Environment Agency permitting decisions

Bespoke permit

We have decided to grant the permit for Imperial Park Anaerobic Digestion Plant operated by BioConstruct New Energy Limited.

The permit number is EPR/HP3230DJ.

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:

- 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

Description of the main features of the Installation

The site has been designed to treat up to 300 tonnes per day of liquid and solid waste via anaerobic digestion. The liquid waste arrives in sealed tankers and is pumped into one of the reception tanks via a stone trap where it is mixed / macerated. The reception tanks are located within a waste reception building that is provided with fast acting doors, kept under negative pressure and fitted with an extraction and odour abatement system.

The solid waste (seasonal green waste) is received in an outside reception area where it is loaded into the charging system for the digestion process. Any green waste not loaded into the charging system will be moved into the solid waste reception building by the end of the working day.

The anaerobic digestion takes place in two primary 'fermentation' tanks where the waste is held for approximately 44 days and a 'post fermentation' tank, where it is held for approximately 21 days to ensure maximum biogas capture. The resultant digestate waste is then pumped to pasteurisation tanks where the temperature is raised to 70 ^{o}C for a minimum of one hour. The heat treated digestate is then pumped to one of the digestate storage tanks prior to onward recovery, (intended for use as a soil improver).

The biogas produced by the digestion process passes through a de-sulphurisation (activated carbon scrubbing) process and is subsequently combusted in four combined heat and power gas engines, producing both heat for the digestion / pasteurisation process and electricity for export to the National Grid. The gas engines have a combined thermal input of 12.5 MW_{th} and a combined electrical generating output of approximately 5 MW_e.

In order to provide adequate dispersion, the combustion gases from the engines are to be vented to atmosphere via a combined 28.25 metre multi-flue exhaust stack. A separate emergency gas flare will be available to combust biogas should there be insufficient available capacity in the engines.

Emissions to Air of Combustion Products

Introduction

The biogas from the anaerobic digestion process will be fed through an activated carbon scrubbing unit (primarily for de-sulphurisation), compressed and then combusted in four combined heat and power gas engines. The gas engines will generate approximately 5MW_e of electricity for export to the National Grid and the recovered heat will be utilised within the fermenter tanks, pasteurisation tanks and buildings on site.

In terms of global impacts, the combustion process will produce carbon dioxide (CO_2) as methane is oxidised to CO_2 and water. However, it is considered that the process is 'carbon neutral', the CO_2 having been produced from the combustion of a renewable fuel.

In addition, the alternative of not utilising the methane, which has a Global Warming Potential 21 times that of CO_2 (over 100 years), would be far more damaging.

In terms of regional and local impacts, a variety of potentially polluting substances will be produced, as with any combustion process burning fuel at a relatively high temperature.

In addition to CO_2 and water vapour, the other primary emissions are nitrogen and oxides of nitrogen. Carbon monoxide and Volatile Organic Compounds (VOCs) will also be emitted as products of incomplete combustion. Sulphur dioxide (SO_2) may also be emitted in significant concentrations if the feed gas contains high levels of sulphur compounds (such as hydrogen sulphide). Particulate emissions from the combustion of biogas tend to be insignificant.

These are considered in further detail below:

Summary of Potential Impact of Gas Engine Emissions

The applicant has carried out detailed air dispersion modelling for a 'worst case' scenario of all four engines running continuously at 100% load for the whole of the year.

The results of the modelling predict that there will be no unacceptable emissions of nitrogen dioxide, carbon monoxide, nutrient deposition or acid deposition.

We have audited the submitted dispersion modelling using our internal screening tools. We agree with the conclusions drawn in the Operator's modelling assessment report.

We have also carried out an assessment of VOCs using our internal screening tool which uses the AERMOD modelling system. The screening tool has conservatism built in and as a further conservative assumption, ethylbenzene was used as a surrogate for speciated VOCs. The more usual surrogate of benzene was not used, as a review of VOC data in biogas derived from source-segregated biodegradable waste, suggests that benzene concentrations are likely to be low compared to other VOCs.

The conclusion of this screening exercise is that VOC emissions are likely to be insignificant.

Other gases, such as 'dioxins' and 'furans', are expected to be emitted in trace concentrations, as their formation will be minimised by correct combustion control.

The most important oxides of nitrogen formed in the combustion process are nitric oxide (NO) and nitrogen dioxide (NO_2), collectively referred to as NOx. The proportions of each emitted vary depending on the process, but typically primary NO_2 from combustion sources is between 5-10%. Once in the atmosphere, NO is quickly oxidised by ozone to form NO_2. Our recommended conversion rate of

NOx to NO_2 for a 'screening / worst case scenario' is 100% long term conversion and 50% for short term conversion. For detailed monitoring, these conversion factors may be reduced to 70% and 35% respectively. The detailed modelling used the conservative conversion factors of 100% and 50%.

The results of the detailed air dispersion modelling are reproduced below:

Maximum process contribution at receptors – screening for insignificance

Pollutant	Environmental Assessment Level (EAL)	Process Contribution (PC)	PC as % of EAL	Insignificant? ($PC_{long\ term}$ <1% EAL and $PC_{short\ term}$ <10% EAL)
NO_2 (human health, long term)	40	2.59	6.5	No
NO_2 (human health, short term)	200	21.52	10.8	No
CO (human health, 8hr short term)	10,000	80	0.8	Yes
NO_2 (ecological, long term)	30	0.73	2.4	No
NO_2 (ecological, short term)	75	5.79	7.7	Yes

Notes:

- All the above concentration figures are in $\mu g/m^3$
- The EAL is the relevant environmental standard taken from our online guidance ;Air emissions risk assessment for your environmental permit'
- PC is the modelled Process Contribution (the airborne concentration after dispersion into the receiving environment).

From the above table and according to our methodology set out in our online guidance 'Air emissions risk assessment for your environmental permit', carbon monoxide can be screened out as insignificant, as the process contribution is <10% of the short term EAL, (there is no established long term environmental standard for carbon monoxide). The NO_2 process contributions were above the insignificance levels and are so considered further in conjunction with background levels, as below:

Maximum long term NO_2 predicted environmental concentration at receptors

Pollutant	Environmental Assessment Level (EAL)	Long term background concentration	Process Contribution (PC)	PEC	PEC as % of EAL	PEC > 70% of EAL
NO_2 (human health, long term)	40	17.5	2.59	20.09	50.2	No
NO_2 (ecological, long term)	30	17.5	0.73	18.23	60.8	No

Notes:

- All the above concentration figures are in µg/m^3
- PC is the modelled Process Contribution (the airborne concentration after dispersion into the receiving environment).
- PEC is the Predicted Environmental Concentration, (the sum of the PC and background levels)

As can be seen from the above results, taking existing background concentrations into consideration, the Predicted Environmental Concentrations are less than 70% of the long term EAL at all receptors. We consider that it is unlikely that any long term environmental standards will be exceeded.

Maximum short term NO_2 predicted concentration at receptors

Pollutant	Environmental Assessment Level (EAL)	Long term Background Concentration	Process Contribution (PC)	Predicted Headroom (EAL – 2 x LT background)	PC as a % of Headroom	PC > 20% of Headroom ?
NO_2 (human health, short term)	200	17.5	21.52	165	13.0	No
NO_2 (ecological, short term)	75	17.5	5.79	40	14.5	No

Notes:
- All the above concentration figures are in µg/m^3
- PC is the modelled Process Contribution (the airborne concentration after dispersion into the receiving environment. For NO_2 the PC was derived from a 'screening / worst case scenario' of 100% long term conversion and 50% for short term conversion.
- PEC is the Predicted Environmental Concentration, (the sum of the PC and background levels)
- The Predicted Headroom is the difference between the EAL and the short term background (due to the variability of short term background levels our guidance recommends using the precautionary figure of 2x the long term background). This figure is a precautionary estimate of the existing concentration remaining before the EAL is reached.

As can be seen from the above results, taking existing background concentrations into consideration, the Process Contributions for are less than 20% of the short term headroom. We therefore consider that it is unlikely that any short term environmental standards will be exceeded.

Acidification, Nutrient Enrichment and Toxic contamination

The Environment Agency H1 risk assessment guidance recommends considering the potential effect of a site within a 10 km screening distance of any Special Protection Area (SPA) / Special Areas of Conservation (SACs) / or a wetland sites designated of international importance under the Ramsar Convention (Ramsar site). This screening distance is reduced to 2 km for Sites of Special Scientific Interest (SSSI) and other nature conservation sites such as nature reserves and local wildlife sites.

This distance has been further refined for combustion activities by the Habitats Directive Technical Advisory Group in the publication of 'AQTAG014' ('Guidance on identifying 'relevance' for assessment under the Habitats Regulations for PPC installations with combustion processes'). This guidance gives targeted screening distances depending on the size of the combustion plant. Outside of these screening distances, no detailed assessment of the effect of the aerial emissions from the installation on designated Habitat sites is required.

The proposed total size of the combustion plant in this case is just under 12.5 MW_{th} and so falls within the 5-20 MW_{th} bracket in AQTAG014. The screening distance for plant of this size is given as 500 metres, beyond which the activities are not considered relevant for assessment purposes.

Teesmouth & Cleveland Coast SPA/Ramsar site is within 10 km, but at a distance greater than 500 metres of the site, (the nearest point of the SPA/Ramsar being 775 metres from the stack).

It can therefore be concluded that, according to AQTAG014, the site is not relevant for assessment purposes. It can therefore be screened out as not being able to have a likely significant effect.

By application of the same screening criteria, it can also be concluded that the engine emissions are unlikely to adversely affect the notified interest of any SSSI, (the nearest being Tees & Hartlepool Foreshore and Wetlands SSSI in the same location as the above SPA/Ramsar site).

In addition, the applicant has carried out detailed air dispersion modelling that includes potential enrichment and acidification impacts on Teesmouth and Cleveland Coast SPA and Ramsar site, as follows:

Critical loads (Nutrient enrichment and acidification due to nitrogen deposition)

Nutrient Nitrogen deposition at Teesmouth & Cleveland Coast SPA/Ramsar

Maximum critical load (CL_{max}), (kg N/ha/yr)	PC_{ground} nutrient deposition rate, (kg N/ha/yr)	% PC_{ground} of CL_{max}	PC_{ground} insignificant ? (% PC_{ground} < 1% CL_{max})
8	0.074	0.9	Yes

Acid deposition at Teesmouth & Cleveland Coast SPA/Ramsar

Minimum critical load ($CL_{min}N$), (keq/ha/yr)	Maximum critical load ($CL_{max}N$), (keq/ha/yr)	PC_{ground} acid deposition rate (keq/ha/yr)	PC_{ground} as % of critical load function	PC_{ground} insignificant ? (% PC_{ground} < 1% CL function)
1.998	4.58	0.005	0.2	Yes

Notes:

- $CL_{min}N$ – this is a measure of the ability of a system to "consume" deposited nitrogen (e.g. via immobilisation and uptake of the deposited nitrogen);
- $CL_{max}N$ – the maximum critical load of acidifying nitrogen, above which the deposition of nitrogen alone would be considered to lead to an exceedance.
- The critical load function is defined by the ClmaxN, ClminN and where applicable ClmaxS, (maximum critical load for sulphur).

It can therefore been seen that impacts from deposition can be screened out as being insignificant, as the Process Contribution is less than 1% of the relevant critical load.

Oxides of sulphur emissions

The main oxide of sulphur formed in the combustion process is sulphur dioxide (SO_2). SO_2 is formed in the combustion process by oxidation of sulphur compounds in the feed gas. The amount of SO_2 formation will therefore be dependent on the sulphur content of the fuel. This in turn is dependent on the feedstock for anaerobic digestion. These sulphur compounds tend to be principally be in the form of hydrogen sulphide, (H_2S).

In this instance, the operator is proposing to install an activated carbon de-sulphurisation unit in the biogas feed prior to combustion. The applicant considered that this would result in negligible emissions of SO_2 and therefore did not include SO_2 in the detailed air dispersion modelling.

We have carried out a screening exercise for SO_2 using the screening tool described in the 'Summary of Potential Impact of Gas Engine Emissions' section above. A further calculation was carried out for the critical load function using the tool on the Air Pollution Information System website.

The audited inputs used in the submitted dispersion modelling were selected as inputs into the screening tool, together with a SO_2 emission concentration of 350 mg/m^3. There are no benchmark emission concentrations for SO_2 from biogas spark ignition engines. However, the 350 mg/m^3 figure has been derived from an assumed H_2S concentration in the biogas of 2,500 ppmv, (3,750 mg/m^3) followed by a 95% reduction by the de-sulphurisation unit, giving a resultant concentration of 125 ppmv (188 mg/m^3) of H_2S in the biogas. This gives a subsequent SO_2 emission concentration of approximately 350 mg/m^3 in the exhaust gas. The H_2S concentration in the biogas and percentage reduction by the de-sulphurisation unit are considered to represent sufficiently conservative figures for screening purposes.

At this emission concentration, the resultant predicted ground level concentrations are unlikely to lead to a breach of an environmental standard at a human health receptor. In addition, the predicted acid deposition rate is unlikely to have any significant effect at Teesmouth & Cleveland Coast SPA/Ramsar/SSSI.

However, the ground level concentrations (particularly short term), cannot be considered insignificant and warrant further investigation and verification once the site becomes operational and actual site data on biogas sulphur content is available.

It is understood that the operator is planning to install continuous H_2S monitors in the feed line post de-sulphurisation and prior to combustion. The data from these monitors can be used to calculate the SO_2 emission concentrations, (assuming there will be no other sulphur compounds, the H_2S is completely oxidised to SO_2 and there will be no dilution from combustion air).

Alternatively, SO_2 emissions can be directly measured via stack monitoring.

Improvement conditions (IC1 and IC2) have therefore been set to require the quantification and further assessment of SO_2 emissions. This assessment is to follow the steps identified in our online guidance 'Air emissions risk assessment'. These operator will therefore have to carry out the following steps:

1. Calculate the process contribution (PC) of sulphur dioxide to the air;
2. Identify whether the sulphur dioxide PC can be considered insignificant, (in which case the emissions do not have to be assessed further);
3. If sulphur dioxide is not screened out in step 2, calculate the predicted environmental concentration (PEC, which is the PC plus the concentration of sulphur dioxide already present in the environment);
4. Identify if sulphur dioxide if emissions have insignificant environmental impact, (in which case they can again be screened out);
5. Undertake detailed air dispersion modelling if sulphur dioxide cannot be screened out;
6. Compare the sulphur dioxide PC and PEC with the relevant environmental standards and summarise the results;
7. Review whether any further action is needed;
8. Submit the above findings to us for review.

In summary, we are satisfied that Best Available Techniques are being used to minimise the generation of pollutants and that suitable stack heights are being used to provide adequate dispersion.

Odour

As an anaerobic digestion plant accepting a mixture of food, agricultural and green waste, the site has the potential to generate odours.

The operator has therefore produced an odour management plan (OMP) to address the risks as follows:

Waste storage and treatment

Excluding seasonal green waste, all wastes are to arrive in sealed tankers.

The tankers then discharge the waste into reception tanks via a stone trap to allow stones and gravels to settle out in order to reduce subsequent wear on plant and equipment, (such as pumps). As the deposited waste is open to atmosphere whilst in the trap, it has the potential to release odours. The discharge point and stone trap is therefore located within a building that is fitted with fast acting doors and is kept under negative pressure with 3.5 air exchanges per hour. The extracted air is passed through an ultraviolet (UV) reactor where a photocatalytic and ozone oxidation process takes place. This process is followed by an activated carbon filtration phase, reducing the concentration of odorous compounds further prior to venting to atmosphere.

The seasonal green waste arriving at the site will be temporarily deposited in an outside waste reception area. From this reception area, the green waste is to be loaded into the plant's charging system during the day of receipt. Any residual waste not loaded into the charging system before the end of the working day is to be moved into the solid waste storage building. The outside waste reception area is then cleaned and washed down.

The green waste will not be stored for longer than 8.5 days, based on the theoretical storage capacity of the building.

Once transferred into the anaerobic digestion plant, the system essentially becomes sealed with all treatment and transfers being via sealed tanks and pipework.

Biogas

The biogas prior to combustion can be a source of odour, particularly from compounds such as methane and hydrogen sulphide. In addition, once combusted, the resulting oxides, (such as nitrogen and sulphur dioxide) can also be malodorous.

The design of the plant, (such as the use of a flare and sizing of the biogas storage capacity) should minimise the release of unburnt biogas, (such venting should only occur in the event of an emergency).

In addition, a small quantity of oxygen is injected into the digestion tanks to reduce the hydrogen sulphide concentration of the feed gas. Whilst this is to primarily protect the engines from corrosion, it also reduces the odour loading of any vented biogas.

The combustion controls, including the selection of a suitably tall stack, should also allow for adequate dispersion of the exhaust gas from the biogas combustion.

We are satisfied that by employing the measures contained in the OMP, odour should not cause pollution outside of the site. However, a standard operating techniques condition (condition 2.3.2) has been included in the permit, meaning a revised OMP can be requested if the existing OMP proves ineffective once the plant becomes operational.

Site Condition report- containment and protection

A Site Condition Report (SCR) has been submitted as part of the application. The SCR identifies the site as being underlain by the Redcar Mudstone formation of Jurassic age, with drift geology comprising of laminated clay.

In terms of groundwater vulnerability, this has been classed as a secondary B aquifer with no source protection zones in the immediate vicinity of the site. No surface water bodies are present within 500m of the site.

A large area of made ground is indicated to the north of the railway line adjacent to the site, which marks the boundary of the land reclaimed from the river estuary. Historical Ordinance Survey (OS) mapping data (OS map of 1854) indicates the site comprised of and was largely surrounded by arable farmland with the Middlesbrough- Redcar railway already present on the northern boundary at that time.

A review of subsequent historical maps has identified brick and tile works, railway infrastructure and work buildings were present however these structures were subject to subsequent demolition and removal activities. The historical OS maps also identified potential in-filled ground which appears to relate to a former reservoir and apparent clay pit.

Records for the vicinity of the site indicate that 11 recorded pollution incidents have occurred within 500m of the site, of which two incidents were classified as being significant. Records also indicate that there are three existing landfills within 1,000m of the site and 16 historical landfill sites within a further 1,500m of the site.

Due to the industrial land use of the site, the operator has undertaken an intrusive investigation of the land, the results of which are presented in the SCR. This baseline data indicates that the made ground should be classed as being contaminated.

The operator considered that no remediation of the site was considered necessary below the proposed building footprint and areas of hardstanding. This was based on the depth of made ground present, contamination profile and proposed end use of the site. The baseline soil contamination data can, however be used as evidence of existing contamination and used for comparison at the permit surrender stage as necessary.

The site will not treat or release any 'Relevant Hazardous Substances', ('RHS') as defined by the Industrial Emissions Directive (IED). However, some of the raw materials used to support the digestion process/CHP engines may be classed as hazardous substances, such as lubrication oil (and subsequent used oil), iron chloride and antifoaming agents. These oils are to be stored within the CHP building and the chemical reagents are to be stored in the Tech1 building.

Having due regard to this and the supporting risk assessment, it is considered unlikely that pollution of soil or groundwater will occur from a relevant hazardous substance.

However, it is noted that the SCR does not contain groundwater monitoring data. Our 'H5 Site condition report guidance' states that:

> applicants whose activities involve using, producing or releasing RHS must recognise that if they choose not to carry out intrusive investigations, we will assume the baseline level of contamination to be zero, because the IED requires quantification. Where there is any doubt, we advise that applicants obtain sufficient evidence of pre-existing contamination to facilitate a simple determination at the point of surrender.

In this case we have advised the operator accordingly with respect to the absence of any groundwater monitoring.

Rainwater and uncontaminated surface water are to be collected and discharged to the existing surface water sewer near the site exit, (as shown on the 'Drainage Layout – Building Area' drawing). Whilst numerical emission limit values have not been set for this discharge, a weekly visual check has been required for visible oil and grease.

In terms of site infrastructure, the drainage from the external (green waste) reception area and the bunded area fall to a collection chamber situated within the bund. The drainage collected in this chamber is then pumped back into the main AD fermentation tanks.

The bund itself is consists of a 2.45 metre high concrete wall, the capacity of which is sufficient to contain over 25% of the total tank volume.

Bunds wall are routinely constructed such that they are continuous and without interruption. In this instance, the bund wall has been constructed with two vehicular access points, (one entry and one exit point), to enable tankers to draw off digestate from the digestate storage tanks located within the bund.

In order to provide containment at these access points, specifically designed, engineered and tested proprietary 'flood gates' are to be employed. Design calculations have been carried out to ensure that the gates, hinges and seals can withstand the potential worst case hydrostatic loading in an incident.

These gates are controlled remotely and by default kept in the closed position when not in immediate use. When in use, the gates will be open for approximately one minute to allow entry/exit of the tankers.

The emptying of the digestate tanks will occur 7 months of the year, between April and October. It is anticipated that a maximum of 2 collection tankers will visit the site within any given day. As a result the gates will be open for a total of four minutes per day. Waste delivery tankers will not pass through the bunded area, but will access the facility via the eastern end of the site. The access point was formerly for exiting vehicles only but will now be an entry and exit point.

In addition, various traffic management measures have been put in place for vehicles entering the bunded area, including:

- One way traffic flows from west to east;
- 5mph speed restriction;
- Armco barriers to be installed between the digestate and post fermentation tanks and the main access road; and
- Concrete bollards to be in place at strategic points.

The operator also has procedures in place in the event of either a spillage from, for example, a leaking flange or in the event of a catastrophic failure of the tank. The tanks have also been pressure tested as part of commissioning and are subject to a weekly visual integrity check as part of the permit process monitoring requirements.

We have been supplied copies of the pressure testing results, design calculations, technical drawings and photographs of the gates constructed in situ.

An improvement condition has also been set for the submission of a report that reviews the effectiveness of the gates and any additional procedures required following commissioning. This improvement condition has been set with a timescale of three months following permit issue, such that it is completed in advance of digestate draw off commencing in April 2017.

Following full consideration of the above points, we have taken a risk based decision in accepting the use of the gates as a departure from having a continuous concrete bund wall. We consider that the measures proposed will control the risk from spills within the bunded area.

Best Available Techniques (BAT) Assessment

The operator has carried out a BAT Assessment in support of the permit application. This assessment compares the proposed techniques against the indicative BAT standards contained within the following relevant guidance notes:

- Sector Guidance Note IPPC S5.06 Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste, ('SGN'); and
- draft Technical Guidance Note, 'How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion', version 1.0, November 2013, ('draft TGN').

The Assessment included consideration of the following aspects:

- Waste pre-acceptance;
- Waste acceptance;
- Waste reception and storage;
- Waste treatment, (general principles);
- Biogas treatment;
- Energy requirements;
- Digestate storage;
- Emissions to air;
- Odour control;
- Point source emissions to surface water;
- Noise and vibration;
- Management systems;
- Raw material selection;
- Water use;
- Waste recovery and disposal;
- Accidents and abnormal operations; and
- Environmental monitoring.

Of the above aspects, point source emissions to air, odour control and waste storage (in particular the bunding arrangements) were considered to be key issues, as described in the above sections of this document.

Noise

The noise aspect also warranted particular consideration due to the proximity of sensitive receptors. Whilst situated in an area of predominantly industrial and commercial use, there are residential properties located approximately 370 metres to the south of the site and a traveller's site approximately 50 metres to the west.

The operator's noise risk assessment submitted in support of the permit application appends a BS4142:1997 noise assessment report, also submitted as part of the planning application.

The BS4142:1997 methodology ("Method for rating industrial noise affecting mixed residential and Industrial Areas") is the most commonly used and accepted method for the measurement and rating of industrial and background noise levels outside dwellings in mixed residential and industrial areas. It also gives an indication of whether or not complaints are likely. It does this by comparing the noise (rating) level from the site at the receptor against the existing background noise level.

A difference greater than approximately 10 dB indicates that complaints are likely. A difference of greater than approximately 5 dB is of 'marginal significance', with a difference of less than -10 dB indicating that complaints are unlikely.

The submitted BS4142 assessment concluded that complaints are unlikely from the residential properties to the south, having a daytime difference of -8d B and a night-time difference of -10 dB. The assessment also concluded that the likelihood of complaints from the traveller's site would be marginal., having a daytime difference of 7 dB and a night-time difference of 5 dB.

The noise report noted that the primary sources of noise (gas engines and stack) would be screened from the traveller's site by the fermentation and digestion tanks. The report also noted that the specific noise levels used in the BS4142 assessment were derived from identical plant in Germany. The site in Germany has up to 80 HGV vehicle movements per day, whereas there are only likely to be 9 movements at this site. The report concluded that these two factors would mean that actual noise levels on site are likely to be lower than those used in the BS4142 assessment.

As a result the report went on to conclude that this would mean complaints from any receptor were unlikely.

We consider that there is some uncertainty associated with the rated levels used in the assessment. As mentioned above, these were derived from noise measurements associated with a plant in Germany. It has not been possible to substantiate whether the plant is identical and hence it has not been possible to verify the rated levels used in the assessment. However, considering the expected noise levels from sources on site and the attenuation due to distance, it is at this stage considered to be a reasonable value to use.

It is also noted that the BS4142:1997 methodology has since been superseded by the publication of BS4142: 2014. The revised edition of the guidance clarifies the application of the standard and introduces new aspects such as good practice for reducing uncertainty. The original assessment could therefore have been refined by submitting a report in accordance with BS4142: 2014. However we did not request a revised noise risk assessment as we consider the original assessment to be broadly indicative.

We consider that the digestate and fermentation tanks will provide a degree of shielding from the gas engine and stack noise. Shielding can have a variable effect, depending on the scale of shielding afforded and the relative heights of source screen and receptor, ranging from 5 to 15 dB. In this case, the engines would be fully shielded and the stack partially shielded, which could result in lower noise levels than in the assessment.

The operator's environmental risk assessment also states that, in order to minimise noise, preventative maintenance of all plant and equipment will be carried in accordance with the manufacturer's recommendations.

The site also has a one-way traffic management system that means the use of vehicle reversing bleepers should be minimised.

From the information provided, we are satisfied overall that noise is not anticipated to be an issue at the site.

We have included our standard noise condition in the permit which requires the operator to minimise their noise emissions.

Should noise become an issue once the site becomes operational, then a permit condition has been included which means we can request a noise management plan.

Process monitoring control

Process monitoring control is also an aspect of anaerobic digestion that warrants particular consideration in order to ensure stable operation and to minimise operational difficulties, such as foaming. It should also provide sufficient warning of system failures which may lead to loss of containment and potentially explosive biogas.

The BAT Assessment set out the various process monitoring to be undertaken at the site and was subsequently supplemented by additional information received on 28/11/16.

The majority of the operations will be managed at the site via a SCADA (Supervisory Control and Data Acquisition) system. The digestion process will be continuously monitored for key parameters such as temperature at various points, pH, ammonia, gas production and composition, (including H_2S, CH_4, CO_2, O_2 concentration). Gas pressure, flow rates, substrate volume, filling states are also to be remotely monitored. In terms of manual monitoring, samples are to be taken daily from each of the fermentation tanks for pH and volatile fatty acids. In addition fortnightly samples are also to be taken and assessed for total nitrogen, ammonium, phosphorous and potassium

he fermentation tanks are also to be fitted with a foam detector and de-foaming system. The operation of the agitators are to be controlled by the SCADA system, with manual height adjustment.

In addition, the incoming waste stream is subject to a sampling regime in order to characterise the waste that includes:

- pH and alkalinity;
- Particle size distribution and physical contaminants (only for solid feedstock);
- Total solids and volatile solids;
- Total organic carbon;
- Biochemical methane potential;
- Nutrient analysis;
- Calorific value;
- Fibre content;
- Volatile fatty acids; and
- Heavy metals and potentially toxic elements

Conclusion

From the information provided in BAT Assessment and elsewhere in the permit application, (such as the operating techniques), we are satisfied that the proposals are in accordance with indicative BAT and that the departure in terms of the bund 'flood gates' is acceptable.

Annex 1: decision checklist

This document should be read in conjunction with the Duly Making checklist, the application and supporting information and permit.

Aspect considered	Justification / Detail	Criteria met Yes
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 on the 20/09/16: – Director of Public Health; – Redcar and Cleveland Borough Council, (Environmental Health Authority); – Food Standards Agency; – Health and Safety Executive; and – Public Health England The application was also advertised on the relevant part of the GOV.UK website between 15/09/16 and 13/10/16.	✓
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 our guidance on what a legal operator is.	✓
European Directives		
Applicable directives	All applicable European directives have been considered in the determination of the application.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
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.	✓
Site condition report	The operator has provided a description of the condition of the site. See key issues of decision section for further information We consider this description is satisfactory, (see proviso in key issues section regarding groundwater baseline monitoring). 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 site of heritage, landscape or nature conservation, and/or protected species or habitat, (Teesmouth & Cleveland Coast SPA and Ramsar site and Tees & Hartlepool Foreshore and Wetlands SSSI). A full assessment of the application and its potential to affect the site, species or habitat has been carried out as part of the permitting process. We consider that the application will not affect the features of the site, species or habitat. We have not formally consulted on the application, (an assessment form [Appendix 11] which concluded no likely significant effect on the SPA and Ramsar has been sent to Natural England for information). An Appendix 4 Notice that concluded there would be no adverse affect on the notified interest on the SSSI has been completed and saved to our record system for audit purposes. The decision was taken in accordance with our guidance.	✓

Aspect considered	Justification / Detail	Criteria met Yes
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. The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment all emissions may be categorised as environmentally insignificant with the exception of nitrogen dioxide. We have assessed the risk from nitrogen dioxide emissions and consider that it is unlikely that the emissions from this installation will cause an exceedance of any Environmental Assessment Level. Additional Environment Agency assessment was carried out to consider emissions to air of VOCs and sulphur dioxide. See key issues of decision section for further information	✓
Operating techniques	We have reviewed the techniques used by the operator and compared these with the relevant guidance notes, (Sector Guidance Note IPPC S5.06 Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste, 'SGN'). We have also given due consideration to the draft Technical Guidance Note, 'How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion', version 1.0, November 2013, (hereafter referred to as 'draft TGN'). With one exception, the proposed techniques/ emission levels for priorities for control are in line with the benchmark levels contained in the SGN/draft TGN and we consider them to represent Best Available Techniques (BAT) for the facility. The exception mentioned above is the proposed interruption of the otherwise continuous concrete bund wall with vehicular access gates. See key issues section for further details.	✓

Aspect considered	Justification / Detail	Criteria met Yes
	We have considered the operators justification for departure from the guidance and accept it, as described key issues of decision section above. We consider that the emission limits included in the installation permit reflect the BAT for the sector.	
The permit conditions		
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 as they are suitable for the proposed treatment. Only seasonal green waste is to be temporarily stored outside, in accordance with the Odour Management Plan. We made these decisions with respect to waste types in accordance with Sector Guidance Note IPPC S5.06 Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste	✓
Improvement conditions	Based on the information on the application, we consider that we need to impose improvement conditions. We have imposed improvement conditions (IC1 and IC2) to ensure that emissions of sulphur dioxide are either insignificant or otherwise addressed accordingly. We have also imposed improvement conditions to verify the effectiveness of the odour abatement system and vehicular access gates within the bund following commissioning, (IC3 and IC4 respectively).See key issues of decision section for further information	✓
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. We have decided that emission limits should be set for the parameters listed in the permit. NO_2 has been identified as being emitted in not insignificant quantities and an ELV has been set for this substance. ELVs have also been set for CO and VOCs, primarily as performance parameters, being indicative measures of combustion efficiency. It is considered that the ELVs described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment secured.	✓
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. Annual monitoring has been set for NO_x (expressed as NO_2), CO, SO_2 (subject to review in accordance with improvement condition IC2) and VOCs in order to measure compliance with the relevant ELVs and, in the case of NO_2, the values used in the air dispersion modelling. 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 such that relevant monitoring data is reported at an appropriate frequency.	✓
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 our guidance on what a competent operator is.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
Technical competence	Technical competency is required for activities permitted. The operator is a member of an agreed scheme. The operator satisfies the competence requirements for environmental permits.	✓
Relevant convictions	The Case Management System has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the competence requirements for environmental permits.	✓
Financial provision	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions. The operator satisfies the competence requirements for environmental permits.	✓

Annex 2: Consultation and web publicising responses

Summary of responses to consultation and web publication and the way in which we have taken these into account in the determination process.

Response received from
Health and Safety Executive
Brief summary of issues raised
No comments
Summary of actions taken or show how this has been covered
No further action

Response received from
Public Health England
Brief summary of issues raised
1. The applicant did not assess worst-case emissions or emissions from the on-site flare (on the basis that it will be used <10% of the time when one of the engines is down for maintenance). The Environment Agency should ensure that the base-case is representative (eg, via annual monitoring) and that it is satisfied that worst-case gas engine / flare emissions would not lead to adverse impacts off-site 2. Various solid wastes are to be deposited on the outside concrete pad, but the odour management plan focusses on seasonal green waste only. The Environment Agency should clarify this area with the applicant and ensure that sufficient mitigation is in place to prevent off-site odour impacts arising from activities at the installation
Summary of actions taken or show how this has been covered
1. Annual monitoring has been set which can be used to check the emission inputs into the detailed air dispersion modelling. We are satisfied that the worst case scenario was used in the modelling as the flare will not operate at the same time as all the engines and the emission rates are lower for the flare. Modelling all engines operating all the time at 100% load is therefore considered to be the worst case scenario. 2. The Operator subsequently confirmed that only seasonal green waste is to be deposited on the outside concrete pad.

Response received from
Redcar and Cleveland Borough Council – Environmental Health
Brief summary of issues raised
The site is in close proximity to the Haven Traveller site to the west (~150 m from the proposal) and the residential properties at Salisbury Terrace (~450 m from the proposal). There is concern that site operations could potentially give rise to both odour and noise nuisance together with significant loss of amenity to the residents.
Summary of actions taken or show how this has been covered
1. Odour issues have been addressed by the odour management plan which, amongst other key elements, includes restricts the wastes deposited outside to seasonal green waste only. We are satisfied with the odour management plan and it forms part of the operating techniques required by the permit conditions. 2. Noise issues are considered as described in the 'BAT Assessment' section of the Key Issues above. Our standard condition regarding noise and vibration has been included as part of the permit. Should noise and/or vibration become an issue once the site becomes operational, then this condition gives us the ability to require the provision of a noise and vibration plan.

No responses were received from the Director of Public Health, Food Standards Agency or as a result of the web publication