Permitting Decisions- Bespoke Permit

We have decided to grant the permit for Horse Close Anaerobic Digester, Courteenhall, Quinton, NN7 2QF operated by Acorn Bioenergy Operations Limited

The permit number is EPR/RP3426SN/A001.

The permit was granted on 12/01/2026.

This application is for a bespoke installation permit for an Anaerobic Digestion (AD) plant with a treatment capacity exceeding 100 tonnes of waste per day. As such, it constitutes a listed activity under Schedule 1, Part 2, Section 5.4 A1 (b)(i) of the Environmental Permitting (England and Wales) Regulations 2016. In addition to the main installation activity, the site is also permitted to undertake the following Directly Associated Activities (DAAs):

- storage of waste pending recovery or disposal,
- physical treatment for the purpose of recycling,
- steam and electrical power supply,
- emergency flare operation,
- gas upgrading,
- raw material storage,
- gas storage,
- digestate storage,
- carbon dioxide (CO_2) capture and storage,
- surface water collection and
- storage and odour abatement

The AD plant is designed to treat up to 94,000 tonnes per year feedstocks, consisting of energy crops (primarily maize and whole-crop silage), straw, animal manures and non-hazardous liquid wastes.

Biogas produced as part of the AD process can be used in either the onsite combustion plant or the biogas upgrading plant. The onsite combustion plant includes a 2.83 MWth Combined Heat and Power (CHP) plant and a 0.66 MWth dual fuel emergency boiler which can also operate on natural gas. To supplement the above combustion plant, the site also operates a 2.857 MWth CHP on natural gas, and a 1.867 MWth diesel generator for emergency use only.

The biogas upgrade plant converts biogas into biomethane for transport offsite and injection at a central gas to grid injection point. Carbon dioxide (CO_2) from the biogas is captured and upgraded to 99.9% purity. The treated/upgraded CO_2 is liquefied, transported for use in suitable industrial and commercial applications.

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.

Purpose of this document

This decision document provides a record of the decision-making process. It;

- summarises the decision making process in the decision considerations section to show how the main relevant factors have been taken into account.
- highlights key issues in the determination
- shows how we have considered the consultation responses

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

Read the permitting decisions in conjunction with the environmental permit.

Key issues of the decision

1) **Digestate storage bay**

The Waste Treatment BREF and BAT conclusion 14 states:

In order to prevent or, where that is not practicable, to reduce diffuse emissions to air, in particular of dust, organic compounds and odour, BAT is to use an appropriate combination of the techniques…., as listed in the BAT Conclusion.

An extract from the appropriate techniques listed in BAT Conclusion 14 for the prevention, or where that is not practicable, the reduction of diffuse emissions to air from open tanks is set out in Table 1 below.

Table 1			
Technique		**Description**	**Applicability**
d	Containment, collection and treatment of diffuse emissions	This includes techniques such as: • storing, treating and handling waste and material that may generate diffuse emissions in enclosed buildings and/or enclosed equipment (e.g. conveyor belts);	The use of enclosed equipment or buildings may be restricted by safety considerations such as the risk of explosion or

		• maintaining the enclosed equipment or buildings under an adequate pressure; • collecting and directing the emissions to an appropriate abatement system, via an air extraction system and/or air suction systems close to the emission sources.	oxygen depletion. The use of enclosed equipment or buildings may also be constrained by the volume of waste.

Section 9 of the 'Biological waste treatment: appropriate measures for permitted facilities' states that "*Where digestate is from food waste, you should treat it in a building with an appropriate air ventilation and extraction system. This must direct exhaust air to an abatement system or for recovery.*" and that operators *"must effectively minimise fugitive emissions from dewatered digestate fibre and digested sewage sludge cake. This applies to all stored material. For example, you must store it, under a suitable cover, in an enclosed building fitted with an air ventilation and extraction system and in field stores in line with farming rules for water*"

On review of the application, we identified that while the digestate storage solution involved the storage of digestate in an enclosed bunker with a roller shutter door, this building is not abated.

On review of the site-specific process being undertaken and the location, we identified that the site:

- operates based on a 71-day hydraulic retention time significantly minimising the potential biological activity of any stored digestate.
- proposes a maximum storage capacity of 215 tonnes at any one time, with a maximum storage period of 72 hours ensuring a quick turnaround
- proposes to meet end of waste for digestate under the Anaerobic digestate: resource framework (ADRF).

On review of the applicant's air quality impact assessment document, dated 31/11/2025, this concluded that the predicted 98th percentile of 1-hour mean odour concentrations at the nearest receptor was predicted to be $0.70ou_E/m^3$. This is below the adopted criterion of $1.5ou_E/m^3$ for 'most offensive' odours as set out in our guidance H4 Odour Management. On this basis, we agreed that the site operation is not likely to cause odour impact at human receptors.

Due to the long retention time, short storage periods, low odour impact and ADRF proposed status, we have deemed the risk from diffuse emissions to be adequately

controlled through the storage of digestate within the enclosed bunker. To verify the odour assumptions carried out we have included IC5 which requires the operator to review the odour abatement measures on site, including the proposed storage of digestate. Where odour levels are shown to be unacceptable, the operator will be required to propose improvements which may include installation of abatement plant in accordance with the Waste Treatment BAT Conclusions and the 'Biological waste treatment: appropriate measures for permitted facilities'

2) Passive odour control units

BATc 34 requires that in order to reduce channelled emissions to air of dust, organic compounds and odorous compounds, including H_2S and NH_3, BAT is to use one or a combination of the techniques which are defined as adsorption, biofilters, fabric filters, thermal oxidation or wet scrubbing.

On review of emission point A19 (for the covered digestate lagoon), A20 (the liquid feedstock tank), and emission points A21 and A24 (for the digestate offtake points), the operator proposed to use impregnated carbon filters which would meet the requirements of BATc 34 under the technology identified as adsorption.

Due to the nature of these tanks and lagoon, the emissions will not be continuously channelled and will only occur when there is air displaced during the filling and emptying, and as such these will be passive odour control units.

On review of the OCUs, the carbon within the filter will be impregnated with additives for the removal of odorous compounds such as H_2S and NH_3 that are not readily adsorbed by standard carbon grades. The operator has undertaken modelling to demonstrate that the proposed abatement system will have sufficient capacity and will be appropriately designed for treating NH_3 and H_2S through several key measures. This includes:

- The carbon type/ blend will be impregnated to react chemically with H_2S and NH_3, enhancing removal through adsorption and subsequent neutralisation or transformation of the gases.
- The use of impregnated activated carbon with high pore volume and surface area to ensure efficient adsorption of both H_2S and NH_3
- The carbon filter bed will have adequate depth and residence time to achieve the target removal efficiency which is designed for over 95% removal at specified airflow rates and contaminant concentrations.

The operator has also proposed that weekly emissions monitoring results will be undertaken to determine filter renewal timeframes, through the use of a portable

gas analyser for NH_3 as part of routine maintenance, with daily sniff testing also being applied.

The applicant undertook modelling based on assumptions to demonstrate that emission limits would be below the relevant emission limit values set for BAT 34 which are 20 mg/m^3 for ammonia and 1000ou_E/m^3 for odour concentration.

Due to the passive nature of these OCUs, we have not set emission limits in line with BAT for emission points A19, A20, A21 and A24 as BAT requires the *"average value of three consecutive measurements of at least 30 minutes each"* which cannot be achieved on emission points A19, A20, A21 and A24. However, to demonstrate that the odour abatement plant is effective, we have set IC6 that requires the operator to verify the assumptions made in the air modelling assessment for emission points A19, A20, A21 and A24. In the event the results do not meet the requirements of BAT 34 of the Waste Treatment BREF, the operator shall submit a written 'abatement plan' and obtain the Environment Agency's written approval to it. The plan shall contain the final designs and an implementation schedule for the installation of abatement plant at emission points A19, A20, A21 and A24 that meets the requirements of BAT 34 of the Waste Treatment BREF.

3) Carbon capture process

As part of the application the operator modelled potential venting scenarios. On assessment of this modelling, the operator confirmed that the venting of carbon dioxide would not reach the ground level.

4) Biogas upgrading plant

We consider it appropriate to set an IC1 and IC2 which requires the operator to undertake a monitoring survey following the commencement of operations at the biogas upgrading plant to obtain actual (real-time) operational monitoring data.
Improvement Condition IC2 requires the operator to undertake an air emissions impact assessment (H1 software tool) using the results of the monitoring survey and compare the long and short term impacts of pollutants in accordance with the Environment Agency Guidance – *Air emissions risk assessment for your environmental permit*. Following the review of results from the monitoring survey and impact assessment, the Environment Agency shall consider whether emission limits are appropriate at emission point A8. We have used this approach for biowaste treatment facilities proposing to install biogas upgrading plants across England.

5) Effectiveness of abatement

The installation includes processes which produce waste gas and odour emissions that are discharged to air via stacks. BAT conclusion 14 of the Waste Treatment BREF states that emissions from diffuse sources should use techniques like, *collecting and directing the emissions to an appropriate abatement system via an air extraction system and/or air suction systems close to the emission sources*. This installation includes the storage and treatment of wastes in a manure building. To prevent diffuse emissions of pollutants, emissions are extracted and treated by an air abatement system.
As part of the determination, we reviewed the operator's abatement plant and its suitability in providing effective abatement to diffuse air emissions which was based on assumptions of waste gas streams due to the facility not yet being operational.

To verify whether the proposed OCU measures will be effective and adequate to prevent and/or minimise emissions released to air, we have set improvement condition 5. The improvement condition requires the operator to demonstrate via determining the composition of waste gas emissions, monitoring and additional risk assessment that the proposed abatement system effectively treats the emissions to air. Where further improvements are identified, the operator is required to implement these measures.

6) Methane Slip

We have included improvement condition IC3 in the permit which requires the operator to assess methane slip resulting from the combustion of biogas via the CHP engine. Following an assessment of the data, the Environment Agency shall consider whether emission limits for volatile organic compounds are applicable for this installation.

7) Air Quality Impact Assessment

The site will operate a 2.83 MWth combined heat and power (CHP) engine for 8,760 hours per year at emission point A1 on natural gas, a 2.857MWth CHP engine for 7,500 hours per year at emission point A2, a 0.609 MWth dual-fuel boiler on biogas and natural gas for 1,314 hours per year at emission point A4, a 1.867 MWth diesel generator for less than 500 hours per year at emission point A5, and an emergency flare at emission point A3.

The applicant considered the impacts of oxides of nitrogen (NO_X), carbon monoxide (CO), sulphur dioxide (SO_2) and total volatile organic compounds (TVOC as benzene).

We agree that emissions from the proposed facility are unlikely to cause exceedances of environmental standards at any human health receptor.

The combustion process at the installation / regulated facility is not considered ‘relevant’ for assessment under the Agency’s procedures which cover the Conservation of Habitats and Species Regulations 2017 (Habitats Regulations) and/or the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act (CRoW) 2000). This was determined by referring to the Agency’s guidance ‘AQTAG014: Guidance on identifying ‘relevance’ for assessment under the Habitats Regulations for installations with combustion processes.’ Thus, no detailed assessment of the effect of the releases from the installation's combustion processes on SACs, SPAs and Ramsar sites is required.”

Decision considerations

Confidential information

A claim for commercial or industrial confidentiality has not been made.

The decision was taken in accordance with our guidance on confidentiality.

Identifying confidential information

We have not identified information provided as part of the application that we consider to be confidential.

The decision was taken in accordance with our guidance on confidentiality.

Consultation

The consultation requirements were identified in accordance with the Environmental Permitting (England and Wales) Regulations (2016) and our public participation statement.

We consulted the following organisations:

- Local Authority – Environmental Health/Environmental Protection department.
- Health and Safety Executive
- UK Health Security Agency
- National Grid
- Food Standards Agency.
- Animal and Plant Health Agency
- Local Authority – Planning

The comments and our responses are summarised in the consultation responses

Operator

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 our guidance on legal operator for environmental permits.

The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 ‘Understanding the meaning of regulated facility’, Appendix 2 of

RGN2 ‘Defining the scope of the installation’, and Appendix 1 of RGN 2 ‘Interpretation of Schedule 1’.

The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit.

The site

The operator has provided a plan which we consider to be satisfactory.

These show the extent of the site of the facility.

The plan is included in the permit.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.

Nature conservation, landscape, heritage and protected species and habitat designations

We have checked the location of the application to assess if it is within the screening distances we consider relevant for impacts on nature conservation, landscape, heritage and protected species and habitat designations. The application is within our screening distances for these designations.

We have assessed the application and its potential to affect sites of nature conservation, landscape, heritage and protected species and habitat designations identified in the nature conservation screening report as part of the permitting process.

We consider that the application will not affect any site of nature conservation, landscape and heritage, and/or protected species or habitats identified.

We have not consulted Natural England.

The decision was taken in accordance with our guidance.

Environmental risk

We have reviewed the operator's assessment of the environmental risk from the facility.

The operator’s risk assessment is satisfactory.

General operating techniques

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility.

The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.

Operating techniques for emissions that screen out as insignificant

Emissions of NO_X, CO, SO_2, TVOC (as benzene) and NH_3 have been screened out as insignificant, and so we agree that the applicant's proposed techniques are Best Available Techniques (BAT) for the installation.

We consider that the emission limits included in the installation permit reflect the BAT for the sector.

Odour management

We have reviewed the odour management plan in accordance with our guidance on odour management.

We consider that the odour management plan is satisfactory and we approve this plan.

We have approved the odour management plan as we consider it to be appropriate measures based on information available to us at the current time. The applicant should not take our approval of this plan to mean that the measures in the plan are considered to cover every circumstance throughout the life of the permit.

The applicant should keep the plans under constant review and revise them annually or if necessary, sooner if there have been complaints arising from operations on site or if circumstances change. This is in accordance with our guidance 'Control and monitor emissions for your environmental permit'.

Raw materials

We have specified limits and controls on the use of raw materials and fuels.

Waste types

We have specified the permitted waste types, descriptions and quantities, which can be accepted at the regulated facility.

We are satisfied that the operator can accept these wastes for the following reasons:

- they are suitable for the proposed activities
- the proposed infrastructure is appropriate; and
- the environmental risk assessment is acceptable.

Pre-operational conditions

Based on the information in the application, we consider that we need to include pre-operational conditions P01 to P06 in the permit.

The pre-operational conditions and the reasons for including them are detailed in Table S1.4 of the permit.

Improvement programme

Based on the information on the application, we consider that we need to include an improvement programme.

We have included an improvement programme to ensure that the application proposals and assumptions in the risk assessment are reviewed and verified (see Key Issues section).

Emission Limits

Emission Limit Values (ELVs) and/or equivalent parameters or technical measures based on Best Available Techniques (BAT) have been added for the following substances:

- Oxides of Nitrogen (NO and NO_2 expressed as NO_2)
- Sulphur dioxide
- Carbon monoxide
- Odour concentration
- Ammonia

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.

We made these decisions in accordance with reference the relevant technical guidance for Biological waste treatment: appropriate measures for permitted facilities and Waste treatment Best available techniques BAT conclusions.

Based on the information in the application we are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.

Reporting

We have specified reporting in the permit.

We made these decisions in accordance with Biological waste treatment: appropriate measures for permitted facilities and Waste treatment Best available techniques BAT conclusions.

Management System

We are not aware of any reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.

The decision was taken in accordance with the guidance on operator competence and how to develop a management system for environmental permits.

We only review a summary of the management system during determination. The applicant submitted their full management system. We have therefore only reviewed the summary points.

A full review of the management system is undertaken during compliance checks.

Technical Competence

Technical competence is required for activities permitted.

The operator is a member of the CIWM/WAMITAB scheme

We are satisfied that the operator is technically competent.

Previous performance

We have assessed operator competence. There is no known reason to consider the applicant will not comply with the permit conditions.

No relevant convictions were found. The operator satisfies the criteria in our guidance on operator competence.

Financial competence

There is no known reason to consider that the operator will not be financially able to comply with the permit conditions.

Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

Consultation Responses

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, and the way in which we have considered these in the determination process.

Responses from organisations listed in the consultation section

Response received from UK Health Security Agency.

Brief summary of issues raised:

The main emissions of potential concern are pollutants from the onsite point sources, including nitrogen dioxide, sulphur dioxide, carbon monoxide, and Volatile Organic Compounds (VOCs) (as benzene), emissions of bioaerosols from the onsite storage of organic wastes and odour from the onsite storage of organic wastes and the processes onsite.

The applicant has undertaken an air quality assessment of the emissions from the point sources onsite, including consideration of the abnormal operating scenarios, following available good practice guidance, which has indicated that the effects from these pollutants would be not significant at nearby sensitive receptors.

The applicant has undertaken a Bioaerosols Risk Assessment for the site, using the sourcepathway-receptor model to identify the level of risk associated with bioaerosols from the site. The assessment has concluded that the risk is very low or low at nearby sensitive receptors.

The applicant has undertaken an assessment of odour associated with the site using Detailed Dispersion modelling. The applicant has utilised the EA Technical Guidance Note H4 – Odour Management to assess odour emissions associated with the site. Predicted odour concentrations are below the adopted criterion of $3ou_E/m^3$ for 'moderately offensive' odours. On this basis, the site operation is not likely to cause odour impact at human receptors.

We note in the documentation that the applicant has not included a stack height assessment. I would have expected to see this included within the air quality assessment to justify the height of the stack. However, this does not affect my view of the assessment presented.

Based on the information contained in the application supplied to us, UKHSA has no significant concerns regarding the risk to the health of the local population from the installation. This consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best

practice.

Summary of actions taken:

We have taken into consideration the key recommendations from the UKHSA in assessing the risk associated with the site operations and we are satisfied that the proposed control measures in the application represent BAT and that the permit conditions are robust enough to ensure that there are no significant impacts on public health as a result of the permitted site's activities.

No response was received from the following organisations:

- Local Authority – Environmental Health/Environmental Protection department.
- Health and Safety Executive
- UK Health Security Agency
- National Grid
- Food Standards Agency.
- Animal and Plant Health Agency
- Local Authority – Planning