Environment Agency permitting decisions

Variation

We have decided to issue the variation for Thornhaugh Landfill operated by Augean South Limited.

The variation number is EPR/RP3133PP/V006.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Description of the changes introduced by the Variation requested by the operator

This is a Substantial Variation.

The operator applied for a variation to their permit to make the following changes:

- To extend the current installation to include operation of landfilling in additional areas of land comprising Phases 1 and 2 (permitted under EAWML 70119) and in an area of land known as ‘Bradshaw land’ between Phases 4 and 7.
- To excavate wastes that have already been deposited in Phases 1 and 2 and waste materials present in Phases 4 and 7.
- To include a waste operation for sorting, screening and crushing of waste to recover materials prior to their removal from the site or use at site.
- To add temporary storage and handling of excavated waste as a directly associated activity (DAA).
- To remove the Carbon Dioxide compliance limits in accordance with the Industry Code of Practice on perimeter soil gas.

Description of the changes introduced by the Environment Agency initiated variation - Landfill sector review

The Environment Agency has a duty, under the Environmental Permitting (England and Wales) Regulations 2010, regulation 34(1), to periodically review permits. As a result of that review we have identified a number of necessary changes we must make to the permit to reflect current legislation and best practice. These changes principally relate to:

- The addition of a standard condition for landfill gas management at all landfills;

- A change to the hydrogeological risk assessment condition so that reviews are undertaken every 6 years rather than every 4 years;
- The addition of standard leachate and groundwater quality monitoring tables (schedule 3); and
- A standard reporting table (schedule 4).

The review will also aim to do the following:

- Consolidate permits - all variations to the permit will be brought together in to one permit so the requirements will be clearer.
- Formalise changes to monitoring requirements and compliance limits where we have agreed them in writing, for example as the result of a hydrogeological risk assessment review.
- Waste acceptance rules will reflect the Landfill Directive and governments' waste strategies.
- Implement the Industrial Emissions Directive (IED) and other regulatory changes.
- Include permit conditions to implement the statutory requirements of the Waste Framework Directive, for example to reflect the requirements of the waste hierarchy.

Site specific issues which result in a change to the current template will also be addressed, for example incorporating completed improvement conditions into the permit and removing inconsistencies.

Other changes may relate to a specific permit or amendments to monitoring requirements or emission limits which have been agreed with the Environment Agency but not incorporated into the permit.

Schedule 1 to the notice summarises the changes we have made to the permit.

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
- justifies the specific conditions in the permit other than those in our generic permit template.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Structure of this document

- Key issues
- Annex 1 the decision checklist
- Annex 2 the consultation and web publicising responses

Key issues of the decision

Phases 1 and 2 regulated under EAWML 70119 were excluded from the landfill installation re-permitted under the PPC Regulations because they were not engineered in accordance with the requirements of the Landfill Directive. As a result, the operator submitted a Closure Report to the Environment Agency in May 2008 and a variation application (EPR/FP3790NJ) in December 2010 to enter Phases 1 and 2 into closure. However, after discussions with us, the operator applied in October 2014 to consolidate Phases 1 and 2 into the landfill installation permit EPR/RP3133PP by proposing to excavate the old waste materials prior to re-engineering in accordance with the current Landfill Directive requirements. In determination of this variation we have accepted the operator's proposals. Therefore the requirement to cap and restore Phases 1 and 2 as imposed in variation notice EPR/FP3790NJ no longer apply. The issuing of this variation removes the need for the operator to meet the Landfill Directive closure requirements at this time. Landfill closure will be dealt with once the current filling operations permitted in the consolidated landfill installation cease.

Annex 1: decision checklist

This document should be read in conjunction with the application, supporting information and permit/notice.

Aspect considered	Justification / Detail	Criteria met Yes
Receipt of submission		
Confidential information	A claim for commercial or industrial confidentiality has been made. We have accepted the claim for confidentiality. We consider that the inclusion of the relevant information on the public register would prejudice the applicant's interests to an unreasonable degree. The reasons for this are given in the notice of determination for the claim. The decision was taken in accordance with our guidance on commercial confidentiality.	✓
Consultation		
Scope of consultation	The consultation requirements were identified and implemented. The decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements. For this application we consulted the following bodies: • Peterborough City Council – Environmental Protection Team • Peterborough City Council – Director of Public Health • Public Health England – Centre for Radiation, Chemical and Environmental Hazards • Health and Safety Executive (HSE)	✓
Responses to consultation and web publicising	The web publicising and consultation responses (Annex 2) were taken into account in the decision. The decision was taken in accordance with our guidance.	✓
Operator		
Control of the facility	We are satisfied that the applicant (now the operator) is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with EPR RGN 1 Understanding the meaning of operator.	✓

Aspect considered	Justification / Detail	Criteria met Yes
The facility		
The regulated facility	The extent of the activities and operations taking place at the site required clarification. The regulated facility is an installation which comprises the following activities listed in Part 2 of Schedule 1 to the Environmental Permitting Regulations and the following directly associated activities (DAAs). • Section 5.2 Part A(1) (a), The disposal of waste in a landfill -Landfill for non-hazardous waste and landfill restoration. • Section 5.2 Part A(1) (a), The disposal of waste in a landfill -Landfill for hazardous waste (stable non-reactive or asbestos) and landfill restoration. • Landfill gas extraction and flaring of landfill gas for disposal in an appliance. • Leachate extraction and removal off site. • Discharges of site drainage from the landfill. • Storage of fuel for operation of plant and equipment. • Storage and handling of drums prior to disposal. • Temporary storage and handling of excavated waste. The regulated facility also includes a waste operation at which the following recovery operations will be undertaken. • R5 Recycling/reclamation of inorganic substances • R13 Storage of waste pending any of the operations numbered R1 to R12 (excluding temporary storage, pending collection, on the site where the waste is produced) The variation includes the addition of a waste operation R5 to authorise limited forms of waste treatment comprising sorting, screening and crushing. Wastes imported to the site will be treated to recover materials and waste from the site will be treated to recover materials for use on site or exported for use off site. The operator applied to include the R12 operation with reference to Annex II of the Waste Framework Directive (WFD) (2008/98/EC), to cover preliminary operations such as sorting at the site prior to their treatment at the site.	✓

Aspect considered	Justification / Detail	Criteria met Yes
	The WFD includes additional text defining the use of the R12 (Exchange of Waste) waste operation, which includes reference to various preliminary activities and states that it should only be used if there is no other appropriate recovery code. In this instance the recovery code R5 can be used for all intermediate or preparatory activities carried out prior to a waste fulfilling a useful purpose, and therefore we have determined that R12 will not apply. Leachate recirculation has been carried out at the site in the past, but during the determination the operator confirmed that leachate recirculation was not currently undertaken. If the operational requirements change in the future and recommencement of the leachate recirculation is needed, the operator will be required to apply for a variation to the permit and submit a revised Landsim model accompanied with detailed recirculation schemes. The Landsim model submitted within this application did not consider leachate recirculation and therefore this activity is excluded from the permitted activities. The decision on the facility was taken in accordance with Appendix 2 of RGN 2 “Defining the scope of the installation” and Appendix 1 of RGN 2 “Interpretation of Schedule 1”.	
European Directives		
Applicable directives	All applicable European directives have been considered in the determination of the application.	✓
The site		
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. A plan is included in the permit and the operator is required to carry on the permitted activities within the site boundary. The variation extends the current permitted boundary to authorise landfill operations in additional areas comprising Phases 1 and 2 (previously permitted under EAWML 70119) and in the area of land known as ‘Bradshaw Land’ between the current Phases 4 and 7.	✓

Aspect considered	Justification / Detail	Criteria met Yes
Site condition report	The operator has provided a description of the condition of the site. We consider this description is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under IED– guidance and templates (H5).	✓
Biodiversity, Heritage, Landscape and Nature Conservation	The application is within the relevant distance criteria of a nature conservation, and protected species/habitat. A full assessment of the application and its potential to affect the sites/species/habitat has been carried out as part of the permitting process. We consider that the proposed changes do not significantly alter the established emissions and baseline conditions of the installation. The site has a history of quarrying and landfill operations. The current management and mitigation measures have ensured the protection of existing features. Therefore we are satisfied that our previous assessment that was carried out during the determination of the original application is still valid and no further assessment of potential impact is required. We have not formally consulted on the application. The decision was taken in accordance with our guidance.	✓
Environmental Risk Assessment and operating techniques		
Environmental risk	We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory. <u>Hydrogeological Risk Assessment (HRA)</u> At a meeting on 27/11/14, the operator requested written early agreement on the reduced geological barrier specification to allow arrangements to be made for the engineering of the next Phase 7A. Subsequently as part of the duly making review we rejected the operator's proposals to reduce the geological barrier specification for all future phases from 1m to 0.5m, because this did not give us the necessary assurance that groundwater, the	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	nearby springs, Thornhaugh Beck and Wittering Brook would be sufficiently protected. We considered the proposals to be inadequate even after consideration of additional assurances through CQA procedures proposed to us in a letter dated 22/01/15. What followed was a number of exchanges of correspondence and a conference call (30/04/15) with the operator to attempt to resolve this issue. This started with a more detailed review of the HRA and several questions that we put to the operator (letter dated 03/02/15) on the risk assessment (Landsim) modelling. Most of the identified HRA issues were satisfactorily addressed with initial exchanges of correspondence (EA letters dated 03/02/15, 10/03/15; MJCA letters dated 18/02/15, 26/03/15). However, there remained one unresolved but important issue in relation to the period of active management control assumed in the model (EA letter dated 02/04/15, MJCA letter dated 13/04/15), which significantly influenced the model results and was the difference between a pass and a fail for this site in relation to the protection of groundwater depending on the values used. At a conference call and in a letter dated 30/04/15, the operator outlined a new proposal for Phase 7A, in an attempt to avoid further delays with excavation and construction of that phase. Some additional engineering measures were proposed in the form of a 6mm GCL beneath the low density polyethylene (LLDPE) geomembrane cap, and further modelling was provided to address the outstanding issue in relation to the values used for the period of management control. In theory, the infiltration rate through the landfill reduces significantly with the more robust capping proposals thus reducing the risk of uncontrolled leachate generation over the longer term. The operator made it clear that the additional engineering measures were being offered solely in relation to Phase 7A and would not apply to the rest of the site. In our letter dated 11/05/15, we requested further justification for the use of significantly reduced infiltration values in the modelling to represent the new engineering design. There were further exchanges of correspondence (MJCA letters dated 13/05/15, 21/05/15 and EA letter 21/05/15) which concluded in the agreement of an enhanced design for phase 7A consisting of 0.5m engineered clay liner with a HDPE	

Aspect considered	Justification / Detail	Criteria met
		Yes
	geomembrane and GCL, and a composite capping layer consisting of GCL and LLDPE geomembrane. The operator also agreed to monitor cap infiltration rates to validate the very low values for infiltration assumed in the risk assessment. The agreement of engineering for Phase 7A was finalised under the existing permit by letter of 29/05/15 from the Environment Agency to Augean South Limited, and subsequently by incorporation of the agreement (letter from MJCA to the Environment Agency dated 21/05/15) into the operating techniques (Table S1.2) of this permit. Following the successful resolution of issues associated with Phase 7A, we followed up with a request for further information dated 26/07/15 to deal with the outstanding HRA issues for the remainder of the site. In particular we were keen to see a similar design strategy as for 7A to resolve the modelling issues and to reflect the environmental sensitivity of the site. In response (letter dated 25/08/15) the operator provided a new design and accompanying HRA. The cap design was amended to GCL with an overlying granular drainage layer but without the benefit of the HDPE membrane that was proposed for phase 7A. The operator suggested that the GCL would provide a more consistent reduction in infiltration over the longer term as opposed to HDPE which gradually degrades over time. The basal engineering reverted back to the original design of 0.5m clay and HDPE but without the benefit of GCL that was agreed for phase 7A. We then asked for further information (dated 28/10/15) requesting that either the design is changed to be consistent with the Phase 7A design, or to recalculate the infiltration value to account for potential decrease in performance of the GCL cap over time and to remodel and redesign the engineering with built in redundancy. The operator responded (13/11/15) to the effect that they would not be amending the proposed design which in their opinion incorporates significant conservatism, and that the infiltration values used are also conservative. We contacted the operator to suggest that a meeting would be necessary to discuss and finally resolve these issues. This was scheduled for 29/01/16 but in fact an agreement was reached before this. Following an email exchange (20/01/16, 27/01/16) and telephone discussion with the operator on 26/01/16 we agreed a compromise consisting of:	

Aspect considered	Justification / Detail	Criteria met
		Yes
	- a basal liner design consisting of a geosynthetic clay liner (GCL) in addition to the 0.5m of engineered low permeability clay and geomembrane proposed in the application. - a cap design as proposed in Schedule 1 to the response dated 25/08/15 to the Schedule 5 Notice dated 16/07/15 comprising a GCL with an overlying 0.3m thick granular drainage layer and restoration soils of between 1m and 1.5m thickness and that Augean will carry out infiltration monitoring in order to obtain empirical data on infiltration rates. The methodology for the infiltration monitoring is to be agreed with the Environment Agency prior to the commencement of capping in Phase 7A through a Pre-operational Condition PO5. This concluded the successful resolution of all outstanding HRA issues. <u>Stability Risk Assessment (SRA)</u> We were mainly satisfied with the operator's stability risk assessment but required further detail on monitoring proposals in terms of existing waste slopes that are exposed prior to covering them with the new engineered lining system. Waste side slopes will be cut into and remain unsupported for an unspecified period of time before being covered by an engineered lining system and then new waste. For these slopes, the modelled factors of safety for short term (undrained, total stress) and long term (drained, effective stress) are approximately 1.1. The operator proposed that these slopes are monitored when they are exposed to spot signs of instability which would be rectified prior to side slope lining placement. In a response of 05/05/15 to Schedule 5 Notice dated 19/03/15 the operator explained that the description in paragraph 2.8 of the Stability Risk Assessment (SRA) Report dated September 2014 regarding the temporary excavated slopes that will be formed during the development of the site may have been misunderstood. No lining over the temporary 1v:1.5h excavation slopes will take place. Details of the design of the 1v:2.5h side	

Aspect considered	Justification / Detail	Criteria met
		Yes
	slopes which will be lined over are provided in paragraphs 2.5 to 2.7 of the SRA and have a modelled factor of safety of 1.97 as shown in Table SRA4. The temporary excavation slopes will be formed as the previously filled Phases 7, 1 and 2 are progressively excavated. These slopes will be temporary and will subsequently be excavated as the excavation works progress. The stability of the temporary slopes will be visually monitored by the site operator as is done for other existing temporary excavated and waste slopes at the site. As detailed in paragraph 12.5 of the SRA should evidence of instability be identified then the temporary slope gradients and heights will be reduced as necessary. All previously deposited waste within unlined cells at the site will be removed prior to lining works taking place. As shown on Figure SRA 4 and SRA 6 of the SRA the perimeter side slope liner will be constructed on slopes excavated to expose natural materials along the excavated north eastern, southern and western perimeter boundaries. A northern side slope will also be formed between the existing Phase 3 and future Phase 2 as shown on Section B of Figure SRA 5. This will be constructed against backfilled natural materials as was the southern side slope of the existing Phase 3. The eastern section of the northern side slope will be formed between the current access area and future Phase 1 East as shown on Section A of Figure SRA 5. Investigation of this area, as detailed at Appendix C of the ESID, found that the materials beneath this area of the access route which will remain are likely to comprise natural in situ ground. If waste is encountered in this area or any excavated side slope subgrade then the waste will be removed and backfilled with suitable engineered fill prior to the landfill liner being constructed. Also, we considered that the response dated 05/05/15 to Schedule 5 Notice dated 19/03/15 was not clear on the mixes and types of waste that will be placed in future cells and the degree of settlement that could occur as a result. Therefore we requested via Schedule 5 Notice dated 16/07/15 that the operator provides an assessment of settlement of the cells which will be re-engineered and filled, and assess the effects of any settlement on the capping system.	

Aspect considered	Justification / Detail	Criteria met
		Yes
	We were satisfied with the operator's response that the settlement will not significantly impact on the integrity of the cap. The operator explained that the wastes to be deposited in the future cells at the site are no different from those authorised under the current permit. The waste receipt data for the site demonstrates that only limited amounts of waste that are significantly biodegradable are and will be accepted at the site. As required by the stability risk assessment, to improve waste mass stability, the waste will be deposited in horizontal layers across the full width of the cell. This will reduce further the potential for differential settlement as waste streams will be layered resulting in a cumulative settlement which will reduce the effects of local variability in individual waste layers. The operator explained, as identified in the 2004 permit application, settlement of waste may occur during the life of the site and monitoring and maintenance of the capping system will need to be undertaken. As part of the ongoing management of the site routine regular inspections and surveys of the cap will be undertaken and any identified deterioration or failure of the cap will be investigated and rectified. Whilst the waste types to be accepted will not include significant quantities of biodegradable wastes consistent with the current operational practices, it is expected that any significant settlement which could affect detrimentally the integrity of the capping system as a result of the acceptance of limited quantities of biodegradable waste will take place within the 60 year management period of the site and any deterioration in the cap or its performance would be identified during this period and rectified. The operator confirmed that consistent with current practices employed for the existing lined site, differential settlement of the waste mass will be minimised by the selective placement of the waste streams. The waste used to form the final lift prior to the placement of the capping subgrade layer will be of a consistent nature, devoid of large elements that may not degrade at the same rate as the majority of the material. Objects which could collapse to leave a void directly beneath the cap shall be removed from this layer or will be crushed before disposal. In order to reduce further the risk of differential	

Aspect considered	Justification / Detail	Criteria met
		Yes
	settlement of waste a compacted subgrade layer using site derived natural materials or suitable selected stable waste material will be placed across the compacted final layer of waste. The installation of heavy structures such as leachate storage tanks on top of the capping system will be avoided. Consistent with the current approved cap design for the site it is proposed that the capping system will employ a GCL which will be lapped and therefore can accommodate gradual movement of the underlying waste mass. Settlement in the waste if it were to manifest beneath the cap would be gradual and conform to the long term geotechnical shear strength properties of the cover layers and waste resulting in shallow inclined catenary surfaces rather than abrupt steps. The strains in the capping system caused by these shallow depressions or changes in slope gradient of the restored areas would be accommodated by the laps within the GCL. In addition we have the benefit of the cap infiltration monitoring requirement in the permit, which is important for demonstrating that the design infiltration is reasonably accurate. If the monitored infiltration rate is greater than the design value, then we will be able to question how/ why the cap is leaking more than planned, and one cause may be loss of integrity due to differential settlement. <u>Landfill Gas Risk Assessment (GRA)</u> We were mainly satisfied with the operator's gas risk assessment but required in Schedule 5 notice dated 16/07/15 the operator to review their assessment on the following aspects: ▪ the changes to infiltration values for the amended phase 7A design, and for subsequent phases; ▪ predicted waste types; and ▪ hydrogen sulphide generated from high sulphate wastes/gypsum. We were satisfied with the operator's response of 25/08/15 and have reflected the necessary gas monitoring requirements in Table S3.9 of the permit. <u>Amenity risk assessment</u> We considered the operator's amenity risk assessment mainly satisfactory.	

Aspect considered	Justification / Detail	Criteria met Yes
	However, the operator did not submit an odour model assessing the worst case scenario for emissions originating from re-exposing former landfill waste which we consider necessary as deposited waste has potential to generate saturates and volatiles that may have an impact on the surrounding sensitive receptors, in particular residential dwellings. We requested the operator to undertake this assessment via Not Duly Made letter dated 31/12/14. We are satisfied with the operator's response which included an odour assessment using the GasSim model. The assessment consisted of the screening approach using maximum worst case concentrations based on dilution factors demonstrated by research and the modelling assessment based on a worst case assumption that the entire surface of the waste mass in Phase 1 and Phase 2 will be exposed. It used worst case trace gas concentrations recorded at the site for fresher waste and regional meteorological data including seasonal variations. We are satisfied that this assessment demonstrates that the potential for any adverse environmental impact in terms of odour on surrounding sensitive receptors is negligible.	
Operating techniques	We have reviewed the techniques used by the operator and compared these with the relevant guidance notes – How to comply with your environmental permit – Additional guidance for landfill (EPR 5.02), and Developing a management system and Controlling and monitoring emissions. The proposed techniques/emission levels for priorities for control are in line with the benchmark levels contained in the Landfill Directive and we consider them to represent appropriate techniques for the facility. The permit conditions ensure compliance with the TGN.	✓
The permit conditions		
Updating permit conditions during consolidation.	We have updated previous permit conditions to those in the new generic permit template as part of permit consolidation. The new conditions have the same meaning as those in the previous permits. The operator has agreed that the new conditions are acceptable.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	Certain template conditions have been amended to reflect current best practice. These changes have been developed in consultation with industry having regard to the relevant legislation as follows: <u>Condition</u> 1.5 Generic condition added to reflect the requirements of the Waste Framework Directive. 2.7.1(a). We have added reference to a specific table to clarify what wastes are permitted at which permitted activity. 2.7.2. Added to separately identify the waste types and quantities that can be accepted for restoration. While part of the landfill activity, the waste types and quantities need to be separately identified to confirm they are appropriate for use. 2.10. Revised gas management condition imposed for all landfills that accept biodegradable waste to ensure compliance with the relevant requirements of the Landfill Directive. 3.1.1. Generic condition imposed on all activities to simplify the sub-conditions. This avoids the need for additional sub-conditions that refer to compliance limits in individual tables in schedule 3. 3.1.4 – 3.1.5. Revised conditions to reflect the terminology used by the Groundwater Directive and to require hydrogeological risk assessment reviews every 6 years rather than every 4 years. Two sub-conditions that referred to limits in specific tables in schedule 3 deleted as they are now covered by 3.1.1. 3.6 Revised generic pests condition imposed on all activities. 4.2.2. Amended to ensure that information on ‘annual production/ treatment’ (schedule 4, Table S4.2) is provided in February each year where annual reports	

Aspect considered	Justification / Detail	Criteria met
		Yes
	may be submitted at other times of the year. This includes data on landfill gas collection that must be reported to government by April each year. 4.2.2(a). Text expanded to clarify the details we require in an annual report. 4.2.2(h). New condition requiring annual submission of a plan of monitoring and extraction locations with reference to monitoring tables in schedule 3. Schedule 1, table S1.1. Amended description to the landfill activity to clarify that this includes restoration. Activity references amended to reflect changes introduced by Industrial Emissions Directive (2010/75/EU). Leachate storage moved from a specified activity to a Directly Associated Activity. 4.3.1. Added Industrial Emissions Directive (IED) specific notification condition. Schedules Table S1.1. Amended description of the landfill activity to clarify that this includes restoration. Activity references amended to reflect changes introduced by Industrial Emissions Directive (2010/75/EU). Table S1.5. Amended to clarify that restoration is a separate part of the landfill activity unrelated to landfill cover. Schedule 2. Template list of appropriate waste added for landfills for non-hazardous waste. Waste types prohibited by the Landfill Directive have been removed for clarity. Schedule 3. Monitoring and compliance tables have been re-ordered so that those with compliance limits appear first. Standard monitoring frequency and parameters have been included for certain routine monitoring requirements.	

Aspect considered	Justification / Detail	Criteria met Yes
	Table S3.6. Added specific requirements for monitoring asbestos fibres, where necessary. Schedule 4, table S4.1. Amended to only require regular reports of information that relate to compliance limits. Table S4.2. Additional details of landfill gas extracted required to improve climate change data quality. Table S4.3. Amended to include natural gas as an energy source for consistency with other sectors. Schedule 6. Definitions added to clarify meaning of: • Inert waste • Exceeded • Hazardous substances • Medicinal product • Previous year • Relevant waste acceptance criteria • Relevant waste acceptance procedures. See also Schedule 1 of the notice.	
Raw materials	There is no change to raw materials and fuels as a result of this variation.	✓
Waste types	We have specified the permitted waste types, descriptions and quantities, which can be accepted at the regulated facility. <u>Non-hazardous landfill</u> We have excluded the following wastes for the following reasons. 08 01 20, 08 02 03, 16 01 06, 16 08 04, 18 01 07. This is because these waste types are either liquid, end-of-life vehicles, or otherwise not suitable for disposal at non-hazardous landfill. <u>Waste operation</u> We have excluded the following wastes for the following reasons.	✓

Aspect considered	Justification / Detail	Criteria met Yes
	01 04 11, 01 04 12, 10 12 06,10 13 10, 10 13 11, 19 02 03, 19 03 05, 19 03 07, 19 04 01, 19 13 06, 20 02 03. This is because we consider that acceptance of these waste types may pose an unacceptable risk to the environment, particularly in relation to groundwater. We made these decisions with respect to waste types in accordance with 'How to comply with your environmental permit - Additional guidance for landfill (EPR 5.02).'	
Pre-operational conditions	Based on the information in the application, we consider that we need to impose pre-operational conditions. PO1: Condition relating to operation of the microturbine was moved from the improvement programme to pre-operational conditions as we deemed that the management and maintenance procedures shall be in place prior to commencement of the operation. PO2: The operator is required to review their risk assessments and associated management plans in relation to disposal of stable non-reactive hazardous waste, asbestos waste and construction material containing asbestos, and gypsum waste prior to construction of monocells as at the time of permit issue the operator was not certain about the different waste types to be deposited in future phases. PO3: The operator is required to submit detailed waste management procedures to the Environment Agency for approval prior to excavation of Phases 1, 2, 4 and 7. This is required to ensure that the excavation and handling of waste materials is carried out in compliance with permit conditions in particular in terms of storage arrangements and emission control, and in accordance with Quality Protocols on end of waste status. PO4: To comply with condition 2.6 on landfill engineering the operator is required to remove all existing waste disposed of in Phases 1 and 2 from the area proposed for each new cell prior to waste deposit in the new cells within these Phases.	✓

Aspect considered	Justification / Detail	Criteria met Yes
	PO5: As per the agreement on the engineering (dated 26/01/16) prior to commencement of capping in Phase 7A the operator is required to submit detailed written proposals to monitor cap infiltration. The operator requested that we add the word 'verify' to this condition to allow them to have more flexibility. The operator explained that they may wish to validate the originally assumed cap infiltration rates through experimentation or calculation. We agreed to make this change to this condition as the proposed procedure will require our approval in writing.	
Improvement conditions	Based on the information on the application, we consider that we need to impose improvement conditions. We have imposed improvement conditions to ensure that: ➢ Waste types, quantities and acceptance criteria for wastes that are and will be accepted on site for the purpose of landfill restoration are assessed and determined (IC1). ➢ All existing monitoring action plans are reviewed and updated to take account of any changes to monitoring requirements in the permit (IC2). ➢ The exhaust gases from the microturbine are monitored, analysed and assessed (IC3). ➢ The cap infiltration monitoring or verification in Phase 7A is implemented (IC4). ➢ The expenditure plan then in force for the site is reviewed in respect of leachate generation based on the cap infiltration monitoring or verification carried out in Phase 7A (IC5). ➢ Additional groundwater monitoring provision will be in place and emission limits set (IC6, IC7).	✓
Incorporating the application	We have specified that the applicant must operate the permit in accordance with descriptions in the application, including all additional information received as part of the determination process. These descriptions are specified in the Operating Techniques table in the permit.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
Emission limits	We have decided that emission limits should be set for the parameters listed in the permit. <u>Leachate level limits</u> We have maintained existing emission limits in the permit. <u>Groundwater emission limits</u> We have accepted the operator's proposals on groundwater emission limits based on recorded leachate and groundwater quality data. Emission limits for the new borehole TH26 will be determined after 12 months of groundwater quality monitoring once the borehole has been installed (IC7). We have imposed interim groundwater monitoring requirements until completion of excavation of the waste materials and installation of engineered liner in Phases 1 and 2 as agreed with the Environment Agency in May 2014 to an addendum to a closure report for Phases 1 and 2. <u>Landfill gas limits in external monitoring boreholes</u> The operator applied to remove the CO_2 limits from the permit and incorporate them into a site gas management plan in accordance with the Industry Code of Practice on perimeter soil gas (ICoP), August 2011. We are satisfied that the operator has derived action levels following the statistical approach presented in the ICoP using Carbon Dioxide background data recorded at the site between October 2004 and December 2014. It is only appropriate to remove CO_2 compliance limits from the permit where elevated gas readings are not putting any nearby receptors at risk. At Thornhaugh landfill there are houses close to the perimeter boundary next to Phases 6A, 6B and 3. 'Background' CO_2 concentrations in boreholes adjacent to these phases as measured in TH02, TH03, TH04, TH05, TH06, TH07, TH08, TH09 are typically less than 5% and methane concentrations are negligible. Therefore, while there are nearby receptors, there are no indications of any significant problems. However, to ensure that the risk is negligible we asked the operator to confirm whether there are any basements	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	or void spaces where CO_2 could accumulate beneath these houses. The operator considered it unnecessary to confirm that the nearby properties do not have basements or void spaces. They explained that regardless, monitoring at the boreholes for the components of landfill gas including CO_2 facilitates assessment of whether landfill gas is migrating from the landfill phases. The monitoring includes the differential pressure and as necessary gas flow at the boreholes to facilitate assessment of the potential for gas to migrate beyond the landfill boundary by advective flow which is the most significant mechanism for gas migration. The data collectively are reviewed regularly and the risk to the properties is assessed. The review of the data and the assessment of the risk is the subject of a landfill gas monitoring action plan related to the proposed action levels in respect of carbon dioxide. The risk assessments and regular reviews are based on the assumption that the properties comprise sensitive potential receptors. The presence or absence of basements or void spaces does not affect the assumed sensitivity in these assessments. We are satisfied with the operator's measures in respect of the monitoring and management of landfill gas and therefore have removed the CO_2 emission limits from the permit. We also confirm that the action plan is in line with the ICoP to investigate and remediate any future breaches of action levels, as detailed in section 6.0 of the Landfill Gas Monitoring Action Plan (dated 14th September 2008). The ICoP also allows a review of methane compliance limits, although these are not removed from the permit. The operator has not reviewed the methane data. No reason has been given for this, but it might be because of negligible methane concentrations recorded in the perimeter boreholes at the site during the period October 2004 to December 2014. The operator suggests that negligible methane concentrations demonstrate that gas migration has not occurred at the site and carbon dioxide data recorded during this period can be considered to comprise background data. This is not necessarily correct because in theory the presence of elevated CO_2 concentrations could also be a product of methane	

Aspect considered	Justification / Detail	Criteria met Yes
	oxidation.	
Monitoring	We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. Standard monitoring tables for groundwater, leachate and surface water quality have been added. The operator has provided the monitoring and extraction point plan – MEPP - showing the locations of leachate and landfill gas extraction and monitoring points and all monitoring points. These monitoring requirements have been imposed in order to simplify the monitoring requirements for the operator. We made these decisions in accordance with our guidance document 'How to comply with your environmental permit – Additional guidance for landfill (EPR 5.02)'.	✓
Reporting	We have specified reporting in the permit. Standard Table S4.1 has been added as a result of the permit review. The following changes have been made to the reporting frequency: Particulate matter in ambient air from 12 to 6 months. We made these decisions in accordance with our guidance document 'How to comply with your environmental permit – Additional guidance for landfill (EPR 5.02)'.	✓
Operator Competence		
Environment management system	There is no known reason to consider that the operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.	✓
Technical competence	Technical competency is required for activities permitted. The operator is a member of an agreed scheme. The existing competency is correct and covers the new waste	✓

Aspect considered	Justification / Detail	Criteria met Yes
	operation.	
Financial provision	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence. We have imposed a site specific Financial Provision condition 1.2.3 in the permit. This requires the operator to provide additional Financial Provision if deemed necessary following the submission and approval of the expenditure plan required by Table S1.3 (IC5). In improvement requirement (IC5) the operator is required to review the expenditure plan then in force for the site in respect of leachate generation based on the cap infiltration monitoring carried out in Phase 7A. The cap infiltration monitoring is required to demonstrate that the design infiltration would be reasonably accurate. The financial provision arrangements satisfy the financial provisions criteria.	✓

Annex 2: External Consultation and web publicising responses

Response received from
Public Health England (PHE)
Brief summary of issues raised
PHE recommend that any Environmental Permit issued for this site should contain conditions to ensure that the following potential emissions do not impact upon public health: - Particulate matter or fugitive dust emissions from onsite activities including waste excavation, handling, processing, storage, and infilling works. As per the Principles of Excavation document, we would suggest a new risk assessment and management activity to be amended if hazardous or other waste is identified; and - Odour emissions from onsite activities similar to those described above. PHE has no significant concerns regarding risk to health of the local population from this proposed activity, providing that the applicant takes all appropriate measures to prevent or control pollution, in accordance with the relevant sector technical guidance or industry best practice. In relation to potential risk to public health, PHE recommend that the Environment Agency also consult the following relevant organisation(s) in relation to their areas of expertise: the local authority, the Food Standards Agency and the Director of Public Health.
Summary of actions taken or show how this has been covered
We are satisfied that the permit conditions 3.2 and 3.3 along with the existing management plans ensure that fugitive emissions and odour are controlled and do not have an unacceptable impact on public. The operator submitted an odour modelling assessment that considered emissions originating from re-exposing former landfill. This assessment demonstrated that risk to odour pollution outside the permit boundary is minimal. Prior to excavation of any of the old landfill cells the operator is required to submit to the Environment Agency approval detailed waste management procedures that consider any necessary additional environmental monitoring and emission control. The decision to consult was taken in accordance with our guidance.

We did not receive any responses to web publicising.