

Natural Resources Wales Permitting decisions

Refusal

We have decided to refuse the permit for Parry's Quarry

The Applicant is RJS Engineering Limited

The proposed facility location is Parry's Quarry, Alltami, Flintshire, CH7 6NY

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements.

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been taken into account.

Structure of this document

- Annex 1 the Key Issues and reasons for refusal
- Annex 2 consultation responses

Annex 1: Key Issues and reasons for refusal

What this document is about

This is a decision document, which accompanies a Refusal Notice..

It explains how we have considered the Applicant's Application, and why we have decided to refuse to grant a permit to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position.

How this document is structured

- 1. Summary of our decision**
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1 Summary of our decision

Our decision is to refuse the application for a non-hazardous waste landfill at Parry's Quarry, Alltami, Flintshire. We are refusing this application because we do not consider that the gas management system proposed is adequate and, therefore, we are of the opinion that this will cause unacceptable levels of landfill gas migration and release of greenhouse gases and other pollutants to the atmosphere resulting in odour nuisance to sensitive receptors in close proximity to the proposed site.

GASSIM modelling has also shown that there will be a significant odour impact, even from normal daily operations to sensitive receptors in close proximity to the proposed site.

2 Overview of the decision making process

Duly Making

An application was received on 26th June 2013. Several elements of the application were either missing or unclear, therefore the application could not be accepted as duly made. The application was accepted as duly made on 12th August 2013 following the receipt of additional information.

Consultation

The application was publicised on our website between 19th September and 22nd October 2013 and a newspaper advert was published in the Flintshire Leader on 20th September 2013.

We placed a paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register held at Natural Resources Wales, Chester Road, Buckley, Flintshire, CH7 3AJ and also sent a copy to the Flintshire County Council, Environmental Permit Public Register Documents, Pollution Control, County Hall, Mold, CH7 6NB for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made.

Further to this we sent copies of the Application, for comment, to the following bodies:

- Flintshire County Council Local Planning Department
- Flintshire County Council Environment Protection Department
- Food Standards Agency
- Health and Safety Executive
- National Grid
- Primary Care Trust (Public Health Wales)
- Dŵr Cymru Welsh Water – Local Sewerage undertaker

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

In addition, we also held a public drop in session on 8th October 2013 at Beaufort Park Hotel, Alltami, Mold.

All representations made were taken into account and a summary of those representations can be found at Annex 2

Determination

Although we were able to duly make the Application, more detailed information was required for determination purposes. Schedule 5 'Further Information Notices' were served on 21st October 2013, 3rd March 2014, 8th April 2014 and 11th September 2014 requesting additional information. Copies of the information notices and the responses were placed on our public register. In addition to this, we met with the applicant on two separate occasions to discuss the shortfalls in the application and how these could be addressed.

The application has been in determination for a period in excess of 18 months. The fourth and final Schedule 5 Notice was sent 11th September 2014, with a date agreed with the applicant for a response to be provided by 3rd November 2014. The applicant requested an extension on several occasions, the first of which was to request an extension until 31st December 2014, this was agreed and a provisional date 24th November 2014 was set with the applicant to discuss the proposals. This meeting was cancelled at the applicant's request.

On 15th December the applicant requested a further extension until 31st January 2015 to submit a response to the Schedule 5 Notice. Again this date was agreed. A third request to extend the response time was submitted on 14th January, requesting that we extend until 28th February 2015. We did not agree to the further extension. A meeting was held at the applicants consultants offices in Shrewsbury on 30th January, where we agreed general expectations regarding the minimum level of detail of response we expected and what decision could reasonably be deferred until possible pre-operational or improvement conditions provided sufficient detail was provided in the Schedule 5 response. The formal response to the last Schedule 5 request was received on 3rd February 2015.

A summary of the technical analysis can be found below in section 4.

Legal aspects

A summary of the legal framework is set out in section 5.

Environmental considerations

A summary of environmental issues is at section 6.

3 Description of the facility and general issues

3.1 The site

The proposed landfill is located at Parry's Quarry, which is approximately 1km north east of the village of Alltami, Flintshire in North Wales. The site is accessed off Pinfold Lane just off the A494. The site is located within a large outcrop of carboniferous coal measures strata (the Ruabon Marl Formation). Below this the site is underlain by mudstones, sandstones and siltstones. This in turn is overlain by glacial till to the north, west and east of the site, comprising brown sandy clay with sandstone fragments and averages 2m in thickness.

The site lies within a secondary aquifer, however it is not located within a designated groundwater source protection zone. The proposed site is situated on the flank of a low ridge approximately 10 km south of the Dee Estuary. The south and south west is at an elevation of approximately 116 metres and rises southwards to a maximum of 160 metres AOD in Buckley. Land to the north east of the site has an elevation of approximately 90 metres AOD.

The topography of the site area falls from 115m AOD at the south west corner of the site to between 105 and 110 metres AOD to the north and east of the site respectively.

There are residential properties located approximately 50 metres south east of the site. A hotel and restaurants are located less than 150 metres from the north eastern boundary in a service area off the A55. There are a number of industrial units to the north and west of the site within 100 to 500 metres of the site boundary. A farm is located approximately 500 metres to the south.

To the South East of the site lies part of the Buckley Claypits and Commons SSSI and Connahs Quay Ponds and Woodlands SSSI, which in turn form part of Deeside and Buckley Newt Site SAC. The area is separated from the proposed landfill and recycling plant by a metal fence designed to prevent newt migration into the working area of the quarry and the proposed landfill area.

3.2 The proposed permitted activities

The proposed installation is for the acceptance of municipal wastes for disposal within a fully engineered landfill. The proposed landfill will fill the quarry void and infill the site to above original site levels to allow for settlement of the wastes resulting in a shallow domed landform. The filling capacity is sufficient to accept 1.57 million tonnes of waste over its lifespan. The area of the proposed landfill is 10.11 hectares comprising the current void space plus further void created by the extraction of engineering fill materials.

The proposed landfill is designed for construction with a basal lining system along the base and sides of the quarry void. Because the base of the proposed landfill is to be below groundwater level, pumping of groundwater would be required to allow the construction of the containment systems. Groundwater could possibly enter the void where there are higher permeability geological formations. To counteract this a groundwater collection and drainage blanket was proposed before commencement of the construction of the containment systems. Electronic submersible pumps and piping were proposed to pump any groundwater to the site balancing ponds where it

was then proposed that it could be pumped to the surface water drainage system which drains to the Alltami Brook.

The design of the containment systems has been subjected to detailed geotechnical design and risk assessment and has been thoroughly scrutinised by NRW geotechnical experts. The final design of the landfill containment systems excluding landfill gas management has been agreed with NRW. NRW are satisfied that the facility could be constructed to provide containment of leachate and remain stable throughout the whole lifecycle of the site and thereafter. NRW were not satisfied that the site could provide the appropriate containment required for the management of landfill gas and odour (see later).

4 Review of technical reports and risk assessments

4.1 Environmental Setting & Installation Design

An overview of the site location, its orientation and general layout are provided in the section entitled “The Site” in the description of the facility section above and thus will not be repeated here. As has been mentioned earlier in this decision document, the application proposed that the landfill be constructed within the void left by previous quarry workings. Within the void sufficient volume remains of low permeability mudstones, siltstones and clays for the construction of the low permeability containment system.

It was proposed that if tipping were to commence, this would be at a rate of 105,000 tonnes per annum over a 15 year period, or, potentially at a lower rate for up to 20 years. The proposed landfill was to comprise four cells, in-filled consecutively in a clockwise direction from Cell 1 in the north west to cell 4 in the north east in two phases of filling. The initial phase of operations was to comprise filling the quarry void to the adjacent topographic level. It was proposed that the final cell (cell 4) was to be filled to its full height during the initial phase of operations and the final engineered cap constructed. Filling operations were then proposed to continue from cell 1, to cell 2 and finally to cell 3. Although the proposed landfill is for non-hazardous waste, a planning condition requires inert waste to be landfilled adjacent to the eastern flank of cells 1 and 2. This cell phasing plan was proposed to be reversed by the Applicant at a meeting held with them on 7th January 2014. The revised cell phasing was proposed to start at cell 4 and construct and fill sequentially from cells 4 – 1.

Groundwater management

The proposed design base level of 80m AOD is approximately 20m below groundwater level to the south of the site and 8 – 10m below groundwater level to the north. As has already been mentioned active groundwater management would be required until a sufficient depth of waste had been deposited to counteract the hydraulic uplifting pressure and prevent basal heave which could cause damage to the basal and sidewall liners.

It was proposed and accepted that groundwater control be implemented via a 500mm thick basal drainage layer with 500 mm diameter piping, 200 mm side branches and 600mm sub-sidewall riser pipes.

Basal and side slope Lining System

A natural geological barrier is present across a large proportion of the base and sides of the site. However because a proportion of the proposed site would be constructed on permeable strata an artificial barrier would need to be constructed, comprising a minimum thickness of $\geq 0.5\text{m}$ of engineered clay across the entire base and sides of

the site. This would need to be combined with 0.5m Artificial Sealing Liner (ASL). The proposed barrier would provide a level of protection equivalent to $\geq 1\text{m}$ of clay at $\leq 1 \times 10^{-9}\text{m/s}$. This is the level of protection required for soil and water as specified in Annex 1, section 3.2 of the Landfill Directive. The proposed basal lining system would therefore be constructed to a permeability of $\leq 5 \times 10^{-10}\text{m/s}$. The minimum gradient of the base of each cell was proposed and agreed to be between 1 and 2% towards the sump to facilitate collection and drainage of leachate.

Leachate collection and extraction system

It was proposed that leachate were to be collected via a piped granular drainage blanket. Pipework was proposed to be laid in a herringbone pattern within the drainage blanket. Collector pipes would lead to a larger diameter perimeter header pipe which in turn would lead to abstraction sumps. The abstraction sumps were to be connected to sidewall risers leading to the surface and via surface pipework for collection prior to being taken off site by tanker for disposal.

Capping System

It was proposed that a landfill gas drainage layer was to be applied on top of the final layer of waste and used as a formation layer for the placement of the clay cap. The clay cap would then have been placed in layers within which surface water drainage pipes were to be installed. These pipes would flow into perimeter surface water ditches. The final cap would be placed progressively and would comprise $\geq 1\text{m}$ thick layer of clay engineered to achieve a permeability of $\leq 1 \times 10^{-9}\text{m/s}$. A covering layer of soil would then be placed directly over the low permeability cap to a thickness of 1m . Seeding was proposed to take place soon after to establish vegetation growth which would mitigate the effects of erosion.

4.2 Hydrogeological Risk Assessment

Geologically Parry's Quarry is located within a large outcrop of carboniferous coal measures strata. The local geology of the cells comprise predominantly mudstone with secondary sandstone and siltstone bands.

The Carboniferous Coal Measures comprise a large, anisotropic, heterogeneous system controlled by the properties of the sandstones and mudstones bands, and affected by faulting and fracturing which can either augment the hydraulic connectivity between permeable horizons, or act as partial barriers to flow where they are in-filled.

The Coal Measures underlying the Parry's Quarry site and surrounds are designated as a Secondary (A) Aquifer. Well-developed sandstone horizons within the overall sequence are regarded as individual aquifers. Secondary Aquifers are defined as variably permeable and can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flow to rivers

NRW reviewed the original permit application in Autumn 2013. Based on the information within the permit application we had a number of additional queries about the application. The main points to address were:

- Height of the groundwater drainage blanket

- The number and location of leachate monitoring points and control of leachate during operation
- Demonstrating that hydraulic containment was technically feasible
- location and number of groundwater monitoring points for groundwater levels and quality.

These were queried by way of a Schedule 5 Notice served on the applicant on 21st October 2013 and followed up with a meeting with the applicant on 7th January 2014. The applicant provided a response to these queries 18th February 2014. We reviewed the additional content and were satisfied with the majority of the responses provided. We agreed that hydraulic containment was technically feasible at this location.

A further schedule 5 Notice was issued on 11th September 2014. We raised some additional queries on the proposed number of additional groundwater monitoring boreholes and the proposed length of monitoring. The applicants were proposing to install 3 additional boreholes which would be monitored for a period of 3 months prior to operations commencing. We also had a further query on the proposal to actively maintain the leachate heads within the landfill at 2m below continually fluctuating groundwater levels adjacent to the site. Our requirement was for leachate levels to be maintained at a fixed 2m below the lowest recorded groundwater level as this would be easier to manage.

We subsequently had a meeting with the applicant and their consultant on 30th Jan 2015. At the meeting we discussed the outstanding issues regarding groundwater monitoring. This was followed by the submission of a formal schedule 5 response on 03 Feb 2015.

At the meeting it was agreed that leachate heads would be maintained at a fixed level of 2m below the lowest groundwater level.

We agreed that if the permit were granted, a total of 7 additional groundwater level and quality monitoring locations would need to be installed as part of a pre-operational condition. At a number of locations multiple monitoring boreholes would be installed to intercept different geological formations beneath the site. The data from these would be used to refine the current conceptual model for the site. A requirement to monitor groundwater within these boreholes would be added as a pre-operational condition to a permit, should one be issued.

Our guidance is that any new monitoring points should be monitored for a period of 12 months prior to start-up. We agreed that if the permit was issued, as there is existing monitoring available, that the new boreholes could be monitored for a period of 6 months and at that point the data could be reviewed. If consistent with the existing monitoring data we could discharge the pre-operational condition. If not, monitoring would need to continue for the full 12 months.

4.3 Stability Risk Assessment

A pre application meeting was held with Environment Agency National Permitting Service on 19th July 2012 (please note that this was prior to the creation of NRW in Wales). A response was provided on 24th August 2012. For stability this sought clarity on cross sections, Conceptual Site Model (CSM) & stability features, leachate well foundation pads, missing drawings, waste mass to counter basal heave, side slope stability from cut bedrock intersections, side slope stability using drained conditions for cohesive strata, waste mass stability and settlement, European Code 7 (EC7) and need for referenced chosen design parameters. For clarity European Codes are a set of technical rules developed by the European Committee for

Standardisation for the structural design of construction works and replace British Standards.

A permit application was subsequently made to Natural Resources Wales in June 2013 and a site visit was arranged for 28th August 2013. This visit was attended by our geoscience stability assessor and our geoscience groundwater technical assessor. The visit facilitated our assessment in that we could better relate to the site setting and conceptualising the site to appreciate key risks.

Following an assessment of the submitted documents, a number of queries were raised regarding stability in the Schedule 5 Notice dated 21st October 2013. These related to clarification of components of the lining system, the cross section drawings, un-drained stability calculations, modelling with horizontal strata, leachate infrastructure and pumping ability. Slope stability calculations of external facing slopes were requested as some were overly steep and their composition and structure was not well understood. Consideration of the 100kT of surplus stone to the south was requested to be discussed as was the groundwater pumping contingency measures during operations as the amount of waste required to prevent heave would take a long period to fill before stability without pumping is achieved. Ongoing monitoring to accommodate EC7 was requested as strata intersections and varied pore water pressures had not been introduced in to short term slope stability calculations.

With respect to the cap, clarification of the landfill gas pressure relief layer was requested as gas pressures were not accommodated in the design. Similarly planting detail of tree roots on the cover material was requested so as not to compromise the mineral cap.

Following a meeting on 07th January 2014 and receipt of developer clarifications and discussion in their Schedule 5 response provided 18th February 2014, it was clarified that the order of completing or filling cells was for cells 4 and 3, then cells 1 and 2. It was also agreed that many aspects were considered to be aspects that would be accommodated under detailed design or as part of the Construction Quality Assurance (CQA) programme.

Consequently it was considered that remaining stability aspects (external facing slopes, further investigation and slope analysis, sensitivity analysis, groundwater pumping contingencies, landfill gas pressure relief in the cap, tree planting/restoration, ongoing monitoring and investigation for geotechnical parameters) could be regulated under pre-operational permit conditions attached to the permit, should one be issued. The proposed groundwater pumping was still considered by Geoscience to present a high financial risk in case the Applicant encountered difficulties and/or walked away from the site. This financial risk would need to be accounted for in the level of financial provision agreed for the site.

4.4 Environment Management System (EMS)

Having considered the information submitted in the application, we were satisfied that appropriate management systems and management structures will be in place, with the exception of the Landfill Gas Management System and inherent odour concerns associated with this.

The Applicant had indicated that they have an EMS that meets the requirements of our technical guidance note EPR 1 'How to comply with your environmental permit'. Please note, the Applicant only needs to submit a summary of the EMS for a permit application. The EMS will be audited to ensure that it is implemented fully in line with our guidance as part of our compliance assessment procedures.

Technical ability

The Applicant must demonstrate that they are technically able to operate the activity. The Applicant has provided a certificate of technical competence for managing Landfill Hazardous Waste (Level 4) – 4LH along with a continuing competence certificate.

All Applicants who use the CIWM/WAMITAB scheme to demonstrate competence must pass a test every two years to show they remain qualified to supervise their relevant activities.

4.5 Accident management Plan

An Accident Management Plan (AMP) was submitted as part of the application. We did not consider the AMP to be satisfactory. Due to the nature of the document and the circumstances in which it may be used an AMP must contain all relevant information in a clear and easy to access format. The AMP submitted relied in part on references to other documents. For example the section on flooding referred to the Surface Water Management Plan and the section on Subsidence and Landslides referred to the Stability Risk Assessment. Both of these documents are separate self-contained documents. Referral to other documents is inefficient and could waste valuable time in the event of an accident if other plans needed to be referred to, in consequence, we requested via a Schedule 5 notice dated 3rd March 2014 that these sections be revised and the AMP re-submitted. There were other issues that required clarification in relation to accidental breach of liner, explosions or fires and associated preventative monitoring and some terms used by the applicant.

A revised AMP was submitted for our approval on 04th June 2014. The AMP contained detail of the following potential hazards:

- Flooding
- Subsidence and landslides
- Fires
- Explosion; and,
- Major breach of the liner.

Further to this the AMP contains details of how the following operational hazards will be dealt with:

- Delivery of raw materials including; substance transfer, overfilling of vessels, making wrong connections, vandalism and unwanted reactions.
- General site operations
- Waste Acceptance including preventing incompatible substances coming into contact
- Waste Handling
- Landfill gas, and,
- Leachate treatment.

A risk assessment was provided as an appendix to the AMP detailing the probability of each risk and management actions taken to control the risk. A spillage action plan and reporting form were also included as appendices.

The AMP did not include a site plan detailing the location of emergency kits or equipment for fire, spill kits and drain caps.

Having considered the revised information submitted by the applicant, we were satisfied (with the exception of the outstanding issues relating to gas management

and odour) that appropriate measures would be in place to ensure that environmental accidents that may cause pollution are prevented.

4.6 Odour Management Plan

In support of their permit application the applicant submitted an Odour Management Plan (OMP). The OMP is a live document and will be used in conjunction with other management plans. The OMP is split into 7 sections the first section is an introductory section and details the purpose and objectives of the OMP as outlined below. The OMP submitted by the applicant had the following objectives:

- To use all appropriate methods to minimise odour emissions,
- To prevent exposure of people outside of the site to levels of odour which would result in annoyance; and
- To minimise the risk of unplanned odour release incidents which could cause annoyance.

Section 2 describes the site and details the following:

- Description of site location and lists nearby sensitive receptors
- Local meteorological conditions
- Planned activities
- An outline of landfill gas management; and
- Leachate management.

Section 3 describes the sources, releases and impacts of odour. It contains the following sub-sections:

- Potential odour sources
- Odour release points and odour producing activities
- Engineering operations; and
- Tipping operations.

Section 4 describes the control measures that will be employed on site including those relating to:

- Waste transport, acceptance and tipping
- Provision of cover materials
- Progressive capping
- Disturbance of waste already in-situ
- Landfill gas extraction system
- Leachate management
- Odour misting sprays; and
- Neighbourhood liaison.

Section 5 relates to abnormal meteorological conditions and failure of control measures.

Section 6 describes the monitoring measures that will be employed to attempt to control odour emissions and provides detail relating to:

- Meteorological monitoring
- Site walk over surveys
- Olfactory monitoring
- Monitoring complaints
- Monitoring frequency of complaints
- Who the responsible person are; and
- Record keeping.

Section 7 relates to permit compliance and provides further details to the following:

- Control and trigger levels
- Compliance actions
- Complaint response
- Corrective actions; and
- Reporting.

After several revisions we were satisfied that the Odour Management Plan would be satisfactory. However, we are not satisfied that the site infrastructure will be such as to enable the site to reduce their odour impact to an acceptable level (see details in Section 6.1).

4.7 Fugitive Emissions Management Plan

Emissions from a diffuse source i.e. those emissions not emitted from a specific point such as a stack or pipe are considered to be the most likely source of emissions from a landfill site. Dust and particulates are the type of fugitive emissions most likely to be encountered at a landfill site. Other sources of fugitive emissions are mud and litter beyond the site boundaries and pest infestations.

The applicant submitted as supporting documentation a Fugitive Emissions Management and Monitoring Plan (FEMP). The first two sections of the FEMP introduces what fugitive emissions are and provides some background information relating to the site location and site activities and also provides background information relating to typical meteorological conditions encountered at the site.

The third section provides detail of the likely fugitive emissions themselves and measures taken to manage these emissions. It contains detail relating to the following:

- Dust and particulate matter including the following-
 - o Monitoring
 - o Control of dust from vehicle movements
 - o Control of dust from construction activities and site restoration
 - o Control of dust from tipping operations
 - o Contingency plans
- Control of pest infestations – birds, vermin and flies including the following-
 - o Monitoring
 - o Controls
 - o Contingency plan
 - o Emergency actions
- Control of mud and litter including the following-
 - o Monitoring
 - o Control of litter
 - o Control of mud
 - o Contingency plan

Sections 4 and 5 relate to carrying out investigations and reporting of incidents respectively.

We were not satisfied that the outstanding landfill gas management issues had been adequately addressed but were satisfied with the remainder of the Fugitive Emissions Management Plan.

4.8 Surface Water Management Plan

A surface water management and monitoring plan was drafted and submitted as part of the application with the aim that surface water emissions could be managed without causing harm to the nearby Alltami Brook or to the Buckley Clay pits Newt Site which is adjacent to the proposed landfill. As has been previously mentioned, this site was proposed to be below groundwater levels and active pumping would be required for several years before the landfill could operate according to the hydraulic containment principles specified, thus, an effective SWMP would be imperative for ensuring no pollution of surface waters could be caused.

The first section of the SWMP related to hydrology, discharges and consents required and specified that the primary objectives of the SWMP were to:

- Keep clean and contaminated water separated at all times
- Ensure discharges are made in accordance with appropriate permissions and limits
- Where excessive contamination occurs – treat to ensure that water can be safely discharged or arrange for alternative disposal.

The second section of the SWMP contained a detailed section relating to the Surface Water Management System itself.

The third section contained an assessment of impacts focusing on:

- Potential impacts during construction; and
- Potential impacts during operations.

The fourth section provided detail on the proposed monitoring and sampling programme and included sections on:

- Management and technical competence
- Surface water monitoring including:
 - Monitoring locations
 - Monitoring schedule
 - Sampling procedures

The fifth section focussed on assessment criteria and compliance limits and included proposed permit limits.

The sixth section of the SWMP referred to the Contingency Action Plan.

The seventh section related to data and reporting and provided details on how data would be collected, presented and reported. The applicant has stated that notification would be used for reporting of breaches or incidents, survey documents would be supplied when survey work was undertaken.

We requested further information to clarify several elements of the SWMP in a Schedule 5 Notice dated 3rd March 2014. The Applicant provided clarification in their response to the Schedule 5 Notice provided 6th June 2014. The SWMP was accepted as appropriate.

4.9 Noise Management Plan

We requested additional information in relation to noise modelling and monitoring. The noise assessment submitted as part of the permit application was a chapter from the Environment Statement submitted as part of the EIA in support of the planning application. It was considered that this noise and vibration assessment did not consider all the necessary information required for our Air Quality Modelling and Risk Assessment team (AQMRAT) to carry out a full assessment of the likely impacts of noise and vibration from these activities. In order for a full assessment to be carried out to consider the effects of noise and vibration from these activities we needed to request the following information:

- Noise Sources (all fixed and mobile plant plus noise emitting buildings) – grid references, referenced sound power levels (octave band preferably), heights, directivities, operating times.
- For noise emitting buildings - corner grid references, heights, octave band reverberant sound pressure calculations or measurements, referenced octave band transmission coefficients and façade emissions, including roof emissions.
- Building aperture emissions (grid references, sound power levels, dimensions, opening times).
- Grid references for site roads and estimates for vehicle sound power levels, traffic numbers and speed.
- Site buildings (whether acoustically emitting or not) – grid references of corners, heights. Also off-site buildings that may affect sound propagation to receptors. This data is required to calculate acoustic screening and reflections.
- Site acoustic barriers - grid references of ends, thicknesses, heights.
- Terrain data – where screening by buildings or barriers is relied on for noise attenuation it can be important to have accurate heights for sources, barrier/buildings and receptors. Use high resolution spot heights or contours. The terrain data should be incorporated into the model, do not submit separate copyrighted terrain files.
- Receptors- give reason for selections, grid references, addresses or other identification, number of storeys (estimate sound pressure levels for each storey), BS 4142 LA90 and estimated/ measured specific and rating LAeq values for site activities. Rationale for non-application of + 5 dBA penalty if not used.

This information was originally requested via a Schedule 5 Notice dated 8th April 2014. A response was provided on 6th June 2014, however this reiterated the applicants opinion that the information submitted for the planning application was sufficient. We re-stated that the planning requirements were for construction noise and our requirements were for an assessment against predicted operational noise.

4.10 Closure and Aftercare Plan

We considered the Applicants Closure and Aftercare Plan as deficient. The submitted plan did not consider all of the requirements in the Technical Guidance Note EPR 5.02: How to comply with your environmental permit – additional guidance for landfill. Some particular essential aspects were missing to support a closure plan. There was no mention of when closure was predicted, nor was there mention of predicted levels of gas and leachate reduction to support closure. There was also no mention of the final landform, whether restoration is required through planning permission and to what end use the landfill would be restored. Furthermore the closure plan was lacking any mention of capping plans, capping materials, whether waste will be

required for restoration and what environmental monitoring was proposed to be carried out. We therefore requested that the applicant re-submit the closure plan in a Schedule 5 Notice dated 3rd March 2014. A revised Closure and Aftercare plan was in response to this Schedule 5 Notice on 6th June 2014. This revision was accepted.

4.11 Waste Types and Acceptance Procedures

The applicant submitted a document entitled Waste Types and Acceptance Procedures which included details of their Waste Acceptance Procedures and the proposed list of waste types to be accepted at the landfill. We accepted the proposed list of waste to be suitable for disposal within the proposed landfill with the exception of the following exclusions:

10 03 28 – wastes from cooling water treatment other than those mentioned in 10 03 27
10 04 10 - wastes from cooling water treatment other than those mentioned in 10 04 09
10 08 20 - wastes from cooling water treatment other than those mentioned in 10 08 19
19 07 03 – landfill leachate other than those mentioned in 19 07 02.

These wastes were excluded because it was considered that they were primarily liquid wastes which are banned from landfill. It was not considered necessary to request further details from the applicant via a Schedule 5 Notice. Instead such exclusions would normally be communicated during consultations over a draft permit should one be issued.

Other than the above listed exclusions, we considered the applicants Waste Acceptance Procedures to be acceptable

4.12 Post-Conviction Plan

A Post Conviction Plan was submitted with the applicant, however it was found that all relevant convictions were already spent and therefore it was not necessary to carry out any further assessment.

4.13 Habitats Assessment

The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. There is a network of protected sites known as Natura 2000 a strict system of species protection. The Directive protects animals and plant species and habitat types which are of European importance.

Article 6 of the Habitats Directive defines how European Protected sites are managed and protected.

Article 6 (1) applies to special areas of conservation and requires Member States to establish the necessary conservation measures and appropriate management plans. Article 6 (2) requires Member States to take appropriate steps to avoid, in the special areas of conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated. Article 6 (3) requires the competent authority to make an assessment of whether any plan or project not directly connected with or necessary to the management of the site is likely to have a significant effect upon the site either individually or in combination with other plans or projects. If a significant effect is likely the competent authority should undertake an appropriate assessment of its implications for the site in view of the site's conservation objectives.

Part of Deeside and Buckley Newt Sites SAC adjoins the proposed landfill at Parry's Quarry. Parry's Quarry is also within 4 km of the Dee Estuary which is designated as a Special Area of Conservation (SAC), Special Protection Areas (SPA) and Ramsar. Because of the nature of the emissions, the distance of the site from the Dee Estuary and the features that make up the designations, we have considered that there is unlikely to be a significant effect from the proposed landfill operations. The applicant submitted a habitats assessment focusing on the Deeside and Buckley Newt Site SAC entitled "Information to Inform a Habitats Assessment" as part of their permit application, further to this they submitted a copy of the Environment Statement which formed part of the Environmental Impact Assessment submitted in support of the planning application.

In carrying out an assessment of likely significant effect of the proposed landfill operations we concluded that there is likely to be a significant effect. We considered that there would likely be a significant effect on the SAC alone and through "in-combination" effects. We concluded that there would likely be a significant effect through the mechanisms of disturbance, habitat loss, nutrient enrichment, smothering and toxic contamination. Each of these mechanisms for impact is discussed in turn:

Disturbance

Although Great Crested Newts (GCN) have been found within the footprint of the quarry area, the protected site was set up specifically as a substitute site for this species by the previous owner of the quarry. Further to this newt fencing surrounds the perimeter of the landfill site, thus providing a means of excluding further newts from migrating into the quarry area. However in spite of this, disturbance during operations is likely to occur unless exclusion fencing and relocation from working areas is carried out. The applicant has a species licence granted by Welsh Government for the re-location of any GCN (Licence no GCN/2535/WAG/IND). However this licence does not cover the entirety of the quarry, instead this licence covers the movement of GCN for the development of a waste transfer station in a separate part of the site. Therefore the applicant would need to apply for a new licence for the movement of GCN for the development of a landfill at the site.

Habitat Loss

There would be no habitat loss within the SAC from the proposed landfill. The Applicant had been operating a quarry here for several years and there is clear delineation between where the quarry ends and where the SAC starts. Management plans, ecological compliance audit and appropriate staff training were proposed which should ensure that there would be no incursion into the SAC from the proposed landfill activities. Furthermore, there would be newt fencing in place to stop migration of newts into the balancing ponds.

However, although such measures were proposed to be in place some of the conservation objectives for the site are:

- Off-site features that impact on successful dispersal, such as roadside gully-pots, will not be subject to future construction
- The terrestrial habitat surrounding breeding ponds will comprise of refuge areas for newts, foraging areas, areas of hibernacula and corridors which will aid the dispersal of great crested newts.
- Off site habitats that function as stepping stone or corridors located between SAC compartments will be maintained for migration, dispersal, foraging and genetic exchange purposes

With this in mind there would inevitably have been some loss of suitable habitat for GCN, but this loss would not have been of areas designated as a SAC.

Nutrient enrichment

Nutrient enrichment could potentially occur from aerial emissions and also from leachate escaping from the site's liner if the permit were granted. With regards to nutrient enrichment caused from leachate egress from the landfill, the landfill was proposed to be operated using the principles of hydraulic containment which should prevent egress of leachate outside of the landfill during the operational phase. However during the construction phase of the landfill, dewatering of groundwater would be required. There was no consideration made to failure of pumps or breaches of the Artificial Sealing Liner if a permit were granted. Therefore it had to be considered that nutrient enrichment could occur from egress of leachate.

Smothering

Smothering would have been possible especially as dust could be generated during both the construction phase and the operational phase of the landfill, therefore, there will be an in-combination effect between different stages of the site development. However effective management techniques such as dousing with water during dry times and when the wind direction is blowing towards the SAC should mean that the risk would be no greater than was previously posed when the quarry was active.

Toxic Contamination

Toxic Contamination could be caused by escape of concentrated leachate. The landfill was proposed to be compliant with the Landfill Directive engineering requirements. However there would be several years before the landfill would be able to operate according to the principles of hydraulic containment. During this time, as the landfill is proposed to be below water table, active pumping of groundwater would be required. There had also been insufficient consideration made to failure of pumps or breaches of the Artificial Sealing Liner in the habitats assessment carried out by the applicant. Therefore it had to be considered that toxic contamination would have been possible to occur from egress of leachate. Furthermore one of the conservation objectives for the SAC is that Algal blooms and surface sheens should be absent from display/breeding ponds. Surface sheens could be taken as an indicator of toxic contamination

Because we determined that there may be a likely significant effect if a permit were granted we had to carry out an appropriate assessment.

A draft appropriate assessment against the objectives of the SAC was carried out for the proposed landfill application. It was concluded that the loss of the quarry land for landfill would **not** have a long term adverse effect as long as:

- a) the quarry remains completely separate from the GCN habitat by newt proof fencing
- b) the habitats within the SAC are managed to enhance the conservation features of the SAC,
- c) non-designated land is managed to compliment the SAC habitats and
- d) semi-natural habitats connections to the wider countryside are retained adjacent to the site.

This considered view is based on the need for ongoing surveillance, translocations of newts found within the working or operational areas and the construction/operational activities being strictly controlled through conditions and licences. Ultimately on restoration, the site has the potential to provide new habitat for GCN to colonise.

There are a number of other applications which could potentially have a significant effect on the SAC due to habitat deterioration caused by people/recreational

pressures. In this instance there is no formal access to the SAC and disturbance through recreational activities is not an issue.

Mitigation packages have been proposed to enhance the local GCN population and the SAC habitats particularly on restoration. The development of the adjacent Alltami Quarry as a landfill could restrict connectivity to the wider countryside further but detailed mitigation will be included within the scheme.

This particular development does add to the in combination effect, however the scale is negligible and would therefore not significantly impact on the site's integrity. However it is recognised that there will need to be a strategic approach to development in the future, so that alternative green spaces are secured for recreation purposes while ensuring the continuity of green links between the different sections of the Deeside and Buckley Newt SACs. In this way the favourable conservation status of the SAC can be maintained in the long term.

Please note, due to the ongoing nature of the application formal approval of appropriate assessment conclusions was not sought as the permission is being refused. However, we have consulted with the conservation advisors for the Deeside and Buckley Newt Site throughout the process and therefore the above discussion can be considered as agreed in principle.

4.14 Amenity and Health Risk Assessment

The applicant submitted an Amenity and Health Risk Assessment as part of their application. The risk assessment considers the impacts of: noise and vibration, odour, fugitive emissions, pests, mud on roads, litter and accidents. The table below shows the receptors and the distance from the proposed landfill.

Type of receptor	Direction from site boundary
Domestic dwellings between 50m and 250 m	SSE and NE
Domestic dwellings between 250 and 500 m	SE, NW, NNW
Offices, industrial units and commercial premises within 500 m	NE, ENE, NW, NNW, SW
Public footpaths within 500 m	W, N
Roads	E, S,W

We did not agree with the applicants Amenity and Health Risk Assessment with regards to the stated impacts of odour, emissions to air and pests. In particular we rejected claims by the applicant that the impact of odour would be negligible and requested that the applicant reconsider their assessment. We also could not support the applicants claims that no additional measures would need to be taken to control the risk of air emissions based on guidance. Our position is that site specific measures should always be taken and that this could be interpreted as though there is no need to take any further measures should there be a problem because guidance is being followed. With regards to the risk from pests we required clarification of what specific actions would be taken in the event of these becoming a problem. We therefore requested that the applicant revise their Amenity and Health Risk Assessment in a Schedule 5 Notice dated 3rd March 2014. A revised Amenity and Health Risk Assessment was provided in response to this Schedule 5 Notice on

6th June 2014. Barring issues we still had with regard to odour and gas control, this revision was accepted.

4.15 Financial Provision

Adequate financial security by way of agreed financial provision is a requirement of the Landfill Directive. Article 8 (iv) sets this out as follows: “adequate provisions, by way of a financial security or any other equivalent, on the basis of modalities to be decided by Member States, has been or will be made by the applicant prior to the commencement of disposal operations to ensure that the obligations (including after-care provisions) arising under the permit issued under the provisions of this Directive are discharged and that the closure procedures required by Article 13 are followed. This security or its equivalent shall be kept as long as required by maintenance and after-care operation of the site in accordance with Article 13(d)”.

Financial provision must be 'adequate' for Applicant's to discharge the obligations of their permit for as long as the landfill poses a hazard. We must consider the type of financial mechanism proposed and the security of that mechanism, as well as the amount.

The provision must be sufficient for the Applicant to meet all of the obligations of the permit including the closure and aftercare obligations. The funding must be secure for the duration of the permit so that funds are available to discharge the obligations of the permit. Funds must be accessible to discharge the obligations of the permit at the relevant time so that they are available usually after the work has been done. The rules of access to those funds are set out in a legal agreement between us. The mechanism must be sufficiently flexible to allow appropriate access to funds should there be premature or delayed closure of the landfill.

The Environment Agency provide the guidance and a spreadsheet to be used to calculate the amount of financial provision required which has been adopted by NRW. The applicant submitted an expenditure plan, we did not consider the financial provision calculation to be adequate. We requested further justification from the applicant to consider the following:

1. Costs provided for the engineered clay cap, restoration soils, seeding and cultivation and long term disposal costs were very low. We requested an explanation for how these costs had been estimated.
2. The one off leachate treatment plant provision was set at £2000. We presumed that this was a typographical error and requested actual capital costs for the leachate treatment plant set up.
3. The total length of drains was given as 1,200 metres. We would expect surface water drains to run along the perimeter of the site, thus we expected the total length of drains to be greater than 1200 meters and to actually match the perimeter length. There also didn't seem to be any consideration for drains running outward from the landfill to the perimeter of the landfill. We requested an explanation for the applicants measurements.
4. The percentage of surface water drains cleared per annum was given as 2%. We do not consider this to be an acceptable amount. As a minimum we would expect 15% to be cleared per annum. We requested that the applicant revise their figures upwards to a more reasonable amount.
5. The submitted costs for clearing a length of drain was provided at 50 pence per metre. We considered this to be very low and requested an explanation for how they calculated how much it costs to clear each metre of drain.
6. Only 1% of construction costs was allowed for maintenance of fences and gates. We would expect a fence to need replacing at least twice over a 60 year period. Therefore we would expect this percentage to be revised to at least 5%. We requested that this be revised.

A revised expenditure plan was submitted with the applicants Schedule 5 response on 6th June 2014. However as we have decided to refuse the permit no Financial Provision calculations have been made.

5 The legal framework (what legislation/directives applied and how they affected our decision)

NRW has had due regard to all relevant UK and EU legislative and regulatory requirements including in particular those contained in:

The Environmental Permitting Regulations 2010 (as amended) ('EPR')
The Wildlife and Countryside Act 1981
The Natural Resources Body for Wales (Establishment) Order 2012
The Natural Resources Body for Wales (Functions) Order 2013
The Conservation of Habitats and Species Regulations 2010
Directive 1999/31/EC - The Landfill Directive
Directive 2010/75/EU - The Industrial Emissions Directive
Directive 2003/35/EC – The Public Participation Directive
Directive 2000/60/EC - Water Framework Directive
Directive 92/43/EEC - on the conservation of natural habitats and of wild fauna and flora ('The Habitats Directive')

The development is subject to the Environmental Permitting Regulations 2010 (as amended) ('EPR') because it proposes to carry out an activity listed in Part 1 of Schedule 1 to the EPR:

Section 5.2 Part A (1) (a) – The disposal of waste in a landfill – (ii) with a total capacity of more than 25,000 tonnes.

Schedule 10 EPR applies in relation to applications for and regulation of landfill operations in England and Wales.

NRW has had due regard to all relevant guidance including in particular:

Defra guidance - Environmental Permitting Guidance. The Landfill Directive.
Version 3.1
EPR 5.02 How to Comply with your environmental permit: Additional guidance for landfill
LFD1: Understanding the Landfill Directive
Waste acceptance at landfills: Guidance on waste acceptance procedures and criteria
Guidance on Financial Provision for Landfill
LFE 1: Our approach to landfill engineering

Guidance on landfill gas flaring
Guidance for monitoring enclosed landfill gas flares
Guidance for monitoring landfill gas engine emissions
Guidance for monitoring trace components in landfill gas
Guidance for monitoring landfill gas surface emissions (in England and Wales);
Guidance on gas treatment technologies for landfill gas engines.
UK Waste Industry Code of Practice on Landfill Gas
UK Waste Industry Code of Practice on Perimeter Soil Gas
Environment Agency Guidance on the Management of Landfill Gas

LFTGN 03 including associated guidance documents:

6 Environmental issues: likelihood of pollution

6.1 Landfill Gas Management Plan and Risk Assessment

When assessing the suitability of a proposed landfill gas extraction system for a new non-hazardous waste landfill we must look at the potential hazards that are associated with the production of landfill gas for the entire lifetime of the site. To achieve this the applicant must set out detailed best practice options for achieving the desired outcomes, eliminating or reducing risk to the lowest possible level and installing the best possible industry leading infrastructure with the corresponding maintenance and management of the infrastructure installed.

Queries relating to the landfill gas infrastructure and management were sought via two Schedule 5 notices for further information dated 3rd March 2014 and 11th September 2014 and a meeting at the Applicant's consultants' office in Shrewsbury date 30th January 2015. It was made clear to the Applicant that using a horizontal extraction system as the main extraction system for the operational lifetime of the site did not represent best practice, did not reduce environmental risks to an acceptable level and was therefore unacceptable to NRW. The applicant did not change these details of the design and still proposes a horizontal system as the gas collection system throughout the operational life of the site.

With regard to gas management the main considerations for NRW in deciding such an application is to ensure that any system is designed to:

Eliminate or reduce greenhouse gas emissions
Eliminate or reduce odour from point source and diffuse emission
Eliminate or reduce off site migration with the potential to cause explosion or asphyxiation in a confined space at a receptor
Ensure that the facility will not cause undue pollution, nuisance or detriment to human health, the locality and the environment.

In accordance with paragraph 1 of Annex I to the LFD, NRW can only grant an environmental permit where:

- The location of the landfill is such that the landfill would not pose a serious environmental risk; or
- The corrective measures proposed indicate that the landfill would not pose a serious environmental risk.

In proposing a horizontal trenched system as the main gas extraction and control infrastructure for the operational lifetime of the site the applicant is not adopting best practice and would therefore not be able to ensure that the system meets these aims.

Decision Reasons

Operating a horizontal extraction system for the operational life of the site as the primary extraction mechanism is not best practice and will not be able to adequately control the risks associated with landfill gas for the operational life of the site for the following reasons:

1. Best practice for Landfill in the UK is the guidance issued under the Landfill Directive by member states. In the UK this guidance for landfill gas management is as follows:

Environment Agency/NRW Guidance on the Management of Landfill Gas LFTGN 03 including associated guidance documents:

- Guidance on landfill gas flaring
- Guidance for monitoring enclosed landfill gas flares
- Guidance for monitoring landfill gas engine emissions
- Guidance for monitoring trace components in landfill gas
- Guidance for monitoring landfill gas surface emissions (in England and Wales);
- Guidance on gas treatment technologies for landfill gas engines.

Industry Guidance:

- UK Waste Industry Code of Practice on Landfill Gas.
- UK Waste Industry Code of Practice on Perimeter Soil Gas

LFTGNO3 Guidance on the management of landfill gas and its associated guidance documents, were prepared as a response to the improved standards required by the Landfill Directive, and are part of the best practice guidance. These documents contain details of the type of systems and approach that we might expect an applicant to have proposed. This document sets out a structured approach to the management of all gases generated from landfilled waste. It covers the assessment of landfill gas impacts, the implementation of control methods and the monitoring required to demonstrate proper performance of the control measures. This along with any further technical developments in the industry should be part of a detailed reference section to construct an extraction system to best practice.

2. Horizontal wells were proposed for the operational lifetime of the site. This does not represent an 'early sacrificial system', they are a scavenger system with limited use in shallow waste. A system designed following best practice would be required to expedite the aims of the LFD, which responded to changes in waste depth and site conditions (for example perched water, increase gas yield in times of high rainfall) throughout the operational life of the site where a significant proportion of the Landfill gas is emitted. Horizontal pipework is prone to collapse and bending, clogging and poor application of pressure gradients at any distance from the source of suction. They are prone to air ingress and the resulting increase in oxygen levels can promote fires and cross interference. NRW cannot therefore support the use of horizontal wells as the main extraction system for the operational lifetime of the site.

Pin wells were discussed as an adjunct to horizontal wells in a revised design system. The requirement for a sacrificial and substantial drilled vertical extraction or other best practice system before the site is finally capped is an

essential component of a gas extraction system that may give the required level of control at this site. Furthermore, perched leachate removal will not be possible in horizontal or pin wells which will result in the derogation of the system or gas system failure.

3. Landfill gas can cause harm to human health through explosion, fire, asphyxiation, toxicity and odour. Maximising landfill gas capture reduces harm to human health and the environment including reducing the emission of greenhouse gases that contribute to global climate change. Applicants for landfill environmental permits must ensure that the collection, treatment and use of landfill gas minimises the release of gases.
4. Where fine control is required of landfill extraction systems to reduce the risk of fires and odour emission in a gas scavenging situation then the site must have detailed attention paid to the balancing of each individual well and its oxygen content and pressure distribution across the site. This cannot be achieved with horizontal systems.
5. As waste degrades it settles causing deformation in the waste mass. This will cause deformation in the horizontal pipework and increase the likelihood of poor drainage and loss of functionality along with accumulation of bio-rock, and sludge deposits which will cause pipe blockages that cannot be removed. The applicant has not provided any detail about how these elements would be managed to maintain the efficacy of the system.
6. No explanation has been provided with regard to how the horizontal pipe-work would be de-watered. This is critical to the continuing performance of any gas extraction system. If the pipe-work becomes flooded with perched or basal leachate then no gas can be extracted. This often leads to a build-up of gas pressure under the perching leading to high emissions and increased potential of migration.
7. There was no well-defined gas control regime presented in the application. For example there was no defined balancing regime and pressure control regime. The type of control valve that is used and the applied mains pressure will be vital to maintaining control at shallow waste depths. These details were not specified in the application.
8. Contingency plans for the failure of the system are unacceptable. The continued reliance on a purely horizontal system (with some pin wells as an adjunct system after an issue has been identified) does not represent best practice.
9. Gas extraction would need to begin as soon as possible after tipping has started. Odour nuisance and the establishment of extractable volume will be key drivers to ensuring early intervention and control of gases produced by the deposited waste. The criteria for doing so has not been defined in enough detail.
10. The rationale the applicant has used when including a horizontal extraction design as the main design for the operational life of the site is flawed. The applicant has cited a minor part of the Industry Code of Practice on Landfill Gas (ICOP) without citing the full design and construction elements contained within the ICOP. Furthermore, this has been cited without reference to regulatory guidance notes or a plethora of design options which exist in the

industry. We maintain that the citation of the ICOP is out of context and does not represent an adequate long term solution for the extraction of landfill gas for the operational lifetime of this site.

For clarity, the relevant section of the ICOP is re-produced below:

Each design is useful in differing situations. **The standard well installed will generally be a drilled gas well. Impact wells are useful in very shallow areas (<10 metre depth)** or in areas that are temporarily tipped and will be over tipped at a later date. **Horizontal wells are useful in shallow waste and more usually installed in the active tipping area to control surface emissions.**

11. An effective odour management strategy should be centred on the maintenance of a state of the art gas extraction system. Any management of off-site odours or odour control by means of chemical spraying has proven to be ineffective at other sites and has at times contributed to the problem. A detailed out of hours response to plant or equipment breakdown, a detailed maintenance schedule of the LFG infrastructure including dipping of gas wells (unachievable using the horizontal system proposed) and de-watering along with the provision of in well leachate pumps and perched leachate storage in sealed units (to prevent odour) is essential to ensure that odour is managed correctly. The applicant has not satisfied these requirements in their application.
12. Extracting gas from waste flanks without pulling in air whilst maintaining extraction efficiency is a critical aspect of infrastructure design that is missing in this application. This operational method would render the flanks at the site as un-extractable and therefore a potential source of uncontrolled emissions and odour. No solutions have been proposed to this issue in the application.
13. The greatest volume of gas will most likely be generated and emitted during the operational phase of the site (Greenhouse Gas Inventory Project DEFRA). Therefore to install the vertical drilled extraction system post capping means that the Applicant would only commit to a full extraction system when a greater proportion of the landfill gas has been produced during the operational phase of the site. The rationale for developing the gas management at the site in this way is therefore incompatible with the aims of the Directive.
14. The applicant initially applied a low risk categorisation to this landfill. Analysis of the site environmental setting would immediately point to the site as not being of the low risk category as there are many vulnerable receptors close by and a geology through which gas could migrate. The decreased depth over which sub surface migration can occur due to the narrowing of the migration band by raising the sub water table does not, in our opinion, decrease the risk of migration. It can in some circumstances cause the gas to move further out from the site. The evidence from many sites with clay lining systems is that they suffer from lateral migration. In our opinion the containment system proposed at this site does not represent a barrier to lateral migration. Furthermore the measures and standards applied to the whole extraction system, the type of extraction system and the maintenance of the system would be the most critical aspects of preventing migration at this site.

15. The applicant showed a poor understanding of the risks posed from landfills and the sensitivity of the area by stating that the odour effects from the landfill 'would be negligible.' For installations where there is a significant risk of odour (including all landfills for biodegradable waste), reference must be made to our guidance document H4. This states explicitly that there will be a significant risk of odour from all landfills. This forms the starting point for the risk assessment process for odour from landfills. In the original application and subsequent revisions we believe that the applicant has significantly under-estimated the level of risk .
Allied to this they stated that the proposed clay liner would be 'impermeable to gas' and that an extraction efficiency of 95% would be achieved. Lifetime collections efficiencies in the UK are estimated to be around 55% with the highest surveyed reading of 75% and the lowest 26% These estimates were based on the recent DEFRA DIAL survey which is a snapshot and not a full life history.
16. The phasing plan for the site is critical to the early extraction of gas. The required depth of waste must be achieved quickly and the control of gas from the flanks of the landfill must be built into the design. The applicant has not made provision for these critical issues in the application.
17. Risk assessment should discuss and appraise the worst case scenarios that might result from the proposed operation. When assessing the risk of migration to receptors (housing and other buildings) for example; actual construction details should be used where possible, however where this is not possible, a worst case scenario of an unventilated sub-floor void with no gas protection should be assumed. The level of detail required to ensure that the operation is eliminating the risks from the site or controlling them to an acceptable level has not been provided by the applicant.
18. As we do not agree that the proposed gas extraction system will provide adequate gas control for the operational life of the site, we do not accept the applicant's contention that gas will be retained in the site by the system and that gas migration is an unlikely scenario.

Our relevant decisions should be informed by an environmental risk assessment submitted by the proposed landfill applicant with the permit application. This environmental risk assessment should address both normal, unusual and unplanned operating conditions. It should cover the entire lifecycle of the landfill from initial construction to the point where the landfill no longer poses a risk to the environment. We are of the opinion that the risk assessment (i) inadequately covered the risks posed by the landfill, (ii) underestimated the risks and did not submit the design of the extraction system following best practice and (iii) did not adequately take into account the measures required to be taken should the system fail. Therefore, we cannot be assured that the site will not represent a serious environmental risk or an unacceptable risk of harm to the locality through odour migration, based on the design of the landfill gas system as submitted.

6.2 GASSIM and Air Dispersion Modelling.

In support of the permit application the applicant submitted a landfill gas risk assessment report entitled "Parry's Quarry Air Dispersion Modelling, Final Report, October 2011. Landfill GASSIM modelling files and air dispersion modelling ADMS files were also submitted together with the report.

The applicant has also submitted an odour assessment "Parry's Quarry Environmental Permit Application – Parry's Quarry Amenity and Health Risk Assessment, October 2011", this was the odour assessment used in support of the applicants planning permission. The GASSIM modelling results included in the odour assessment report were significantly different from those predicted by the submitted GASSIM modelling files (see Section 1.1). Also AERMOD air dispersion model was used in the odour assessment. We requested that the applicant provided the corresponding AERMOD and GASSIM modelling files used for the odour assessment for auditing and explained why the GASSIM modelling results were significantly different between planning and permit application. It was noted that there was an error with opening the GASSIM modelling because cells were overlapping and that two gas engines were proposed however not enough landfill gas was predicted to be produced for two gas engines. Clarification was sought for these discrepancies. It was also noted that emissions from the proposed flare were not included in the dispersion modelling and therefore an air quality assessment was requested for the flare. Furthermore several discrepancies were noted with regards to surface roughness parameters used in the modelling and that a background map that was used in the modelling was out of date and may have underestimated Nitrogen dioxide (NO₂) concentrations. This information was requested in a Schedule 5 Notice sent to the applicant on 3rd March 2014. A response was provided by the applicant on 6th June 2014.

In assessing this response it was noted that in the Final Revised Air Dispersion Modelling report it states, "This assessment considers one emission scenario, namely peak emission year (2026) for the surface flux of landfill gas, as derived from GASSIM simulations,". However, the emission rates shown in Table 2.2 of the same page were not consistent with the GASSIM simulations, especially for the odour surface emissions.

Based on the check modelling, we agreed with the applicant's conclusion that it is unlikely the predicted emissions from the proposed installation would have a significant impact on NO₂ air quality at the selected receptors and on the relevant habitat sites in terms of the relevant Critical Levels and Critical Loads. We also agreed with the applicants conclusion that it is unlikely the predicted emissions from the proposed installation would have a significant impact on health in terms of Hydrogen Sulphide (H₂S) EAL and Carbon disulphide (CS₂) EAL.

We needed to clarify with the applicant some further details. Through a 4th Schedule 5 Notice dated 11th September 2014. We requested clarification that cell 4 is the active cell for modelling and how the SNIFFER ER31 report was used in the odour emission calculation. We also requested clarification with regards to Table 2.1 of the Final Revised Air Dispersion Modelling report on (i) what the oxygen and water vapour contents in the engine exhaust and flare exhaust were. (ii) how the flare efflux velocity was estimated and (iii) clarification regarding the flare diameter due to discrepancies between the text and the GASSIM modelling file.

We also requested clarity with regards to Table 2.2 of the report in respect of (i) H₂S and CS₂ emission rates from Cells 1 and 4 which were smaller than GASSIM simulations; (ii) odour emission rates from Cells 1, 2 and 3 which were smaller than GASSIM simulations but larger for Cell 4. Furthermore, the surface roughness was adjusted from 0.75 m to 0.5 m in the applicant's submitted ADMS modelling files for NO_x and odour, but not for H₂S and CS₂. We considered that even 0.5 m is too high. We requested that sensitivity analysis be carried out, in relation to surface roughness, and an explanation for why H₂S and CS₂ had been omitted from the assessment.

Table 2.6 of the report cites Buckley Clay Pits as a SSSI. The site is also a SAC site (SAC Deeside and Buckley Newt sites, UK 0030132). Furthermore, the closest area of the Dee Estuary is approximately 4 km, not 7 km as claimed in the applicants report. There is also an Ancient and Semi Natural Woodland site, approximately 400 metres from the proposed facility, which should have been included in the modelling assessment. We requested that this be revised accordingly and included in the modelling.

The applicant also claimed that data from the FRAME model can be extracted via the Air Pollution Information Service (APIS) website. The APIS website no longer uses FRAME outputs. We therefore requested that this be revised accordingly.

In the applicants response to our Schedule 5 notice, dated on 3rd Feb 2015, the applicant revised the surface emission rates for odour, H₂S and CS₂. The applicant's re-modelling predicts that the World Health Organisation (WHO) odour annoyance criterion for H₂S (of 7µg/m³ as a maximum half hourly average) will be exceeded at 10 out of 13 sensitive receptors, (Table 2.4), and the Environment Agency H4 horizontal guidance odour threshold (of 3 OUE/m³ as the 98th percentile hourly odour concentration in a year) will be significantly exceeded at one sensitive receptor. These predictions were confirmed during our assessment.

We obtained a spreadsheet dataset of concentrations of various landfill trace gases measured by landfill operators (comprising the Landfill Gas Industry Group (LGIG) members) up to 2014. This spreadsheet was based on operator analyses of trace gases during the date intervals provided. In this dataset H₂S is one of the trace gases included in the spreadsheet, and is one of the trace components which have greatest potential to contribute significantly to the odour from a landfill. Measurements of odour and CS₂ were not included in the spreadsheet.

To the best of our knowledge, the GASSIM's default concentration distribution of trace gases including H₂S was based on the measurements before 2007. Further investigation was carried out to compare the GASSIM default distribution of H₂S with more recent actual measurements. This has implications in the H₂S odour criterion assessment and overall odour assessment.

Measured H₂S trace gas concentrations

Figure 1 shows average H₂S trace gas concentration measurements up to 2014. H₂S concentrations in Figure 1 can be divided into three groups: (i) the concentration data was not complete from 1993 to 2000; (ii) relatively stable but lower concentrations between 2001 and 2006; (iii) relatively stable but higher concentrations from 2007 to 2014.

H₂S trace concentration measurements in group (iii) from 2007 to 2014 are more relevant than the GASSIM default values. The 2007 concentration in Figure 1 was

averaged on the measurements of 98 landfill sites, 2008 concentration was averaged on 137 landfill sites, 2009 on 166 landfill sites, 2010 on 135, 2011 on 153, 2012 on 139, 2013 on 142, and 2014 on 43.

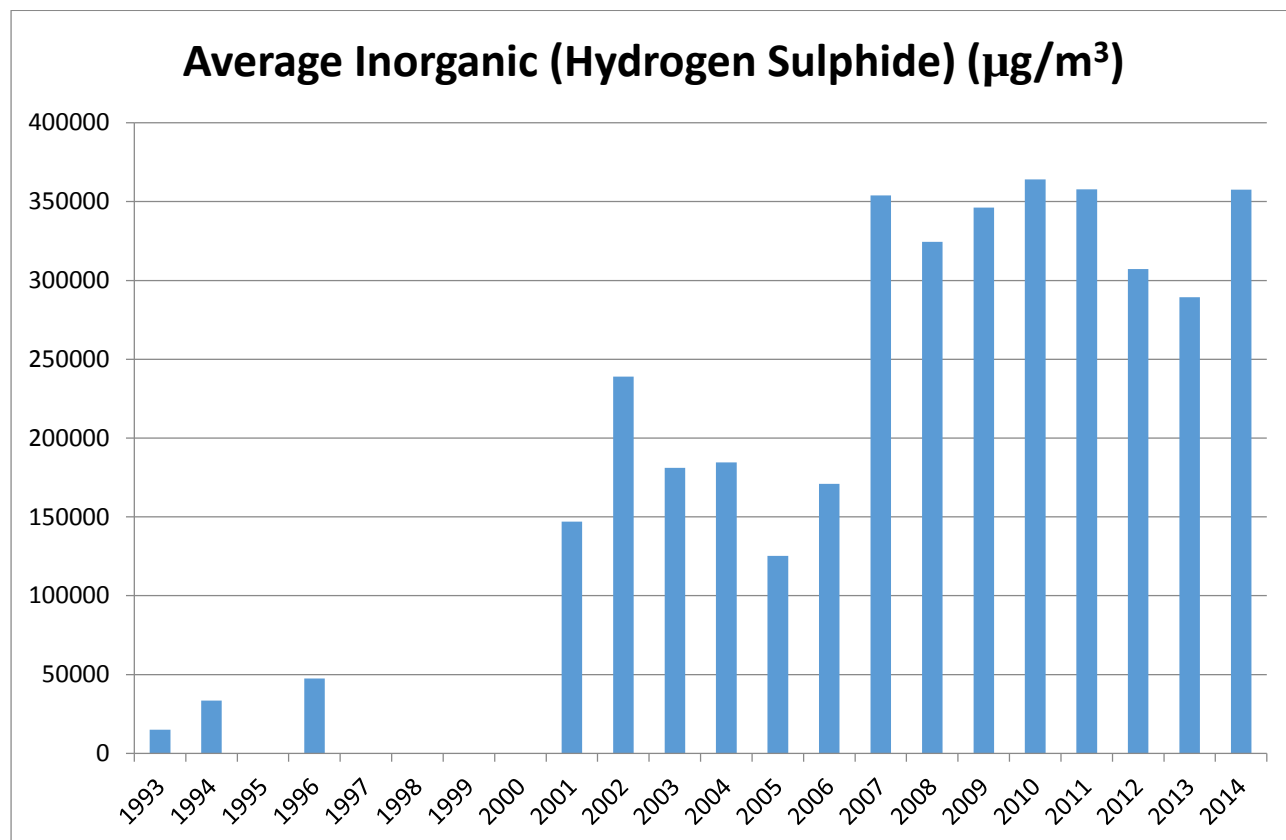


Figure 1. Measured H₂S trace gas concentrations averaged on various landfill sites.

H₂S trace gas concentration distribution

Figure 2 shows GASSIM default H₂S trace gas concentration distribution (in red) compared with fitted measurements from 2007 to 2014 (in green). There are in total 1012 measures from 2007 to 2014.

GASSIM default H₂S trace gas concentration distribution was LogTriangular distribution, whereas for the 2007 – 2014 measurements the distribution is best fitted as LogNormal distribution. It is apparent that the GASSIM default distribution has a lower mean concentration than the distribution based on 2007 – 2014 measurements.

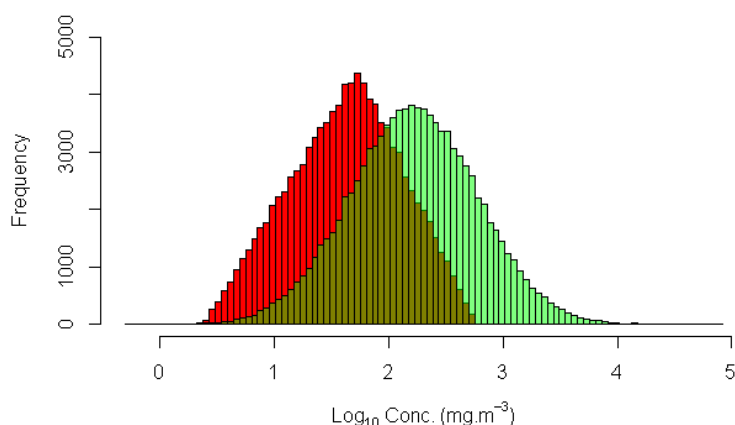


Figure 2. GASSIM default H₂S trace gas distribution (in red) compared with fitted measurements from 2007 to 2014 (in green). There are total 1012 measures from 2007 to 2014.

GASSIM model prediction of H₂S emission rate

The applicant used GASSIM default H₂S trace gas distribution to predict H₂S emission rates for their dispersion modelling. This default distribution should only be used when no update distribution is available.

Figure 3 shows the comparison of predicted H₂S trace gas emission rates between GASSIM default distribution and 2007-2014 measurement distribution. As expected, the GASSIM default distribution consistently gave lower H₂S emission rate than the 2007-2014 measurement distribution. The predicted H₂S emission rate at 2026 was modelled by AMEC using GASSIM default values, if the measured 2007-2014 distribution values had been used then the predicted emission rates would be approximately 20% greater than the applicant modelled.

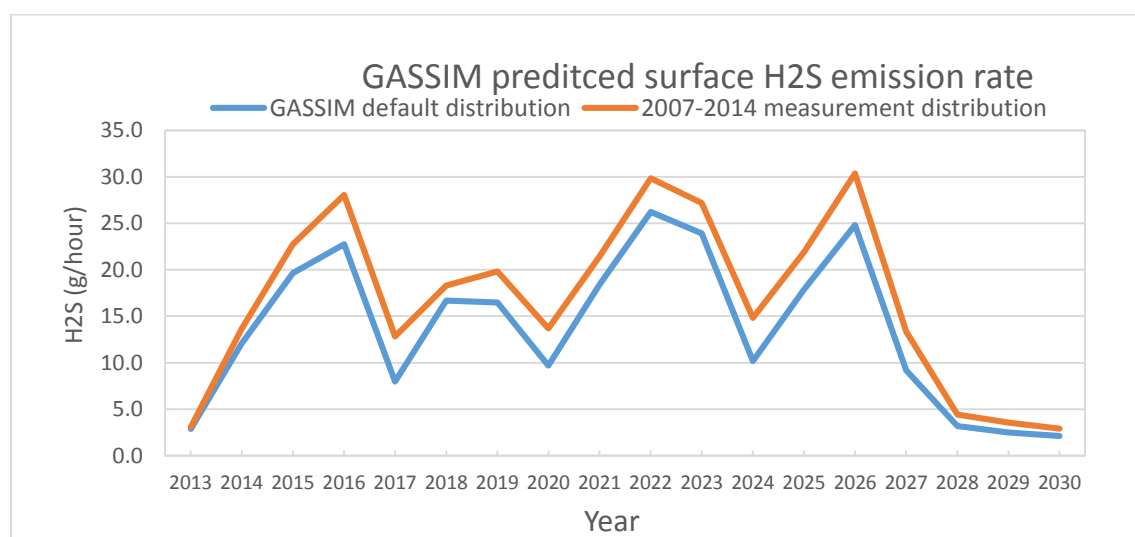


Figure 3. Comparison of predicted H₂S trace gas emission rate between GASSIM default distribution and 2007-2014 measurement distribution.

Conclusions

The applicants remodelling, based on the GASSIM default H₂S trace gas distribution, predicts that the WHO odour annoyance criterion for hydrogen sulphide (of 7µg/m³ as a maximum half hourly average) will be exceeded at 10 out of 13 sensitive receptors. This means that odour nuisance would be expected at these sites. In addition the predictions would have been about 20% higher if the distribution based on the more realistic 2007-2015 data had been used.

There was no measured odour concentration in the provided spreadsheet dataset, therefore the direct comparison on odour emission rate was not possible. However, H₂S is one of the trace components which have greatest potential to contribute significantly to the odour from landfills.

The applicant's remodelling predicts that the Environment Agency H4 horizontal guidance odour threshold (of 3 OU_E/m³ as the 98th percentile hourly odour concentration in a year) will be significantly exceeded at one sensitive receptor, which was confirmed by our assessment.

Annex 2: Consultation, web publicising and newspaper advertising responses

Reponses to our consultation, web publicising and newspaper advertising are summarised in the following table.

Response received from
• Flintshire County Council • Betsi Cadwaladr University Health Board • 17 Public responses
Brief summary of issues raised
• Requests that noise be controlled • Queries relating to how effectively the site would be regulated • Concerns with regards to odour, gas emissions • Concerns raised regarding pests • Concerns on effects on local amenities • Concerns with regard to impact on local wildlife, Alltami Brook and River Dee • Concerns about Subsidence • Concerns about location • Concerns about extra traffic • Concerns about the effect on house prices • Proximity to geological faults • Requests for revised ecological survey to be carried out • Concerns raised about visual impact of landfill • Concerns about the expense of restoration and if applicants have financial backing to manage ongoing restoration costs • Were advised that 3rd part consent would be needed for discharge to Alltami Brook as discharge is not on RJS owned property.