordance with the findings of the recent HRAR (v3 dated 2016, included in **Appendix 3**). These amendments have been discussed previously with NRW, as per the correspondence contained within **Appendix 2**. With regards to Ammoniacal Nitrogen, considering the analysis conducted as part of the HRAR (v3 2016) it is proposed that the compliance limits of boreholes BH10 and BH13 are amended from that listed in Table S4.4 of the Environmental Permit to that of the mean concentration plus 2 standard deviations. It is proposed that these changes are facilitated as part of this Environmental Permit Variation Application.

4.4.6 In addition to the above, accounting for the complex geological matrix for groundwater at Pen-y-bont, it is suggested that the groundwater Mecoprop and Cadmium concentration limits should be amended from those listed in Table S4.4 of the Environmental Permit in line with the Environment Agency's fact sheet on Minimum Reporting Values (MRV's). The proposed amendments to the compliance limits are further discussed in the HRAR (v3 2016) which is included in **Appendix 3** and have been updated as such in line with **Table 5** below.

4.4.7 In light of the above, it is considered that the Environmental Permit should be varied to allow for the inclusion of **Table 5** below to replace Table S4.4 of the Permit.

Table 5- Aftercare phase trigger levels for emissions into groundwater

Locations	Frequency	Parameter	Compliance Limit
BH4, T2, T4, T6 and T13	Quarterly	Chloride	250 mg/l
	6 monthly	Chromium	0.05 mg/l
	Annually	Nickel	0.02 mg/l
	6 monthly	Lead	0.025 mg/l
	Annually	Cadmium	0.001 mg/l
	Annually	Mecoprop	0.1 µg/l
	Annually	Naphthalene	1 µg/l
BH4	Quarterly	Ammoniacal Nitrogen	3.0 mg/l
	Annually	Manganese	7.7mg/l
	Annually	Zinc	0.014 mg/l
BH7, BH8, BH9, BH10, BH12, BH13 and BH14	6 monthly	Chromium	0.05 mg/l
	6 monthly	Lead	0.025 mg/l
	Annually	Naphthalene	0.001 mg/l
	Annually	Mecoprop	0.0001 mg/l
	Annually	Cadmium	0.001 mg/l
BH7	Quarterly	Ammoniacal Nitrogen	1.3 mg/l
	Quarterly	Chloride	250 mg/l
	Annually	Zinc	0.02 mg/l
	Annually	Manganese	0.05 mg/l

Locations	Frequency	Parameter	Compliance Limit
BH8	Annually	Nickel	0.02 mg/l
	Quarterly	Ammoniacal Nitrogen	1.2 mg/l
	Quarterly	Chloride	250 mg/l
	Annually	Zinc	0.25 mg/l
	Annually	Manganese	0.30 mg/l
BH9	Annually	Nickel	0.05 mg/l
	Quarterly	Ammoniacal Nitrogen	0.5 mg/l
	Quarterly	Chloride	250 mg/l
	Annually	Zinc	0.02 mg/l
	Annually	Manganese	0.20 mg/l
BH10	Annually	Nickel	0.02 mg/l
	Quarterly	Ammoniacal Nitrogen	1.0 mg/l
	Quarterly	Chloride	250 mg/l
	Annually	Zinc	0.02 mg/l
	Annually	Manganese	0.7 mg/l
BH12	Annually	Nickel	0.02 mg/l
	Quarterly	Ammoniacal Nitrogen	3.5 mg/l
	Quarterly	Chloride	460 mg/l
	Annually	Zinc	0.02mg/l
	Annually	Manganese	10.2 mg/l
BH13	Annually	Nickel	0.04mg/l
	Quarterly	Ammoniacal Nitrogen	0.92mg/l
	Quarterly	Chloride	320 mg/l
	Annually	Zinc	0.02 mg/l
	Annually	Manganese	3.3 mg/l
BH14	Annually	Nickel	0.02 mg/l
	Quarterly	Ammoniacal Nitrogen	1.9mg/l
	Quarterly	Chloride	340 mg/l
	Annually	Zinc	0.02 mg/l
	Annually	Manganese	2.6 mg/l
T12	Annually	Nickel	0.02 mg/l
	Quarterly	Ammoniacal Nitrogen	0.5 mg/l
	Annually	Manganese	12.0 mg/l
	Annually	Zinc	0.251mg/l
	Quarterly	Chloride	250mg/l
	6 monthly	Chromium	0.05mg/l
	Annually	Nickel	1.4mg/l
	Annually	Lead	0.025mg/l
	Annually	Cadmium	0.006mg/l
	Annually	Mecoprop	0.04µg/l
T13	Annually	Naphthalene	1µg/l
	Quarterly	Ammoniacal Nitrogen	2.5mg/l
	Annually	Manganese	2.1mg/l
	Annually	Zinc	0.031mg/l

4.5 Surface Water Management

Surface Water Monitoring

- 4.5.1 With regards to surface water management, the operator conducts surface water sampling at 3 points, WP1, WP2, and WP3 (upstream, downstream and adjacent to the site). In addition to this, there is a surface water sampling point (WP4) situated, after the settlement lagoons but before the infiltration reed beds to the northeast of the site. If a surface water discharge is made from the site to the River Dee, sampling is also conducted at an additional monitoring point, WP5.
- 4.5.2 It is clear from the annual data review for 2015 and 2016, that there was no discharge made at sampling locations WP4 and WP5 for the duration of these reviews. In addition to this, a review of the background surface water quality data obtained from upstream monitoring point WP1, downstream sampling point WP3 and midstream sampling point WP2 indicated that there is no evidence of any deterioration in the water quality on the River Dee that could be attributed to landfilling activities.
- 4.5.3 Given the above, as part of this Variation Application it is proposed that the frequency of surface water monitoring is decreased to quarterly (for a basic analytical suite) from monthly and to 6-monthly (from quarterly) for the larger analytical suite. Please note, the operator is also proposing that monitoring for COD and Dissolved Oxygen is now completed at 6 monthly intervals as opposed to be included with the more basic

analytical suite of monitoring. Given this, it is suggested that **Table 6** below will replace Table S4.9 of the Environmental Permit going forward.

Table 6- Surface Water Monitoring

Monitoring Point Reference	Frequency	Parameter
WP1, WP2, WP3 and WP4, WP5 (if surface water is discharged from the site)	Quarterly	Ammoniacal Nitrogen, Chloride, Suspended Solids, pH, Electrical Conductivity
WP1, WP2, WP3 and WP4, WP5 (if surface water is discharged from the site)	Six – Monthly	COD, Dissolved Oxygen, Sulphate, Alkalinity, Total Oxidised Nitrogen, Total Organic Carbon, Sodium, Potassium, Calcium, Magnesium, Iron, Manganese, Cadmium, Chromium, Copper, Nickel, Lead, Zinc, Phosphate

4.5.4 The operator recognises that the landfill site is in a sensitive area within a meander within the River Dee, therefore the reduction in monitoring frequencies for the basic analytical suite is considered to be a conservative approach. Monitoring frequencies for the larger analytical suite (reduced to 6-monthly) is at least in line with the minimum monitoring requirements of LFGTN02 which specifies that ongoing characterisation of surface water composition should be undertaken at six-monthly intervals.

Surface Water Trigger Levels

4.5.5 The discharge of surface water from the site and monitoring at surface water monitoring points WP4 and WP5 is a rare occurrence and therefore monthly monitoring (as stipulated within Table S4.3 of the Environmental Permit) is considered to be unnecessary. Given this, the operator is proposing to vary the monitoring frequency at monitoring points WP4 and WP5 to a 6-monthly basis, or as necessary (depending on whether water is discharged from these points). Therefore, going forward **Table 7** below should replace Table S4.3 of the Environmental Permit.

Table 7 – Surface Water Trigger Levels

Surface water	Frequency	Parameter				
		Suspended Solids	Oil & Grease	Ammoniacal Nitrogen	Chloride	Volume
WP4 (to the grass plots to the North East of the site)	If utilised, six-monthly	100 mg/l	No visible oil or grease	3 mg/l	250 mg/l	5616 m ³
WP5 (to the River Dee)	If utilised, six-monthly	100 mg/l	No visible oil or grease	3 mg/l	250 mg/l	5616 m ³

4.5.6 Please note, the operator is not proposing to vary the parameters or limits associated with the surface water monitoring points (as listed in **Table 7** above).

4.6 Revision to the Restoration Plan

4.6.1 It is proposed that the site will be restored to a mixture of woodland, hedges, pasture areas and grassland, with the hardstanding, office and industrial units to the southwest being retained. The restoration details for the facility are illustrated upon Drawing Reference Number WR7350/5/04. Please note, the restoration details for the site have recently been amended to lower the final restoration profile of the site to coincide with current site levels (refer to **Drawing Reference Number WR7350/5/04** of Closure Plan [Doc. Ref.: WR7350/CP] presented in **Appendix 1**) and associated post-settlement levels (as shown in **Drawing Reference Number WR7351/5/04**). These amended restoration plans have been submitted to the Local Planning Authority but are currently awaiting approval.

4.6.2 Additionally, a subsequent planning application proposing the development of residential has recently been submitted to the Local Planning Authority for approval. The area covered by this planning application incorporates the location of the existing leachate storage tanks. Should planning application be granted FCC wish to submit an Environmental Permit Partial Surrender Application to surrender the south eastern portion of the Pen-y-bont Landfill and revise the site’s Environmental Permit Boundary accordingly; with a draft Surrender Site Condition Report presented in **Appendix 7**. As

part of this process, the leachate storage tanks will be relocated to the north of the gas compound presented as a power plant of in **Drawing Reference Number WR7351/5/04**. Prior to any relocation works, details on the leachate tanks relocation will submit an Environmental Permit Variation Application detailing the decommissioning and relocation to NRW for approval.

4.6.3 It is important to note that should no planning permission be attained then the leachate tanks will not be relocated and will remain in their current position.

4.7 EWC Code list

4.7.1 Waste acceptance at the site ceased on 28th October 2016 and therefore the extensive EWC code list which is included in Schedule 6 of the Environmental Permit is no longer required. As part of this Environmental Permit Variation Application, the operator is seeking to revise the EWC code list from the Environmental Permit and remove all waste codes except for those required to support ongoing site restoration requirements (note the installation of the cap and associated protection is complete).

4.7.2 In light of this revision it is proposed that the EWC Code list presented in **Table 8** replaces the list of permitted wastes presented in Schedule 6 of EPR/GP3830BG/V007.

Table 8 – Revised EWC Code List detailing the wastes to be accepted at the Pen-y-bont Landfill Site

01	WASTES RESULTING FROM EXPLORATION, MINING, QUARRYING, AND PHYSICAL AND CHEMICAL TREATMENT OF MINERALS
01 04	wastes from physical and chemical processing of non-metalliferous minerals
01 04 08	waste gravel and crushed rocks other than those mentioned in 01 04 07
02	WASTES FROM FRUIT, VEGETABLES, CEREALS, EDIBLE OILS, COCOA, COFFEE, TEA AND TOBACCO PREPARATION AND PROCESSING; CONSERVE PRODUCTION; YEAST AND YEAST EXTRACT PRODUCTION, MOLASSES PREPARATION AND FERMENTATION
02 04	wastes from sugar processing
02 04 01	soil from cleaning and washing beet
10	WASTES FROM THERMAL PROCESSES
10 01	wastes from power stations and other combustion plants (except 19)
10 01 02	coal fly ash
10 12	wastes from manufacture of ceramic goods, bricks, tiles and construction products
10 12 08	waste ceramics, bricks, tiles and construction products (after thermal processing)
17	CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)
17 01	concrete, bricks, tiles and ceramics
17 01 01	concrete
17 01 02	bricks
17 01 03	tiles and ceramics
17 01 07	mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 05	soil (including excavated soil from contaminated sites), stones and dredging spoil
17 05 04	soil and stones other than those mentioned in 17 05 03
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 12	wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 09	minerals (for example sand, stones)
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 02	garden and park wastes (including cemetery waste)
20 02 02	soil and stones (excluding topsoil and peat)

4.8 Technically Competent Management Coverage

- 4.8.1 Natural Resources Wales (NRW) require operators holding Environmental Permits to be competent to deal with the environmental risks associated with their activities. Following definite closure of the facility the attendance of the technical competent manager will be reduced in accordance with NRW's guidance² i.e. minimum of 1 hour and a maximum of 2 hours per week.

² How to comply with your environmental permit (Version 8, October 2014)

5.0 CONCLUSIONS

- 5.1.1 Following on from a request by FCC Waste Services (UK) Limited for their Pen-y-bont Landfill Site, this application seeks to vary the Environmental Permit for the aforementioned site to account for the site's entry into definitive closure.
- 5.1.2 This documentation along with its supporting drawings and appendices and provides the required level of information to enable determination of the application to be made.