

Environment Agency permitting decisions

Bespoke permit

The Permit Number is : EPR/DB3503HL

The Applicant / Operator is : Rathlin Energy (UK) Limited

The Site is located at : West Newton B Wellsite, Crook Lane,
West Newton, East Riding of Yorkshire,
HU11 4LP

Consultation commenced on : 05/10/2015

Consultation ended on : 30/10/2015

Determination date : 26/07/2016

We have decided to grant the permit for West Newton B Wellsite, operated by Rathlin Energy (UK) Limited.

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 document explains how we have considered the Applicant's application to permit a mining waste operation and an installation for the flaring of waste gas for the West Newton B Wellsite, and why we have included the specific conditions in the permit we are issuing to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

Preliminary information

We gave the Application the reference number EPR/DB3503HL/A001. We refer to the Application as “the **Application**” in this document in order to be consistent.

The number we have given to the permit is EPR/DB3503HL. We refer to the permit as “the **Permit**” in this document. The Application was duly made on 15/09/2015

The site for the proposed mining waste operation is located at: West Newton B Wellsite, Crook Land, West Newton, East Riding of Yorkshire, HU11 4LP

Use of terms

The Applicant is Rathlin Energy (UK) Limited. We refer to Rathlin Energy (UK) Limited as “the **Applicant**” in this document. Where we are talking about what would happen after the Permit is granted, we call Rathlin Energy (UK) Limited “the **Operator**”.

Additive

Chemical or chemicals manually added to clean water.

Cement

Cement is pumped to seal off the formations when installing casing. During the drilling process, steel casing is installed within the wellbore in stages, and then cemented in place.

Conditioning spacer

Conditioning spacer is a fluid used to separate drilling fluids and cement and is used to displace drilling muds from the borehole prior to cement being applied

Drilling muds

Drilling muds are used to lubricate the wellbore while drilling.

Drill cuttings

Drill cuttings are broken bits of solid material naturally occurring underground and removed from a borehole as part of the drilling process into underground formations.

Drill Stem Test (DST)

A Drill Stem Test is a test involving the drill string with a downhole shut-in valve allowing the well to be opened and closed down the well via the drill pipe. A DST can be used for establishing reservoir pressures, permeability and determining the nature of any formation fluid.

Extractive waste

Extractive waste is waste directly resulting from the prospecting, extraction, treatment and storage of mineral resources and the working of quarries.

Flaring

Flaring is a technique used where quantities of flammable gas are burnt in a

controlled manner. The gas flow is ignited under controlled conditions.

Prospecting

Is defined by article 3(21) of the Mining Waste Directive as 'the *search for* mineral deposits of economic value, including sampling, bulk sampling, drilling and trenching, but excluding any works required for the development of such deposits, and any activities directly associated with an existing extractive operation'.

Regulated facility

This is the term used in the Environmental Permitting (England and Wales) Regulations. Those regulations provide that any regulated facility must be operated only under and in accordance with an environmental permit. The regulations define this term as to include a "mining operation". A "mining operation" is further defined so as to include the management of extractive waste whether or not it involves a waste facility. The term "regulated facility" is therefore quite different to the term "waste facility" which is defined in the Mining Waste Directive.

Reservoir

A porous and permeable rock in which oil or gas may be present.

Surface conductor

The first string of casing run to prevent surface losses and or washouts below the cellar base in addition to isolating aquifers.

True vertical depth (TVD)

True vertical depth is the absolute vertical distance between the datum to a point in the wellbore. It is measured in a straight perpendicular line. Common datum levels are ground level (GL), Ordnance datum (mAOD) or Kelly bushing (KB).

Well bore

The inside of the borehole which has been drilled through different geology and characteristics of a rock.

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**
 1. Brief outline of process
 2. Summary of our proposed decision
 3. How we took our decision
 4. The legal framework
 5. Description of the facility
 6. General issues
 7. Environmental issues: and their control
 8. Other legal requirements

- **Annex 1 the consultation and web publicising responses**

Key issues of the decision

This Application is for a permit for the management of the extractive waste resulting from prospecting for hydrocarbon resources, namely oil and gas at West Newton B Wellsite, Crook Lane, West Newton in North East Lincolnshire.

The Application includes the flaring of waste gas arising from such prospecting activities. As the produced water arising from the appraisal activities has the potential to contain low levels of Naturally Occurring Radioactive Material (NORM) in sufficient quantities to be classed as radioactive waste, the Applicant has applied for a separate Radioactive Substances Regulation (RSR) permit which will regulate the ways in which the Operator will manage radioactive material.

The RSR permit Application, which is an application for SR2014No4 standard rules permit for accumulation and disposal of radioactive waste from the NORM industrial activity of the production of oil and gas, will be considered separately from this permit and will also be regulated by the Environment Agency.

If the Applicant decides to include additional prospecting activities and/or full scale commercial production, a variation of the permit will be required.

Any such variation Application would be determined on its merits and be subject to our normal consultation process. Any Application to vary will require an amended waste management plan to be submitted and considered by us.

1. Summary of our decision

We have decided to issue the permit to the Applicant. This allows the Operator to manage a mining waste operation for the management of extractive waste not involving a mining waste facility. The extractive mining waste will arise from the drilling of a sidetrack borehole.

We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements and that the permit will ensure that a high level of protection is provided for the environment and human health.

The permit notice contains conditions taken from our standard environmental permit template, including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting (England and Wales) Regulations 2010 (the 2010 Regulations), Directive 2006/21/EC (the Mining Waste Directive) and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the permit, we have considered the Application and accepted the details are sufficient and satisfactory to make the standard condition appropriate.

We try to explain our decisions as accurately, comprehensively and as plainly as possible.

2. How we took our decision

The Application was duly made on 15/09/2015. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination.

We carried out consultation on the Application taking into account the Environmental Permitting Regulations 2010 and our statutory Public Participation Statement.

We advertised the Application by a notice placed on our website, which contained all the information required by the regulations, including telling people where and when they could see a copy of the Application.

We placed a paper copy of the Application and all other documents relevant to our determination on our Public Register at The Environment Agency Lateral House Office, 8 City Walk, Leeds, LS11 9AT. We also sent a copy to Yorkshire County Council for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made.

We sent copies of the application to the following bodies, including those with whom we have “Working Together Agreements”:

- Local Planning Authority
- Mineral Planning Authority
- Health and Safety Executive
- Public Health England
- Director of Public Health

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

Although we were able to consider the Application duly made, additional information in support of the Application was also received as follows:

Following the submission of the permit application we requested further information on the documents submitted via a schedule 5 notice.

In response to our requests for further information, the Applicant revised their original proposals. They stated that they were no longer proposing to carry out an extended well tests as proposed in the original application. They also revised the proposals for the flare they were going to use. As a result of these changes the Applicant provided revised and updated proposals relating Waste management plan, chemical inventory of additives to be used during the exploratory drilling operations, air dispersion and modelling report, odour management plan, noise impact assessment and flare specification for the drill stem testing activities.

Additional information for the 2nd schedule 5 notice was subsequently received on 15/01/2016. Through this 2nd schedule 5 notice the Environment Agency requested more information on different aspects of the proposed flare. We received a

satisfactory response to the 2nd schedule 5 notice on 13/04/2016. We received further information on surface water management on 24/06/2016.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 1. We have taken all relevant representations into consideration in reaching our determination.

3. Brief outline of process

3.1. Well site construction

Construction of the wellsite will result in a small amount of non-extractive wastes being produced, a description of which is provided below together with a description of the construction operation. For clarity, the wellsite construction does not generate extractive waste and has therefore been not been considered in the waste management plan.

The West Newton B wellsite will be constructed by initially excavating the topsoil and relocating it on the northern and western boundary of the wellsite. The topsoil, which will be stored on the wellsite for subsequent wellsite restoration, will be formed into a bund, which will provide partial screening of the wellsite. The subsoil will then be 'cut to fill', a method of removing subsoil from the higher areas of the wellsite and relocating it within the lower areas of the wellsite to create a level plateau.

Once the wellsite is level, a ditch will be excavated around the perimeter of the active area of the wellsite. The perimeter ditch will form part of the wellsite containment, collecting and storing surface run-off water.

Following excavation of the perimeter ditch, the active area of the wellsite and the perimeter ditch will be overlaid with a High Density Polyethylene (HDPE) membrane to provide wellsite integrity and ensure any run off water flows to the perimeter ditch for subsequent discharge or removal via road tanker and disposed at an Environment Agency permitted waste facility. The HDPE membrane is protected by two layers of non-woven geotextile matting placed above and below the membrane to ensure damage is not incurred and integrity of the active area of the wellsite is maintained. The HDPE membrane is integrity tested during installation to ensure complete containment of the active area of the wellsite.

The perimeter containment ditches will be open along the northern and upper western boundaries of the active area of the wellsite with the southern, eastern and lower western boundaries of the active area backfilled using a twin walled perforated plastic pipe and clean aggregate to maintain containment.

Stone aggregate will be used for the site surface. The stone aggregate is used for the surface of both the active and non active areas of the wellsite. Any stone aggregate that is surplus to requirement will either be transported back to the facility from whence it came or stored onsite for subsequent use should the need arise to maintain the wellsite surface and/or access track.

Two drilling cellars will be constructed within the centre of the active area of the wellsite and form a containment area from which each of the two (2) permitted wells will be drilled, whilst also housing the wellheads. A large diameter casing, circa 6m in length, is cemented below the base of the drilling cellar to protect the base of the drilling cellar from being undermined during the drilling of the surface conductor. It also provides a conduit within which drill cuttings can circulate to surface for subsequent collection and off site disposed at an Environment Agency permitted waste facility. The drilling cellars are constructed around the large diameter casings using precast concrete rings encased in a concrete jacket surround. The impermeable membrane is incorporated into the cellar construction to maintain environmental integrity of the active area of the wellsite.

A concrete drilling pad will be constructed at surface, immediately surrounding the drilling cellars. The concrete pad will be sized and constructed to take the ground loading of the drilling rig. Cement used for the construction of the drilling cellars and surface drilling pad will be carefully calculated to minimise waste. Cement surplus to requirement will be returned to the supplier and be reused or recycled minimising waste produced.

No wellsite construction activities result in the production of extractive waste as all excavated subsoils will be stored on site for subsequent reuse in the restoration of the wellsite.

3.2. Management of surface run-off

The active area of the wellsite has been designed to provide complete environmental containment of surface run-off water and any potential surface pollutants during the exploratory operations. During periods of activity within the active area of the wellsite, all water contained within the perimeter containment ditches will be removed via road tanker and disposed at an Environment Agency permitted waste facility.

During periods of inactivity within the active area of the wellsite, water contained within the perimeter containment ditch will be tested to confirm it is suitable for discharge via the Class 1 SPEL oil-water separator to an a 150mm sealed drainage pipe that drains into a nearby watercourse (L Dyke). in accordance with a Surface Water Management Plan (RE-05-EPRA-WNB-SP-004-03).

If the results of the test identify that the surface run-off water is not suitable for discharge, the water will be removed via road tanker and disposed at an Environment Agency permitted waste facility.

3.3. Drilling operations

The Operator intends to drill two vertical boreholes in both the Cadeby formation and the Kirkham Abbey formation up to a depth of approximately 2,044 metres. Thereafter, the Operator will carry out drill stem tests.

The well construction will take place in stages. The drilling method and any additives are detailed in the Waste management Plan. Section 5.3.1 (Wellsite Construction) in the waste management plan describes the step by step process of the construction

of the wells. Section 5.3.3.2 (Main Drilling Operation) in the Waste Management Plan describes the main drilling operation including the composition of drilling fluid in different sections of boreholes.

The chronological order of the proposed well design is summarised in the table below. An outline of the well drilling operations proposed at West Newton B exploratory operations is detailed below.

Proposed Well Design

Hole Size	Conductor/Casing	Depth (TVD BKB)	Drilling Mud
24"	20"	80m	Air/Water
17.1/2"	13.3/8"	505m	Bentonite/Polymer WBM
12.1/4"	9.5/8"	1510m	KCl Polymer WBM
8.1/2"	7"	2044m (TD)	Salt Saturated Polymer WBM
Contingency			
6"	4.1/2" liner	2044m (TD)	Salt Saturated Polymer WBM

First borehole

Hole Section 17 1/2"

- A 17 1/2" (444mm) hole will be drilled from circa 80m True Vertical Depth below Kelly Bushing (TVD KB) to circa 505m TVD KB using a bentonite polymer water based mud system. Once this hole section has been drilled a 13 3/8" (339mm) casing will be run and cemented back to surface. Once cemented to surface the casing will be pressure tested to confirm its integrity. A Formation Integrity Test will be carried out on the 13 3/8" (339mm) casing shoe immediately following the drilling out of the shoe, at the start of the next hole section.

Hole Section 12 1/4"

- A 12 1/4 1/2 (311mm) hole will be drilled from circa 505m TVD KB to circa 1,510m TVD KB using a KCl polymer water based mud system. Once this hole section has been drilled a 9 5/8" (244mm) casing will be run and cemented back to surface. Once cemented to surface the casing will be pressure tested to confirm its integrity. A Formation Integrity Test will be carried out on the 9 5/8" (244mm) casing shoe immediately following the drilling out of the shoe, at the start of the next hole section.

Hole Section 8 1/2"

- A 8 1/2" (222mm) hole will be drilled from circa 1,515m TVD KB to final depth circa 2,044m TVD KB at the base of the Permian formation using a mixed salt saturated polymer water based mud system. Once drilled a 7" (177mm) casing will be run and cemented back to surface. The 7" (177mm) casing will be pressure tested to confirm its integrity. The section TD is subject to change and may result in the 8 1/2" (222mm) hole Section TD being shallower than 2,044m

TVD KB with the remaining formation to 2,044m TVD KB being drilled in a 6" (156mm) hole.

Hole Section 6"

- Rathlin Energy retained the ability to drill from the base of the 9⁵/₈" (244mm) casing shoe to 2,044m TVD KB in two hole sections, 8¹/₂" (222mm) hole and a 6" (156mm) hole. This will result in the depth of the 8¹/₂" (222mm) hole section TD being shallower than 2,044m TVD KB and the remaining formation to 2,044m TVD KB being drilled in 6" (156mm) hole.

In the event that the 8¹/₂" (222mm) hole TD is shallower than 2,044m TDV KB and the remaining formation is drilled in 6" (156mm) hole, a 4¹/₂" (114mm) liner would be run to TD and cemented back to inside the 7" (177mm) casing to a depth of circa 1,700m TDV KB. The 4¹/₂" (114mm) casing will then be pressure tested to confirm its integrity.

Second borehole

The design and construction of the second exploratory borehole will be similar to that of the first, insofar as the depths, borehole diameter and produced wastes are concerned. The second borehole will be subject to a separate WR11 application to the Environment Agency, should a decision be taken to drill the second borehole.

Geological logging will be undertaken during well construction to determine whether the formations encountered during drilling may contain petroleum. The borehole logs will assist the Operator to determine specific zones. Well completion and testing will involve various different processes. This will help to obtain a greater understanding of the formations' properties and determine whether the formations are capable of producing commercial quantities of petroleum. In order to establish communication between the formations being tested and the wellbore, perforating guns will be run into the wellbore and fired. The perforating operation involves the use of shaped explosive charges, which are set within a perforating gun assembly and oriented for individual requirements. Upon detonation from the surface, each shaped charge produces a jet, which penetrates the casing and the formation, providing a direct communication between the formation and the wellbore.

The Operator will also carry out the following additional activities

- The West Newton B well will be subject to a period of suspension using suspension brine and mechanical plugs.
- Liquid Carbon Dioxide is injected into the well to assist in the removal of all wellbore fluids and near wellbore debris sustained during the drilling operation, thus restoring near wellbore permeability.
- Nitrogen is injected into the well to aid the initial lifting of wellbore fluids, thus reducing the hydrostatic pressure and allowing petroleum to flow to surface.

The drilling and management of the extractive waste are regulated under different regimes. An Operator will need planning permission from the Local Mineral Planning

Authority, and a Petroleum Exploration and Development Licence (PEDL) from the Department of Energy and Climate Change (DECC).

3.4. Drill Stem Testing

A Drill Stem Test (DST) may be carried out during the drilling operation to determine whether petroleum is present in the target formation(s). It is undertaken in open hole, prior to running and setting casing across the target formation(s).

A DST is a short duration test to provide an initial analysis of the petroleum composition and its flow characteristics within the formation. The initial information obtained during the DST will be used to inform a decision whether to run casing across the formation and, if so, to establish a more detailed and specific longer term testing programme, often referred to as an Extended Well Test (EWT). An extended well test (EWT) is a longer duration test, which is carried out after putting a cement casing across the reservoir.

The activities permitted in this permit do not include an extended well test. In the event that the initial exploratory operations are successful, the Operator may wish to undertake an EWT, in which case the Operator will be required to make an application to vary this permit in accordance with the Environmental Permitting (England and Wales) Regulations 2010 as amended. Such an application will include submission of flare specifications that are most suited for the EWT.

In order to perform a DST, a packer will be run on drill pipe and set immediately above the formation being tested to provide isolation from the wellbore. The formation will then be flowed, with fluids being flowed to surface through the drill pipe.

Once at surface, fluids will be diverted by temporary pipework to a three phase separator, which will separate out oil, gas and produced liquids. Oil and produced liquids will be diverted via temporary pipework to dedicated storage tanks onsite for subsequent offsite removal for sale and disposal respectively. Oil, which for clarity is not considered a waste, will be transported by a permitted haulier to a permitted refinery for sale. Produced liquids, which are considered a waste, will be transported by a permitted haulier to an Environment Agency permitted water treatment facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility.

Any natural gas separated during the three phase separation will be diverted by temporary pipework to a ground flare located onsite for incineration. At the point of incineration the natural gas is considered a waste.

The flare proposed for the West Newton B exploratory operations is a single tip shrouded flare with a 'tube type' burner provided by PW Well Services. The flare is equipped with a propane fuelled permanently lit pilot, which ensures that ignition takes place as soon as natural gas is present and reignites if there is a break in flow.

The applicant has provided a description of the proposed flare and how it will be operated. The applicant has also provided an acceptable assessment of Best

Available Technique (BAT) for management of waste gases from hydrocarbon exploration. We agree with the conclusions of the BAT assessment based on the current availability in the UK of equipment suitable for short duration testing under the conditions described.

Formation water produced during the DST has the potential to contain low levels of Naturally Occurring Radioactive Material (NORM). Samples of formation water will be sent to a laboratory holding the appropriate accreditations for radionuclide analysis by gamma spectrum. Depending on the outcome of radionuclides analysis, formation water will be transported via a permitted haulier to either an Environment Agency permitted waste water treatment works facility where it is processed, treated and discharged in accordance with the permitted controls of the water treatment facility, or to a bespoke RSR permitted waste treatment facility for treatment and disposal in accordance with the Best Available Technique (BAT).

3.5 Well Completion and Testing Operations

In addition to a DST, geological logging is undertaken during well construction to determine whether formations encountered during drilling may contain petroleum.

The borehole logs assist Rathlin Energy in determining specific zones, which justify subsequent testing. Well completion and testing may involve various different processes, all of which are intended to obtain a greater understanding of the formation properties and ultimately determine whether the formations are capable of producing commercial quantities of petroleum.

Well testing process does vary, depending on the formation being tested. An overview of the various well testing processes to be undertaken during the West Newton B exploratory operations is detailed below and will be undertaken following the running and setting of casing across the target formation(s). This permit only regulates the management of extractive waste arising from this well testing process. The perforating operation, in particular the use of shaped explosive charges, is regulated by the Police Authority and the Health and Safety Executive. For the purpose of determining this permit only the management of extractive waste associated with the perforating operation will be regulated by the Environment Agency has been considered.

Once the casing has been perforated, the fired perforating guns will be brought back to surface.

3.6. Acid Wash/Squeeze and Flow Test within Upper Permian

To improve the flow of petroleum within the Upper Permian formation, an acid, most commonly hydrochloric acid (HCl) at 15% concentration with water (i.e. 150kg of HCl with 1,000kg of water), is applied to the formation through the wellbore. The operation is very much akin to acidisation of boreholes in the water well industry and results in high permeability channels through which water or petroleum can flow.

An acid wash is applied using low pressure and can be used to clean out the natural fractures, having potentially been blocked as a result of the initial drilling operation.

An acid squeeze is applying the acid to the formation under pressure not exceeding the fracture pressure of the formation, resulting in the acid being squeezed through the natural fractures within the formation and increasing the near hole permeability.

The proposed dilution of hydrochloric acid is 15%, which is circulated across the perforations using 1m³ of HCl solution. The process of washing the perforations is repeated a further four times.

Following the washing of the perforations, HCl is then selectively squeezed into the formation at 1m³ of HCl per metre of perforation. It is anticipated that between 6m³ to 11m³ of HCl will be pumped into the formation during the operation, with all spent acid being recovered to surface.

If more than one interval within the Permian interval is to be tested, the operation will be repeated. If required, the acid wash and squeeze will be performed within the Upper Permian reservoir targets.

The HCl reacts with the calcium carbonate in the Upper Permian limestone formation through dissolution to produce carbon dioxide (CO₂), water (H₂O) and chloride ions (Cl). The chloride ions exist in the water and pair to form calcium chloride (CaCl₂). The chemical equation is as follows:



Calcium chloride (salt) is not a hazardous substance and must therefore be considered as a non-hazardous pollutant. Formation water produced in petroleum production wells in North Yorkshire from the Permian interval is considered representative of the formation water anticipated within the Permian interval at West Newton B, East Riding of Yorkshire with a natural salinity of some 349,000mg/l.

The Permian interval lies at a depth of some 1,400m below ground level (BGL) and is isolated from near surface aquifers, groundwater and those users and the environment dependent on them by some 1,150m of overlying low permeability formations.

Whilst the injection of hydrochloric acid within deep saline water bearing formations is a 'groundwater activity', the activity is considered de minimis and can be excluded under Schedule 22 3 (3) of EPR 2010. The acid wash/squeeze within the Permian Carbonate does not, therefore, require a groundwater permit.

3.7 Liquid CO₂ Injection

The purpose of CO₂ injection is to assist in the removal of all wellbore fluids and near wellbore debris sustained during the drilling operation, thus restoring near wellbore permeability. In comparison to nitrogen injection, CO₂ injection allows for greater fluid volume injection, which in turn provides greater formation penetration rates and the recovery of wellbore debris.

Each CO₂ injection treatment requires circa 2m³ and 3m³ litres of liquid CO₂ per 10m interval being treated, which is pumped in liquid state from surface through the wellbore and into the formation. Due to the temperature of the formation, the state of the CO₂ changes rapidly from a liquid to a gas. This process results in a rapid expansion of CO₂, which forces the formation fluid and near wellbore debris from the formation into the wellbore and back to surface. All liquid CO₂ injected into the formation will return to surface in a gaseous state and will be passed through the three phase separator.

Whilst the injection of liquid CO₂ within deep saline water bearing formations is a groundwater activity', the liquid CO₂ will return to surface in a gaseous state. No injected CO₂ will remain in the formation and therefore the injection of liquid CO₂ is considered de minimus and can be excluded under Schedule 22 3 (3) of EPR 2010 from requiring a groundwater activity permit.

3.8. Well decommissioning and site reinstatement

In the event that the well is not successful in establishing commercially producible mineral resources, the well will be decommissioned in accordance with Oil and Gas "UK Guidelines for the suspension and abandonment of wells", the Borehole Sites and Operations Regulations 1995, and the Offshore Installations and Wells (Design and Construction regulations) 1996 and the site reinstated to its former use.

The guidelines and regulations require all distinct permeable zones penetrated by the well to be isolated from each other and from surface by a minimum of one permanent barrier. If any permeable zone penetrated by the well is hydrocarbon-bearing or over-pressured and water-bearing then the requirement is for two permanent barriers from surface, the second barrier being a back-up to the first.

Once the well is decommissioned, the casing strings will be mechanically cut off at 1.5 metres below the original ground level and a steel plate welded over the top. The pre-cast concrete drilling cellar would then be removed and the site restored to its former use.

4. The legal framework

The drilling and management of the extractive waste are regulated under different regimes. An Operator will need planning permission from the local Minerals Planning Authority, and a Petroleum Exploration and Development Licence (PEDL) from the Department of Energy and Climate Change (DECC).

The Permit is granted under regulation 13 of the Environmental Permitting (England and Wales) Regulations 2010, which regulates facilities whose activities involve water discharges and groundwater activities, radioactive substances, waste, mining waste or which are listed in schedule 1 to the 2010 Regulations. The Environmental Permitting regime is the regulatory framework which requires the Environment Agency to deliver the obligations required by national policy and various EC Directives.

We consider that the permit will ensure that the operation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

5. Description of the operation

The operation involves two classes of “regulated facility” as defined in the Environmental Permitting (England and Wales) Regulations 2010 (EPR), namely a mining waste operation and an installation.

As well as being a mining waste operation involving the management of extractive waste the flaring activity is an installation as it involves the incineration of hazardous waste, namely gas, in flare with capacity of more than 10 tonnes a day.

By virtue of the 2010 regulations, an environmental permit is required for the operation of a regulated facility.

5.1 Description of the site and related issues

5.1.1 Location

The site is called the West Newton B Wellsite and is located at Crook Lane, West Newton, Hull, HU11 4LP.

The West Newton B Wellsite is located within open countryside in the county of Yorkshire, within the Parish of Burton Constable. The site is currently in arable agricultural use. The southern boundary is formed by Crook Lane. There is no physical boundary between Crook Lane and West Newton B Wellsite. To the north and west of the site there are no immediate boundaries.

A private access track is planned to be constructed prior to constructing the West Newton B Wellsite which will not generate any extractive waste. The wider surrounding area consists of rural landscape with small villages. An established gas storage facility, Aldbrough Gas Storage, is located 5km to the east of the proposed wellsite and a major petrochemical park, including a power generation facility, Saltend Chemical Park, is located 10km south southwest of West Newton B Wellsite. Total site area is 1.25 hectares.

- There are no designated European sites within 10 km of the site.
- The site is not within a Groundwater Source Protection Zone;
- There are no Sites of Special Scientific Interest (SSSI) within 1 km of the site.

The Applicant submitted a plan showing the extent of the site. We are satisfied with this plan. The plan is included in the permit.

5.1.2 What the regulated facility does

The application is for a permit to drill two exploratory boreholes, for the management of the non-hazardous and hazardous extractive waste and waste gas, should it arise, resulting from prospecting for gas.

The permit will authorise the operation of a regulated facility, namely a mining waste operation for the management of extractive waste not involving a waste facility. The permit will also authorise the incineration of hazardous waste, namely waste gas in a waste incineration plant with a capacity exceeding 10 tonnes a day.

The Applicant proposes to use an enclosed shrouded flare and has provided an acceptable BAT assessment for this type of flare specific to the proposal at this site. The permit limits the flaring of gas to a maximum of 2790 Nm³/hour at reference conditions 273K (0°C) and 101.3kPa (equivalent to approximately 2.49 million standard cubic feet of natural gas per day (MMscfd) at reference conditions 288.15 k (15°C) and 101.3kPa) as set out in the Waste Management Plan and on which the Air Quality Modelling was based.

Unless otherwise agreed in writing by the Environment Agency, the permit requires the Operator to comply with the techniques used in the waste management plan and limits the activities to those stated. We will only authorise minor amendments to the waste management plan without the need to vary the permit.

The discarded drill cuttings, produced water, spent drilling muds, spent hydrochloric acid and cement returns are considered to be extractive waste and as such fall to be regulated under the Mining Waste Directive (MWD).

The activity of managing these extractive wastes under the permit is classified as the management of extractive waste. Mining waste operations, with or without a mining waste facility are regulated by the Environment Agency by means of a permit subject to the Environmental Permitting Regulations 2010. The Applicant has applied for a permit involving the management of waste that does not include a waste facility. We have carefully considered the proposed activity and have concluded that there will be no waste facility as defined in the Mining Waste Directive.

The permit will authorise the management of waste generated by well stimulation. As such, there is the potential to produce oil and gas from the well. This is the threshold requirement to classify the operation as a NORM (Naturally Occurring Radioactive Materials) Industrial Activity (NIA).

The West Newton B exploratory operations will involve the circulating to surface of fluids exposed to the formation during drilling and/or well testing, which may or may not contain Naturally Occurring Radioactive Materials (NORM). Rathlin Energy (UK) Limited have applied and have been granted a Standard Rules permit SR2014No4 for the accumulation and disposal of formation water, as the production of oil and gas falls within the classification of a NORM Industry Activity.

The exploratory operations will involve incinerating gas during the Drill Stem Test (DST). The DST will be used to inform whether an Extended Well Test (EWT) programme will be required.

An EWT is a longer duration test, which is carried out after putting a cement casing across the reservoir. The activities permitted in this permit do not include an EWT.

In the event that the initial exploratory operations are successful, the Operator may wish to undertake an EWT, in which case the Operator will be required to make an application to vary this permit in accordance with the Environmental Permitting (England and Wales) Regulations 2010 as amended.

Such an application will include submission of flare specifications that are most suited for the EWT. If the project does progress to either further prospecting activities and/or full scale production and/or mineral exploitation (including any pre-production development), a variation of the permit will also be required.

This would take into account any changes in the nature and management of extractive wastes and also any changes in the manner and/or scale of operation. If a permit variation is applied for, this will need to be accompanied by an amended waste management plan which will be carefully reviewed.

Any such application would be determined on its merits and be subject to our normal consultation process. Any application to vary will require an amended waste management plan to be submitted and considered by us.

5.3. Waste management activities

The wastes that will or may need to be managed on site are:

- Well suspension brine (01 05 08) – Non Hazardous
- Solidified cement which is in excess of that used (17 01 01) – Non Hazardous.
- Spent hydrochloric acid and calcium chloride (16 10 02) – Non Hazardous.
- Formation water (16 10 02) – Non Hazardous.
- Waste clays and sand (01 04 09) – Non Hazardous.
- Waste water based drilling muds (01 05 04 and 01 05 08) – Non Hazardous.

- Drill cuttings (01 04 08 and 01 05 08) – Non Hazardous.
- Excess conditioning spacer – Non Hazardous.
- Waste gas – Hazardous.
- Nitrogen – Non Hazardous.

The wastes can be classified as hazardous in the event that they become contaminated with hydrocarbons.

Storage arrangements and pollution prevention measures are discussed in Sections 6.9 and 6.10.

The following text is a brief description of how the wastes arise and what will happen to them.

5.3.1. Excess solidified cement

Cementing remediation work will be done as part of the well maintenance operations. Cement will also be used to completely seal the well bore annulus, and in the case of well abandonment a number of cement plugs will be set inside the borehole.

Measures will be taken to correctly assess the amount of cement that is required. However, it will not be possible to make completely accurate predictions and there may be an amount which is in excess of that used. Measures will be taken to minimise the amount of excess material, namely calculating the quantity of cement required as accurately as possible based on the engineering characteristics of the well.

Excess cement which will be returned to the surface will be transferred to a number of open top skips for subsequent removal and disposal to a suitably permitted waste facility.

5.3.2. Hydrochloric acid

Hydrochloric acid is used to wash and clean out natural fractures within carbonate formations that would have been blocked as a result of the initial drilling operations. In addition, dilute hydrochloric acid solution is squeezed into the natural fractures of the carbonate formation under pressure, increasing permeability.

The hydrochloric acid solution will be used in stages to ensure the quantity used is minimised. Hydrochloric acid reacts with calcite and dolomite to produce calcium chloride, which is non-hazardous.

The calcium chloride will be reverse circulated out of the well bore into a number of 1 m³ containers stored onsite for subsequent removal via a licensed haulier to a suitably permitted facility.

5.3.3. Formation water

During flow testing operations there is a possibility of formation water being produced together with gas and oil. Formation water is separated from the gas or gas and oil on surface using temporary fluid separation equipment and transferred via temporary pipe work to storage tanks located onsite for off site removal.

The ability to prevent or minimise formation water is extremely limited. Options for reinjection of produced water have not been considered as the operations are exploratory at this stage and there is uncertainty as to whether produced water will arise from the permitted activities. We are satisfied that the waste, should it arise will be non-hazardous.

5.3.4. Waste gas

During flow testing operations there is a likelihood of natural gas being produced. This will be flowed to determine the characteristics of the formation, allowing the Operator to determine whether or not the reservoir is sufficient enough to produce commercial quantities of natural gas. After the gas has been tested, it will become waste unless it can be used.

There is a requirement to prevent or minimise the generation of wastes. We are satisfied that it would not be feasible to use the gas on site during this prospecting stage.

Natural gas is separated from hydrocarbon liquids, produced water and oil fluids at surface and diverted via temporary pipe work for the flow rate to be tested. It will then enter a shrouded pipe flare located onsite for incineration.

The flare will be fitted with a propane fuelled always-on pilot, which ensures that ignition takes place as soon as natural gas is present and reignites if there is a break in flow.

Natural gas is considered waste at the point of incineration. An air dispersion modelling assessment has been carried out to assess the impact of incinerating gas and we are satisfied that the contribution of emissions from the proposed flaring at locations closest to the well sites is considered to be insignificant.

The operator will be required to monitor inputs into the flare so as to predict emission levels to air from the incineration activity.

5.3.5. Nitrogen

Nitrogen is injected into the well to aid the initial lifting of wellbore fluids, thus reducing the hydrostatic pressure and allowing natural gas to flow to the surface. The quantities of nitrogen required are small and limited to the minimum necessary.

As an inert gas nitrogen that has been previously extracted from the atmosphere will be vented back into the atmosphere without the need for any treatment.

5.3.6. Waste clays, sand and conditioning spacer

The drilling of the exploratory borehole will commence with drilling and installation of a casing string known as a surface conductor. The drilling operation will be carried out using a water well drilling rig which will drill the near surface clays and sands within which the surface conductor casing will be set and cemented into position.

The clay and sand will be circulated out of the well using either an auger or water based drilling fluids and returned to the surface where it is transferred to an open square tank. The ability to prevent or minimise clay and sand arisings is limited given that the underground material within the path of the borehole needs to be removed to allow the conductor casing to be installed. The clay and sand will be transported offsite to a permitted waste facility.

5.3.7. Drilling muds and drill cuttings

An exploratory vertical borehole will be drilled through several layers of rock to a depth of approximately 2,044 metres. The process of drilling the borehole will create extractive waste in the form of drill cuttings, spent drilling muds, and solidified cement.

Only water based drilling mud will be used in the drilling process.

Drilling muds are used to aid in the drilling process by lubricating the drill bit, circulating to surface the rock cuttings from the drilling process and for well control by maintaining a prescribed hydrostatic pressure within the well to prevent the uncontrolled release of natural gas or formation pressure.

Drilling muds are used in a closed loop system, within which the rock cuttings are circulated to surface and removed by vibrating screens (shakers). Finer particles of rock cuttings are then extracted from the drilling mud by a centrifuge and the drilling mud will be circulated back down the well.

Drilling mud waste will be minimised by continually reusing the mud, until it is spent, in a closed loop system and sustained by way of filtering out rock cuttings and finer particles of rock. The rock cuttings tank is a fluid separator tank (perforated false floor), which allows drilling muds coated to the rock cuttings to percolate down through the false floor where it is collected and pumped back into the closed loop mud system.

When the drilling mud weight exceeds the prescribed mud weight, having utilised all means to remove the finer particles, it will need to be diluted. Dilution requires the removal of a prescribed volume of active drilling mud which becomes waste spent drilling muds and diluting the remaining volume with new drilling mud.

Drilling muds are used in a closed loop system and become a waste when no longer required for use in the operation or become spent. In such an event the drilling mud will be transferred from the active mud system on the drilling rig to a vacuum tanker for removal offsite via permitted haulier to an authorised permitted facility.

Drilling muds used will be monitored to ensure that losses to the surrounding geological formation are prevented or where that is not possible minimised. If there are

any variations in pressure and pump rates which may indicate fluid losses to the mud formation, water based fluid loss control agents will be used to minimise leaks. These loss control agents are added to drilling muds and they form a thin low-permeable layer that seal and plug small holes or fractures which stops fluid loss to the surrounding formation.

This dilute solution will be absorbed and remain locked within the micro pore space of the rock formation once the test is complete and can not return to the surface or migrate from the target formation due to the natural impermeable nature of the formation. Only the required quantity of fluid will be use in this process.

5.3.8. Suspension / Completion fluid

On completion of the drilling operations, the well will be suspended with completion fluid, ready for testing. The completion fluid consists of brine and is used to fill the wellbore and ensures there is sufficient hydrostatic pressure over the reservoir formation to prevent natural gas from flowing into the wellbore.

In order to maintain full well control it is essential that when the well is suspended, the wellbore is filled with suspension fluid. Any suspension fluid removed from the wellbore will be stored onsite temporarily. It may then be reused to suspend the well again or will be removed from site.

The most suitable option for disposal is to remove the waste from the storage tanks via road tanker. It will then be subject to treatment at an offsite permitted waste management facility before subsequent disposal. The tanks used to store fluids onsite are subject to weekly visual inspections.

6. General Issues

6.1 Administrative issues

We are satisfied that the Applicant is the person who will have control over the operation of the facility after we grant the permit in line with our Regulatory Guidance Note RGN 1: *Understanding the meaning of Operator (version 4.0)*; and that the Applicant will be able to operate the regulated facility in compliance with the conditions included in the permit.

6.2 Management

Having considered the information submitted in the application, we are satisfied that appropriate management systems and management structures will be in place.

6.3 Financial competence and relevant convictions

We are satisfied that sufficient financial resources are available to the Operator to ensure compliance with the permit conditions.

The Operator does not have any relevant convictions.

6.4 External Emergency Plan

As the activity does not involve a waste facility, there is no requirement for an External Emergency Plan.

6.5 Site security

This is required as part of the written management system of the permit in condition 1.1.1 (a). and will be assessed as part of enforcement inspections.

6.6 Accident management

Having considered the information submitted in the application, we are satisfied that appropriate measures will be in place to ensure that environmental accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. This is part of the written management system of the permit, required by condition 1.1.1 (a).

6.7 Surrender of the permit

When the Operator wants to surrender their permit, they have to satisfy us that the necessary measures have been taken to:

- Avoid any on-going pollution risk resulting from the operation of the facility; and
- To return the site to a satisfactory state, having regard to the state of the site before the activity was put into operation.

We will not grant any application for surrender unless and until we are satisfied that these requirements have been complied with.

The Operator's waste management plan contains information on the steps that they will take to remediate the site.

6.8 The site and its protection

6.8.1 Site setting, layout and history

The site is located at Crook Lane, West Newton, East Riding of Yorkshire, HU11 4LP. NGR TA 20425 37202.

6.8.2 Planning permission

Our decision on whether to grant an environmental permit is separate from the planning application process. An environmental permit allows the site to operate and to be regulated by the Environment Agency exercising its pollution control functions. The Planning Authority, in this case East Riding of Yorkshire County Council, decides whether or not to grant planning permission.

The planning authority determines whether the activity is an acceptable use of the land. It considers matters such as visual impact, traffic and access issues, which do not form part of our environmental permit decision making process. The planning authority must also consider and respond to any objections they may receive on a particular planning application.

The regulated facility does not involve a mining waste facility.

6.8.3 Site condition report

The Operator submitted a site condition report detailing the condition of the site as part of their application. We use the information on a site condition report to establish a baseline for the condition of the site prior to the permitted activity starting. This baseline will be used as a comparison, to establish whether there has been any deterioration of the land as a result of the permitted activities, when the Operator applies to surrender their permit.

The Operator must keep accurate records throughout the lifetime of their permit to clearly demonstrate that their activity has not adversely affected the site. This record will be used, in conjunction with the baseline data described above, to support any surrender application.

6.8.4 Pollution prevention measures

We have considered the location of the site, actual and potential emissions, the sensitivity of receptors and the nature of the activity to decide what appropriate pollution prevention measures need to be in place.

As part of our assessment of the application we have carefully considered the risk assessment provided by the Applicant. We consider that the risk assessment covers all the potential risks and sets out appropriate measures by way of mitigation.

6.8.5. Surface water management

A ditch will be excavated around the perimeter of the active area of the wellsite. The perimeter ditch will form part of the wellsite containment, collecting and storing surface run-off water.

The perimeter containment ditches will be open along the northern and upper western boundaries of the active area of the wellsite with the southern, eastern and lower western boundaries of the active area backfilled using a twin walled perforated plastic pipe and clean aggregate to maintain containment.

Rainfall onto the well site, as well as any potential contaminants such as fuel and oils used in operating the site preparation and drilling machinery, will be directed into the perimeter ditches.

Following excavation of the perimeter ditch, the active area of the wellsite will be overlaid with a High Density Polyethylene (HDPE) membrane to provide wellsite integrity and ensure any run off water flows to the perimeter ditch for subsequent discharge or removal via road tanker and disposed at an Environment Agency permitted waste facility.

The HDPE membrane is protected by two layers of non-woven geotextile matting placed above and below the membrane to ensure damage is not incurred and integrity of the active area of the wellsite is maintained. The HDPE membrane is integrity tested during installation to ensure complete containment of the active area of the wellsite.

During activities on site, water collected within the perimeter ditches will be removed by a road tanker and disposed of at a permitted waste management facility.

During periods of inactivity at the site, water collected within the perimeter ditches will be discharged to a 150mm sealed drain that will then discharge to a nearby watercourse (L Dyke) via a Class 1 SPEL Oil-Water interceptor.

The discharge will need to meet certain water quality criteria before it can be discharged to the drain. If the water quality criteria are not met then the water within the perimeter ditches will be removed by a road tanker and disposed of at a permitted waste management facility.

6.8.6 Storage arrangements

The temporary storage of extractive waste is limited to such storage pending collection as part of the process of transporting the waste off site for recovery or disposal. It will take place on the high density polyethylene (HDPE) membrane, protected above and below by a layer of non-needle punch geotextile. The HDPE membrane will also provide secondary containment for drilling muds and drilling cuttings.

Waste well suspension brine (a non-hazardous waste) will be collected in a horizontal cylindrical closed tank with a capacity of up to 60 cubic metres.

The returning excess cement (a non-hazardous waste) will be collected in five separate skips, each with a capacity of 6 cubic metres.

The spent hydrochloric acid (a non-hazardous waste) will be collected in eleven separate Intermediate Bulk Containers (IBC containers), each with a capacity of 1 cubic metre.

Formation water (a non-hazardous waste) will be collected in four horizontal cylindrical closed tanks, each with a capacity of up to 60 cubic metres.

6.8.7. Fugitive emissions

Fugitive emissions of natural gas are to be prevented by mud control so there should be no emissions.

Fugitive emissions of methane could potentially arise from the wellbore and mud circulation system. The Operator has provided a specific risk assessment for this scenario which includes monitoring and proposes abatement and emergency control measures. We are satisfied that these measures to minimise the risk of fugitive emissions, together with condition 3.1 provide acceptable controls.

6.8.8. Odour management

Odour is not considered to be a particular concern for this site considering its relatively remote location. The use of water based drilling muds are not considered likely to be odour producing. The activity is expected to be of short duration. A risk assessment and conceptual site model was submitted with other supporting

documents on 15/09/15 that provides consideration of odour. We are satisfied that adequate measures will be in place to manage odour.

6.8.9. Noise management

The Applicant provided conceptual site model and risk assessment with other supporting documents on 15/09/15 that provides consideration of noise. Noise monitoring will be conducted prior to and during operations. Sound screen will be erected if required from sound survey results. Silencers will also be fitted to equipment to reduce noise. Noise analysis will also be conducted during operations to ensure that planning permission conditions are adhered to. We are satisfied that adequate measures will be in place to manage noise.

7. Environmental Issues and their control

This section of the document explains how we have approached the critical issue of assessing the likely impact of the permitted activities on human health and the environment. It also details the measures we require to ensure a high level of protection. The principal potential emissions are those to air, water and land.

The key issues arising in relation to human health and the environment during this determination were protection of groundwater; emissions to air; odour; noise; contamination of land; and water quality.

The sections below detail how we considered these issues.

7.1. Assessment of environmental impacts

We are satisfied that the Applicant has properly assessed the risks posed by the proposed activities. The risks identified are detailed in the Applicant's risk assessment. This covers assessments of risks to surface, ground, water and air. We have reviewed the Applicant's assessments of the environmental risk from the operations. The Applicant's risk assessments are satisfactory.

7.2. Emissions to air

During initial flow testing operations, there is a likelihood of natural gas being produced from the target formations.

The ability to prevent or minimise the production of natural gas is extremely limited during the initial exploration. Given that the operation is exploratory, the infrastructure required and the temporary nature of the operations (14 days), it is not practicable during the initial flow test to capture the gas for sale and transportation for use as a fuel or other means of generating energy.

During the drill stem test the produced fluids are expected to be one or any combination of the following: drilling fluids, formation water, oil condensate and gas.

Once at surface, fluids will be diverted by temporary pipework to a three phase separator, which will separate out oil, gas and produced fluids.

Any natural gas separated during the three phase separation will be diverted by pipework to a shrouded flare located onsite for incineration.

The applicant has provided a procedure describing how the flare will be operated. The procedure describes how the gas flow and pressure to the flare will be controlled in order to establish a consistent flow, control flame height so it is not visible and optimise the combustion temperature.

We have included monitoring conditions in the permit requiring the Operator to monitor for temperature, volume of gas going into the flare from which the emissions of oxides of nitrogen, carbon monoxide, total Volatile Organic Compounds (VOCs) and methane can be calculated, and to provide reports of the results.

We have not included a limit for minimum temperature of combustion. We consider it inappropriate to set numeric limits for temperature as this will be difficult to measure accurately.

We have also included a requirement to video the flare continuously whilst it is operational (connected and the pilot light is on). This is to gather information on the flare performance at different feed gas flow rates

During the determination of this application, we considered emissions to air that will arise from the flaring and the potential impact of these emissions on human health and ecological receptors. The Applicant submitted an air quality assessment as part of their application which we then assessed.

A methodology for risk assessment of point source emissions to air, which we use to assess the impacts of air emissions, is set out in our Horizontal Guidance Note H1 and has the following steps:

- Describe emissions and receptors
- Calculate process contributions
- Screen out insignificant emissions that do not warrant further investigation
- Decide if detailed air modelling is needed
- Assess emissions against relevant standards
- Summarise the effects of emissions

The H1 methodology uses a concept of “process contribution (PC)”, which is the estimated concentration of emitted substances after dispersion from the facility into the receiving environmental media at the point where the magnitude of the concentration is greatest. The guidance provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst case dispersion conditions with no allowance made for thermal or momentum plume rise and so the process contributions calculated are likely to be an overestimate of the actual maximum concentrations.

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental Quality Standards (EQS) referred to as “benchmarks” in the H1 Guidance.

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a National EQS (also referred to as Environmental Assessment Level - EAL) which has been derived to provide a similar level of protection to Human Health and the Environment as the EU EQS levels.

National EQSs do not have the same legal status as EU EQSs, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with a national EQS. However, national EQSs are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are considered Insignificant if:

- the long-term process contribution is less than 1% of the relevant EQS; and
- the short-term process contribution is less than 10% of the relevant EQS.

The long term 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The short term 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the threshold provides a substantial safety margin to protect health and the environment.

Where an emission is screened out in this way, we would normally consider the Applicant’s proposals for the prevention and control of the emission to be BAT. That is because if the impact of the emission is already insignificant, it follows that any further reduction in this emission will also be insignificant.

However, where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant.

The Applicant has submitted full air dispersion modelling as part of their application. Air dispersion modelling enables the process contribution to be predicted at any environmental receptor that might be impacted by the operation of the flare.

For those pollutants which do not screen out as insignificant, we determine whether exceedences of the relevant EQS are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedence of an EU EQS is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or refuse the application. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSIs, SACs or SPAs). These additional factors may also lead us to include more stringent conditions than BAT.

If, as a result of reviewing of the risk assessment and taking account of any additional techniques that could be applied to limit emissions, we consider that emissions would cause significant pollution, we would refuse the Application.

The Applicant has assessed the potential emissions to air from the flaring activity against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the flare using the ADMS 5.1 dispersion model, which is a commonly used computer model for regulatory dispersion modelling.

We are in agreement with this approach. The assumptions underpinning the model have been checked and are reasonably conservative.

The Applicant has modelled the concentration of key pollutants at a number of specified locations within the surrounding area.

The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by the Environment Agency's modelling specialists to establish the robustness of the Applicant's air impact assessment. The output from the model has then been used to inform further assessment of health impacts and impact on habitats and conservation sites, and the Immingham air quality management area.

Our review of the Applicant's assessment leads us to agree with the Applicant's conclusions. We have also audited the air quality and human health impact assessment and similarly agree that the conclusions drawn in the reports are acceptable.

Emissions modelled

The air dispersion modelling considered the potential impacts of the main pollutants that could be emitted from the combustion of natural gas based on its expected composition:

- Oxides of nitrogen / nitrogen dioxide (NO_x / NO₂),
- Carbon monoxide (CO)
- Sulphur dioxide (SO₂)
- Benzene (a volatile organic compound, VOC).
- PAH emissions (with reference to Benzo-a-pyrene)
- Particulate matter (PM₁₀)

We are satisfied with the extent of the emissions modelled by the operator.

Conclusions

We are satisfied that the Environmental Risk of the proposal is understood and that it is acceptable. Information provided by the applicant indicates that no Air Quality Standards will be breached.

We have also examined whether the risk assessment and proposed controls take account of modeling uncertainty. The applicant has modelled a range of combustion efficiency, including combustion at lower than expected temperatures. This is a conservative approach and gives a high factor of safety to the modelling results. We are therefore satisfied that the likely range of uncertainty is taken account of, and this gives us a high confidence in our conclusion for no breach of air quality standards, if the applicant controls the flare as they have stated.

7.3. Human Health

We have reviewed the Applicant's report which predicted no exceedences of any relevant Air Quality Environmental Quality Standards (EQS) established for human protection as a result of the proposed flare operations and we are satisfied with it is accurate.

7.4. Waste Management Plan

Under the Mining Waste Directive (Article 5) an Operator of a mining waste operation must draw up a waste management plan (WMP) for the minimisation, treatment, recovery and disposal of extractive waste. We have assessed the Applicant's WMP. The WMP references other documents which together fulfil the requirements of Article 5 of the MWD and ensure that the requirements in Article 4 of the MWD are also met.

We have approved the plan as a whole, subject to conditions in the permit. We are satisfied the permit requirements including the WMP will protect the environment and that Articles 4 and 5 of the MWD are met.

The WMP provides that the material inputs (e.g. drilling muds and dilute hydrochloric acid) have been selected to minimise risk and will be restricted to the minimum amount necessary, thereby minimising the amount of waste generated. It provides an estimate of the amount of each waste that will be managed. Wastes arising from the activities will be recovered where possible. It also characterises each waste type. We are satisfied that waste is correctly characterised taking into account the definition in Article 3 of the Waste Framework Directive.

The WMP including any associated documents are incorporated into the permit by means of condition 2.3.1 and table S1.2. The WMP needs to be reviewed every 5 years but in the unlikely event that the activities give rise to pollution, condition 2.3.1 enables us to require a revision of the plan to be submitted to us for approval and implemented thereafter. Condition 2.3.3 is a standard condition and refers to an extended time period. Although the condition is used in the permit, we do not expect the mining waste operation to extend beyond a year.

7.5. Setting permit conditions

We have set conditions in the permit in accordance with our Regulatory Guidance Series, No RGN 4 – *Setting standards for environmental protection (version 3.0)*. This guidance note explains how we determine the requirements that should apply to a particular activity. Permit conditions specify certain key measures for that type of activity to protect the environment. Other measures may be required through outcome-based conditions. Outcome based conditions specify what we want the Operator to achieve, but do not tell them how to achieve it.

We have used the relevant generic conditions from our bespoke permit template along with other, activity-specific conditions to ensure that the permit provides the appropriate standards of environmental protection.

Our generic conditions allow us to deal with common regulatory issues in a consistent way and help us to be consistent across the different types of regulated facilities. We have included our generic conditions on fugitive

emissions, odour and noise/ vibration to control emissions from the facility.

7.6 Protection of groundwater

We have reviewed the Environmental Risk Assessment and the Hydrogeological Risk Assessment provided by the applicant, against our information and conceptual understanding of the location. We are satisfied that the potential risks to groundwater have been adequately identified and addressed through mitigation measures.

We have evaluated whether a Groundwater Activity Permit is required. Based on the information presented, we have determined that a Groundwater Activity Permit is not required for the proposed activities of drilling for exploratory purposes and the limited well testing, based on the following:

We consider that the use of proposed drilling muds and well testing activities will comply with the groundwater activity exclusion under the Environmental Permitting (England and Wales) Regulations 2010, paragraph 3.3(b) of Schedule 22 in that any discharge to groundwater that may occur would be of a quantity so small as to obviate any present or future danger of deterioration in the quality of any receiving groundwater and that a permit will not be required.

The geological formations into which the tests will be carried out are isolated from near surface aquifers and groundwater formations by about 1,150 metres of overlying rock formations.

The acid wash and squeeze is being performed within the Cadeby geological formation and the Kirkham Abbey geological formation. It is anticipated that between 6 cubic metres to 11 cubic metres of diluted hydrochloric acid solution will be pumped into the geological formation during the acid operation, with all spent acid being recovered to surface.

The diluted hydrochloric acid solution reacts with calcite or dolomite through a dissolution process to produce carbon dioxide, water and chloride ions. The chloride ions exist in the water and pair to form calcium chloride. Calcium chloride is not a hazardous substance and can therefore be considered as a non-hazardous pollutant. All of the spent hydrochloric acid and calcium chloride solution will return to the surface.

Other considerations are:

That the well bore is to be constructed in accordance with the requirements of the HSE and the Petroleum and Development Licence. It is also designed in accordance with industry best practice and in compliance with the Installation and Wells (Design and Construction) Regulations 1996 (DCR). DCR requires the design of the well to be such that no unplanned escape of fluids can occur. The Agency has assessed the risk of drilling a borehole through the Cretaceous Chalk aquifer and we consider that the design of the proposed well bore meets the requirement to prevent any release of liquids in to the water environment.

We have consulted the HSE on the design and operation of the flare and no specific concerns have been raised in response to this. The applicant has referred to relevant safety guidance in their application.

We have assessed the method of construction of the borehole and the proposed drilling additives and we are satisfied that the methods used are appropriate and will ensure that the groundwater is protected. The Operator can only use additives that have been assessed and approved by the Environment Agency or equivalent alternatives subsequently approved. Assessment and approval is also required prior to the use of any other additive during the activities if the Operator needs to use different additives for operational reasons.

We have carefully considered the risk assessment provided by the Applicant and consider that it covers all the potential risks and sets out appropriate measures by way of mitigation.

The Operator's own monitoring will include the monitoring of any loss or gain of fluids within the mud system throughout drilling and appropriate actions to be taken;

As previously stated, only water based drilling muds will be used due to the nature of the formations being drilled.

7.7 Odour

We carefully considered potential odour emissions from the activity during our determination. Condition 3.3.1 in the permit requires that emissions from the activities shall be free from odour at levels likely to cause pollution outside the site.

We are satisfied that adequate measures will be in place to manage odour.

We do not consider that the activity will give rise to significant levels of odour. However, we have included condition 3.3.2 in the permit. This condition enables us to require the Operator to submit a specific odour management plan, should odour become a problem. Should a plan be required in the future, once we

have assessed this plan as suitable, it will form part of the permit and the Operator must carry out the activity in accordance with the approved techniques.

7.8 Noise and vibration

We carefully considered emissions from noise and vibration during our determination. The planning permission has set limits of noise levels to be emitted beyond the site boundary and the Operator will be required to conform to this condition.

In addition, we have set condition 3.4. which allows us to require the operator to submit to us for approval and implementation a noise management plan in the event that the activities at the site are causing noise pollution beyond the site boundary. The applicant has submitted a noise management plan which has been included as part of the approved operating techniques.

7.9 Monitoring

Air

Condition 3.5 of the permit will require the operator to monitor the input to the flare and assess by calculation the emissions to air. The condition contains separate requirements for groundwater and surface water monitoring.

Direct monitoring of emissions from a flare stack is not possible because the length of the flare stack is insufficient for the stack gases to cool sufficiently so as not to damage the sampling equipment. For this reason the Operator will use surrogate parameters to calculate the emissions. The stack emissions can be calculated from the combustion chemistry using the feed gas composition, feed gas flow rate and combustion efficiency.

As a pre-operational condition, the permit requires the Operator to submit their proposed method for calculating the emissions for written approval by the Environment Agency prior to flaring any gas.

The Operator is required to continuously monitor the feed gas flow rate and analyse periodic samples of the feed gas to determine its composition.

Using the parameters above, the Operator is required to assess point source emissions which will be released into the air from incineration of gas, and will also undertake ambient air monitoring for comparison against a baseline. The Operator will keep records of the data collected, which must be submitted to the Environment Agency on a regular basis.

The Operator will undertake a baseline study of ambient air quality around the proposed site prior to operations commencing. Once operational the Operator will continue to monitor air quality in the same locations that the baseline measurements were taken. The results of the monitoring will be made available by the Operator.

We are satisfied that assessing the emissions from the flare using the feed gas flow rate, the feed gas composition and the flare efficiency is appropriate considering that direct monitoring of the flare is not technically possible. This level of assessment will demonstrate whether the combustion is working at the correct level of efficiency to minimise harmful emissions.

Annex II of the Industrial Emissions Directive (IED) lists a number of air pollutants that emission limits could be set for. We have considered the relevant pollutants listed in the IED Annex II that would result from this activity and are satisfied that it is not necessary to set emission limits, as the operating controls will ensure effective and efficient combustion.

We will be reviewing the assessment of point source emissions as part of our compliance work and if we have reason to believe that emissions limits are required, we have the power to vary the permit to impose such limits. If appropriate monitoring methods/techniques are developed for monitoring point source emission from flares, we will review the activities and may vary the permit to change the monitoring requirements.

When in operation, the flare will be supervised by the Operator 24 hours a day to ensure its effectiveness to incinerate the natural gas. Condition 3.5.1.(e) of the permit will require the Operator to provide a video feed of the flare with a screen time display. Should a problem arise the flare can be shut off.

Groundwater

Condition 3.5 of the permit will require the Operator to monitor groundwater. A pre-operational condition of the permit will require the Operator to submit to the Environment Agency a report that details the as built monitoring borehole designs and describes the baseline groundwater quality sampling for the site. We have specified chemical parameters that will be monitored in Table S3.2 of the permit.

7.10 Fugitive emissions

We carefully considered emissions to air during the determination of the application. Fugitive emissions of methane could potentially arise from the wellbore and mud circulation system. The Operator has provided an environmental risk assessment and consideration in the WMP for this scenario which includes monitoring and proposes abatement measures, including mud weight and a blow-out preventer. We are satisfied that these measures to minimise the risk of fugitive emissions, together with condition 3.1 provide acceptable controls.

7.11 Site stability

The management of waste is limited to waste generated from prospecting. Given the limited duration of the drilling activities and that the testing activities do not involve injection of fluids, it is unlikely that these well testing activities will affect the stability of the site.

8 Other legal requirements

8.1. Mining Waste Directive 2006/21/EC

In this section we explain how we have addressed other relevant legal requirements, to the extent that we have not addressed them elsewhere in this document.

8.2. Article 4 – General requirements

Article 4 sets out requirements for the protection of the environment and human health which apply to the management of extractive waste. Under the Environmental Permitting Regulations (England and Wales) 2010 an environmental permit is required for a mining waste operation which is defined as the management of waste whether or not it involves a waste facility. It is through the permit and the conditions imposed that we are satisfied that the provisions of Article 4 will be met.

8.3. Article 5 - Waste management plan

This outlines the requirement for the Operator to provide a waste management plan and the information required within this. The waste management plan, including associated documents, has been assessed in accordance with these requirements and is satisfactory. Condition 2.3.1 ensures that the operations are limited to those described in the WMP and in table S 1.2. It also ensures that the Operator follows the techniques set out and that any deviation will require our written approval.

8.4. Article 6 – Major accident prevention

The permit does not authorise a waste facility and therefore there is no Category A waste facility which require the Applicant to submit an Accident Prevention and Management Plan.

8.5. Article 7 – Application for a permit

The permit covers the management of extractive waste that does not involve regulation as a waste facility. We are satisfied that there is no area designated for the accumulation or deposit of extractive waste beyond the time periods specified.

8.6. Article 8 – Public participation

The permit covers the management of extractive waste that does not involve regulation as a waste facility. However, we have provided the public with the ability to express comments and opinions to us before a decision has been taken and we have taken the results of consultation into account in making the decision to grant this permit.

8.7. Article 9 – Classification system for waste facilities

The permit covers the management of extractive waste that does not involve regulation of a waste facility.

8.8. Article 10 - Excavation voids

There is a requirement under this article of the Mining Waste Directive for the Operator to take appropriate measures in order to secure the stability of the extractive waste, prevent the pollution of soil, surface water and groundwater and ensure the monitoring of the extractive waste and the excavation void when placing extractive waste into excavation voids.

We are satisfied that the Operator will comply with the relevant requirements based on the information provided and the conditions in the permit.

8.9. Article 11- Construction and management of facilities

The permit covers the management of extractive waste that does not involve regulation of a waste facility.

8.10. Article 13 - Prevention of water status deterioration, air and soil pollution

We are required, as the competent authority, to be satisfied that the Operator has taken the necessary measures in order to meet environmental standards, particularly to prevent deterioration of current water status.

We are satisfied that the Operator will comply with these requirements based on the information provided and the conditions in the permit.

8.11. Article 14 - Financial guarantee

The permit covers the management of extractive waste that does not involve regulation of a waste facility and therefore there is no requirement for financial provision.

8.12. Further legislation

8.12.a) Section 4 Environment Act 1995 (pursuit of sustainable development)

Consideration has been given as to whether the granting of an environmental permit meets our principal aim of contributing to attaining the objective of sustainable development under section 4 of the Environment Act 1995. It is felt that the proposed conditions are appropriate in providing effective protection of the environment and in turn sustainable development, in accordance with Section 4 of the Environment Act 1995 and the Department of Environment, Food and Rural Affairs statutory guidance.

That guidance is 'The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002)'. That document:

"provides guidance to the Environment Agency on such matters as the formulation of approaches that the Environment Agency should take to its work, decisions about priorities for the Environment Agency and the allocation of our resources. It is not directly applicable to individual regulatory decisions of the Environment Agency."

The guidance contains objectives in relation to the Environment Agency's operational functions and corporate strategy. Some of these objectives relate to the Environment Agency's wider role in waste management and strategy. In respect of the management of extractive waste, the guidance notes state that the Environment Agency should pursue the following objective:

"to prevent or reduce as far as possible any adverse effects on the environment as well as any resultant risk to human health from the management of waste from the quarrying and mineral extraction industries."

In respect of water quality, the Environment Agency is required to: *'protect, enhance and restore the environmental quality of inland and coastal surface water and groundwater, and in particular:*

- *To address both point source and diffuse pollution;*
- *To implement the EC Water Framework Directive; and to ensure that all relevant quality standards are met.'*

The Environment Agency has had regard to these objectives. We are satisfied that

the imposition of conditions on the permit will mean it is operated in a way which protects the environment and human health.

8.12.b) Section 5 Environment Act 1995 (preventing or minimising effects of pollution to the environment)

We are satisfied that our pollution control powers have been exercised for the purpose of preventing or minimising, or remedying or mitigating the effects of pollution of the environment in accordance with section 5 of the Environment Act 1995.

8.12.c) Section 6 Environment Act 1995 (conservation duties with regard to water)

Consideration has been given to our duty to promote the conservation and enhancement of the natural beauty and amenity of inland waters and the land associated with such waters, and the conservation of flora and fauna which are dependent on an aquatic environment.

We do not consider that any additional conditions are required.

8.12.d) Section 7 Environment Act 1995 (pursuit of conservation interests)

Section 7(1)(c) of the Environment Act 1995 places a duty on us, when considering any proposal relating to our functions, to have regard amongst others to any effect which the proposals would have on the beauty and amenity of any urban or rural area.

We do not consider that any additional conditions are required.

8.12.e) Section 81 Environment Act 1995

The site is not within a designated Air Quality Management Area.

We consider that we have taken our decision in compliance with the National Air Quality Strategy and that there are no additional or different conditions that should be included in this permit.

8.12.f) Section 40 Natural Environment and Rural Communities Act 2006

Section 40 places a duty on us to have regard, so far as it is consistent with the proper exercise of its functions, to conserving biodiversity. 'Conserving biodiversity' includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat. We have done so and consider that no additional or different conditions are required.

8.12.g) Section 23 of the Local Democracy, Economic Development and Construction Act 2009

Section 23 requires us where we consider it appropriate to take such steps as we consider appropriate to secure the involvement of interested persons in the exercise of our functions by providing them with information, consulting them or involving them in any other way. Section 24 requires us to have regard to any Secretary of State guidance as to how we should do that.

The way in which the Environment Agency has consulted with the public and other interested parties is set out in this document. The way in which we have taken account of the representations we have received is set out in the Environmental Permitting (England and Wales) Regulations 2010, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

8.12.h) Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

Consideration has been given to whether any additional requirements should be imposed in terms of the Environment Agency's duty under regulation 3 to secure compliance with the requirements of the Water Framework Directive through (inter alia) environmental permits, but it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

8.12.i) Human Rights Act 1998

We have considered potential interference with rights addressed by the European Convention on Human Rights in reaching our decision and consider that our decision is compatible with our duties under the Human Rights Act 1998. In particular, we have considered the right to life (Article 2), the right to a fair trial (Article 6), the right to respect for private and family life (Article 8) and the right to protection of property (Article 1, First Protocol). We do not believe that Convention rights are engaged in relation to this determination.

8.12.j) Countryside and Rights of Way Act 2000 (CROW 2000)

Section 85 of this Act imposes a duty on Environment Agency to have regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty (AONB). There is no AONB which could be affected by the mining waste activity or gas incineration activity.

8.12.k) Wildlife and Countryside Act 1981

Under section 28G of the Wildlife and Countryside Act 1981 the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

The site is not within the 2 kilometre relevant distance criteria for any Site of Special Scientific Interest.

8.12.l) The Conservation of Habitats and Species Regulations 2010

We have assessed the Application in accordance with guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site.

The site is not within the 2 kilometre relevant distance criteria for any Site of Special Scientific Interest.

Annex 1: Consultation and web publicising

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

A) Advertising and Consultation on the Application

The Application has been advertised and consulted upon in accordance with the Environment Agency's Public Participation Statement. The way in which this has been carried out along with the results of our consultation and how we have taken consultation responses into account in reaching our decision is summarised in this Annex. Copies of all consultation responses have been placed on the Environment Agency and Local Authority public registers.

The Application was advertised on the Environment Agency website from 05/10/2015 to 02/11/2015. Copies of the Application were placed in the Environment Agency Public Register at Lateral House, 8 City Walk, Leeds, LS11 9AT.

The following statutory and non-statutory bodies were consulted:

- Local Planning Authority – East Riding of Yorkshire Council
- Public Health England
- Director of Public Health – East Riding of Yorkshire Council
- Health and Safety Executive

No objections or concerns were received from East Riding of Yorkshire Council Director of Public Health and the Health and Safety Executive.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Public Health England, 25/02/14	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Public Health England had no significant concerns regarding the risk to the health of the local population from the proposed activities. However they noted that their response was based on the assumption that the Operator shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best guidance.	No action required

Response Received from Health and Safety Executive (HSE) – 28/10/2015	
Brief summary of issues raised:	Summary of action taken / how this has been covered
HSE noted that the submitted documentation contained information for planning purposes on the proposal to drill and test up to two exploratory boreholes from the West Newton B wellsite. These operations will be conducted in accordance with recognised regulations, standards and good industry practice. From a well operations perspective HSE have no issues or concerns with the proposals.	No action required

2) Consultation Responses from Members of the Public and Community Organisations

5 responses were formally received from the public.

We can only consider comments which pertain to the management of the extractive waste arising from the exploration for oil and gas and well testing, including flaring of gas regulated under the Industrial Emission Directive which is what the Application relates to. For consultation comments that relate to matters beyond our regulatory control see section 3 below.

Summaries of the consultation responses and how we have addressed them are as follows:

i) Proposed exploratory activities are unsustainable

Concerns were raised that the type of exploratory work that was being proposed was unsustainable.

In section 3 of Key Issues above, we have comprehensively described the activities proposed by the operator. It is only wastes that arise from these sources that can be managed.

We do not directly regulate the mining activity, we regulate the waste that is generated from mining. The permit is for the management of extractive waste from prospecting for mineral resources, including the flaring of gas. In determining the permit we need to be satisfied that the waste is managed in accordance with the regulations.

However the operator is limited to managing waste, including by flaring gas, from the specified activities set out in the permit and waste management plan. In other words, they can not go beyond the activities that we have described in section 3 above. The proposed exploratory activities are for a short term period. Should the operator wish to proceed to using further prospecting and/or extraction techniques, they will need to apply for a variation of the permit which will be considered in the usual way.

ii) Human health impacts, including stress

See above in relation to Health Protection Agency comments. The Health Protection Agency have raised no objection and we are satisfied that the activities we are permitting will not give rise to significant pollution or any emissions that will cause harm to human health, and as such there is no objective reason for anyone to be stressed.

iii) Impact on wildlife

Concerns were raised that the proposed activities did not give any consideration to wildlife.

We have assessed the risk from the proposed activities as part of our determination and we are satisfied that the activities will not pose a risk to local wildlife populations or to any local wildlife sites or nationally or internationally designated wildlife sites.

We assessed the potential likelihood of the proposed activities to impact on designated nature conservation sites, protected wildlife and habitats and we have outlined our conclusions of these assessments in sections 7.11.11.k and 7.11.11.l.

iv) Spillages

Concerns were raised that the risk from potential spillages had not been adequately addressed by the Applicant in their risk assessment. Concerns were also raised about potential spillages off-site during transport of the waste waters.

The risk assessment includes details of how the risks from potential spillages are going to be minimised. The extractive waste transfer and storage activities will take place on an impermeable surface with sealed drainage and containment.

Spillages during transport outside the permitted site boundary are outside the scope of the permit, but are subject to other regulatory controls (Duty of Care).

v) Suitability of the Risk Assessment:

Concerns have been raised about the adequacy of the Applicant's Risk Assessment, whether it identified all the risks and categorised them correctly.

We have reviewed the assessment, and we are satisfied it complies with our relevant guidance and that it identifies and covers all appropriate risks and that measures are in place to address them.

vi) Environmental Impact Assessment:

A number of comments have asked why an Environmental Impact Assessment (EIA) has not been carried out to support the permit application.

An EIA for the proposed activities is not obligatory. An EIA is only required where the planning authority decide the development is likely to have significant effects on the environment which they have not in this case. In any event, we are satisfied that we have sufficient information to determine the application.

vii) Flaring of 2.5 million standard cubic feet of gas per day

Concerns have been raised on how fugitive methane emissions and point source emissions from the flare would be controlled. There were also concerns raised on the effect of the emissions on human health.

The Application provides for the flaring of up to 2.5 million standard cubic feet of natural gas per day for up to 14 days per test. The purpose of the flare is to incinerate natural gas which, if encountered during the well testing phase, is flowed to surface at controlled rates. As the natural gas flows to surface, the Operator will monitor and record flow rate and pressure, giving them a greater understanding of the likely volume of natural gas in place within the formation.

The key to a well test is not only the formation pressure and flow rate per day but the total volume of natural gas produced during the test. A flow rate of 2.5 million cubic feet of natural gas per day has been proposed, based upon minimizing the environmental impact.

Conditions 3.1 and 3.2. of the permit applies controls on fugitive emissions. We recognize that flaring of gas needs to be controlled. We have included condition 3.5.1. that will require the Operator to monitor the flare temperature and feed gas flow rate and calculate the quantities of oxides of nitrogen, carbon monoxide and total volatile organic compounds released into the air.

In support of the permit applications, air dispersion and modelling assessments were carried out and these assessed the maximum concentrations of pollutants generated for nitrogen dioxide and carbon monoxide. The predicted concentrations were compared against relevant air quality standards and their contribution to the ambient concentrations at locations of human habitation closest to the well site. Modelling of emissions from the proposed ground flare predicted emission levels that were within applicable air quality standards. We are satisfied that the contribution of emissions from the proposed flaring operation at locations of human habitation closest to the well site is considered to be insignificant.

viii) Air emissions of gas/fugitive emissions

Concerns have been raised on how fugitive methane emissions and point source emissions from a potential flare would be controlled.

On the subject of flaring, we recognise that the flaring of gas needs to be controlled and we have included monitoring conditions in the permit requiring the Operator to monitor temperature and feed gas flow rate , and calculate the quantities of oxides of nitrogen, carbon monoxide, and total volatile organic compounds emitted. The operator is required to provide monthly reports of the results.

ix) Light pollution

Concerns have been raised that the flare will create light pollution which may impact both local residents and wildlife.

Light pollution is an issue which is considered under the planning permission. We can therefore not address this concern through conditions of an environmental permit

x) Operator competence

A number of concerns have been raised about the Operator and their competence to run the operations on site. One respondent noted that the Applicant had previously failed to manage fugitive emissions at a separate site, West Newton A, where they hold a separate environmental permit.

The permit conditions require the Operator to have an appropriate management system. As part of assessing the operator's compliance with these conditions we will assess the operator's activities and ensure that they comply with their permit conditions.

We have to assess the application made to us and we have no reason to consider that the applicant will not operate in accordance with the permit.

xi) Lack of trust in the Operator

Concerns were also raised that the operator was not transparent in their dealings with the public.

It is quite common for Operators to conduct their own outreach programmes. We are not involved in directing how the Operators conduct their public relations exercises. However we have noted that the Operator published on their website detailed meeting notes produced from each of the community liaison meetings that they held with the local community.

xii) Pollution incident plan

Concerns have been raised that the pollution incident plan has not been made available for the public to comment on.

We have assessed the pollution mitigation measures in the Waste Management Plan and Risk Assessment and we are satisfied that they are appropriate.

However the applicant recognises the need to have internal procedures in place in case of pollution and these will form part of the management system required under condition 1.1.1 of the permit. We check the adequacy of these as part of our compliance work.

We are satisfied we have sufficient information to determine the application.

xiii) Noise pollution

Concerns have been raised that the activities will cause noise pollution.

We are satisfied that the conditions of the permit adequately control the risk of pollution from noise.

The operator submitted a noise management plan that outline measures that they will undertake to manage noise from the site. We are satisfied with this noise management plan. Condition 3.4 of the permit controls noise and vibration and requires that emissions are minimised and, if the activities give rise to pollution due to noise or vibration outside the site, a noise and vibration management plan is submitted to the Agency for approval and implemented.

xiv) Nature of chemicals used

Concerns were raised that the Applicant had not declared fully the nature of some chemicals proposed for use and that we have not fully assessed the proposed chemicals.

The Applicant has not made any claims of confidentiality and has provided a full list of all the additives and fluids that will be used for drilling and well testing. In section 3 above we have described how these additives will be used. We have assessed the additives to be used and we do not consider that they will cause any environmental harm at the rates and levels of use proposed

xv) Misrepresentation on the OPRA profile

Concerns were raised that the Applicant had completed the OPRA profile wrongly and that previous compliance issues were not taken into account.

We have assessed the OPRA profile and concluded that it had been completed correctly. The Applicant does not have any unspent or spent convictions or any other relevant offences in accordance with Rehabilitation of Offenders Act 1974.

3) Other matters outside the scope of this permit Application that the public have commented on which may be more relevant to Applications for other permissions.

a) Location of the site:

Concerns were raised on the effects that the proposed activities will have on the countryside, tourism industry, the agricultural farming industry and local populations in areas around Holderness and Burton Constable Hall. A concern was also raised that the proposed activities will compromise the nearby fragile coastline which was prone to flooding.

Decisions over land use are matters for the planning system. The location of the site is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. The environmental impact is assessed as part of the determination process and has been reported upon in Annex 1.

b) Vehicle access to the site and traffic movements:

These are relevant considerations for the grant of planning permission, but do not form part of the Environmental Permit decision making process except where there are established high background concentrations contributing to poor air quality and the increased level of traffic might be significant in these limited circumstances. This is not the case for this location.

c) Climate change and energy policy

Policy is made by the Government and the policy on exploitation of Shale Gas is no different to that of any other fossil fuel. The policy states "We aim to maximise the economic recovery of oil and gas from the UK's oil and gas reserves, taking full account of environmental, social and economic objectives".

d) Industry Self Regulation

Conventional gas and oil drilling has been regulated for a long time and there is a lot of established knowledge on those activities. Additionally the Regulations are enforced by the Environment Agency, the Health and Safety Executive and DECC.

The waste management activities proposed for this site are well established and the risk management measures in place are commonly used across a variety of industries.