

**Decision document – Horse Hill Developments Ltd
at Horse Hill Well Site, Hookwood**

**Environment Agency Permitting Decisions -
Variation**

**Decision document recording our decision making
process**

The permit number is:	EPR/BB3300XG
The Applicant / Operator is	Horse Hill Developments Ltd
The site is located at	Horse Hill Well Site Hookwood Horley Surrey RH6 0HN
Duly made	14 th December 2016
First consultation commenced on	22 nd December 2016
First consultation ended on	2 nd February 2017
Minded to consultation commenced on	10 th July 2017
Minded to consultation ended on	4 th August 2017
Permit determined	31 st August 2017

Purpose of this document

This is a decision document which accompanies a permit variation notice.

It explains how we have considered the Applicant's application, and why we have included the specific conditions in the draft permit variation we are proposing to grant 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.

We have made our final decision only after carefully taking into account any relevant matters raised in responses we received.

Structure of this document

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Preliminary Information

The application we received contained proposals to drill a deviated track from the existing well, to drill a single directional borehole, HH-2, and to carry out extended well tests from the drilled wells to assess the economic viability of developing an oil production facility at the site. The proposed activities are classified as mining waste operations. The application also contained proposals to use an enclosed ground flare to flare waste gas arising from the well during production tests. The amount of gas to be flared shall not exceed 10 tonnes per day.

The site for the proposed activities is located at Horse Hill Well Site, Hookwood, Horley, Surrey, RH6 0HN. The national grid reference for the centre of the site is TQ 25258 43599.

The Application was duly made on 14th December 2016.

We gave the Application the reference number EPR/BB3300XG/V004. 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/BB3300XG. We refer to the permit as “the **Permit**” in this document.

Use of terms

The Applicant is Horse Hill Developments Ltd. We refer to Horse Hill Developments Ltd as “the **Applicant**” in this document. Where we are talking about what would happen after the Permit is granted, we call Horse Hill Developments Ltd “the **Operator**”.

Conditioning spacer/spacer fluid

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

Drilling muds

Drilling muds are fluids used to lubricate the drilling bit 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.

Exploration

Activities carried out to provide information about geological structures and the presence or absence of gas reserves together with assessments to determine whether the reservoir development is economically feasible.

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 waste gas are burnt in a controlled manner. The gas flow is ignited under controlled conditions.

HSE

Health and Safety Executive

JAGDAG

Joint Agencies Groundwater Directive Advisory Group

Prospecting

Waste Directive defines this 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 2016. Those Regulations provide that any regulated facility must be operated only under and in accordance with an environmental permit. The term is defined in the Regulations so as to include a “mining waste operation, a “groundwater activity” and an “installation”, which in this case includes a facility for the incineration by flaring of hazardous waste in a plant with a capacity exceeding 10 tonnes per day (as an activity listed in Schedule 1 to the Environmental Permitting (England and Wales) Regulations 2016). A “mining waste operation” is further defined so as to include the management of extractive waste, whether or not it involves a waste facility.

Reservoir

The rock formation in which the hydrocarbon being targeted is held.

Surface conductor

The first string of casing run, designed to prevent surface losses and/or washouts below the cellar base, in addition to isolating aquifers. The cellar is the concrete casing surrounding the wellhead and the initial part of the wellbore at the surface.

Target formation

When used in reference to drilling activities, this is the geological formation specifically being targeted by the exploration activities to assess whether hydrocarbons are present, their extent and the potential future well performance. When used in connection with production of hydrocarbons, this is the geological formation specifically being targeted for extraction.

Wellbore

The engineered construction through which the hydrocarbon is to be extracted.

Key issues of the decision

1. Summary of our proposed decision

We have decided to issue the variation to the Applicant. This will allow the Applicant to operate the mining waste operation for the management of extractive waste arising from prospecting for mineral resources limited to hydrocarbon resources.

We consider that, in reaching this 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 variation notice authorises the operation of a mining waste operation at Horse Hill 1, namely the management of extractive waste from prospecting for mineral resources. The prospecting activities are targeting rock layers that lie below ground, to a maximum depth of approximately 2600 metres. The Operator has applied to vary the permit and wishes to carry extended well tests of the Portland Sandstone, Upper Kimmeridge Limestone, Middle Kimmeridge Limestone and Lower Kimmeridge Limestone reservoirs. This variation approves the revisions that have been made to the original Waste Management Plan (WMP) so as to allow the operator to carry out short term and extended well tests, drilling of a side-tack from the existing HH-1 well and the drilling and testing of a new borehole HH-2.

The variation allows for any waste gas to be flared using an enclosed ground flare. The gas to be flared will be less than 10 tonnes per day. A risk assessment has been submitted which considers this emission point.

The variation notice contains conditions taken from our bespoke Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the 2010 Regulations, Mining Waste Directive and other relevant legislation and guidance. 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 14/12/2016. 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: see the Key Issues section.

We carried out consultation on the Application taking into account the Environmental Permitting (England and Wales) Regulations 2016 (2016 Regulations) 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 2016 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 Orchard House, Endeavour Park, London Road, Addington, West Malling, ME19 5SH. Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also made all the Application documents available on their website.

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
- Environmental Health
- 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.

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.

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

- A Schedule 5 Notice was issued on 23rd January 2017 requesting for clarification and further details for activities on site. We received updated documents for the Non Technical Summary (Document Number: HH-PR-Q02); Site Condition Report (Document Number: HH-PR-Q04); Environmental Method Statement

(Document Number: HH-PR-Q08); Waste Management Plan (Document Number: HH-PR-Q10) and updated data safety sheets for additives to be used.

- A request for information was issued on 14/03/17 and 02/06/17 seeking further clarification on proposed additives and design of the cellar. We received details on the design of the cellar and a list of chemicals to be used.

We provided the public with an opportunity to comment on the Application. In Annex 1 we describe how we have addressed issues raised as a result of that consultation process.

As the activity on site is to flow test for oil from the well, it meets the threshold requirement to classify the operation as a NORM Industrial Activity (NIA). The Operator holds Standard Rules SR2014 No 4 permit for the accumulation and disposal of radioactive waste from the production of oil and gas. A separate application has been made for oil storage.

We carried out a Minded to consultation on our draft decisions taking into account the Environmental Permitting (England and Wales) regulations 2016 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. Further details along with a summary of consultation comments and our response to the representations we received on our “minded to consultation” can be found in Annex 1.

Amendments made to the permit following the minded to consultation

No changes were made to the permit conditions as originally proposed. We consider that these conditions provide an enhanced level of protection.

Amendments made to the Decision Document following minded to consultation

This document has been updated to reflect that this is now a final and not a draft decision, to address the consultation comments received and some minor changes have been made for clarity which do not significantly change the nature or sense of what was said previously.

The minded to consultation responses and how we have taken these into consideration in the determination and an explanation can be found in Annex 1 section D

3. Brief outline of process

The original permit was for the management of extractive mining waste resulting from the drilling of an exploratory borehole at the Horse Hill 1 well site. Processes followed for the borehole drilling phase have been outlined in the original decision document that explained how the original permit was issued.

Following the drilling process and initial flow tests, the Operator now wishes to carry out well tests to assess the potential of flow of oil from the Portland Sandstone, Upper Kimmeridge Limestone, Middle Kimmeridge Limestone and Lower Kimmeridge Limestone reservoirs.

The planned activities can be separated into four phases of operations as follows:

Phase 1

This involves the carrying out of three extended well tests (EWTs) and a short-term well test of the existing HH-1 well, to appraise the technical and commercial viability of the hydrocarbon accumulations discovered. Each of the well tests will involve a well work-over, followed by flowing, pumping (as required) and pressure testing with the purpose of evaluating the characteristics of the oil resource that was discovered during the original exploration of HH-1.

EWTs will involve flowing of produced reservoir fluids through high-pressure pipework; separation of the produced fluid's 3 phases of oil, gas and water into individually controllable and metered flow streams; storage of produced oil and produced water in segregated, vented tanks; and safe disposal of produced gas via an enclosed ground flare. Not more than 10 tonnes of gas will be flared per single day.

Phase 2

This is dependent on the outcome of Phase 1 and involves the drilling of a deviated side-track from the existing HH-1 borehole; this will be followed by the carrying out of an EWT of up to 75 days;

Phase 3

This is also dependent on the outcome of Phase 1 and involves the drilling of a new appraisal well Horse Hill-2 (HH-2) from the existing well pad; this will be followed by an EWT of up to 75 days.

The new well will be drilled in the following sequence:

- A new well cellar to be constructed, around 6m north of the existing HH-1 well cellar;
- Setting of conductor pipe and grouting at a shallow depth below ground level;
- Setting and cementing of surface casing;
- Setting and cementing of production borehole;

- Production borehole drilled through the reservoir and then lined with a drilled (or slotted) uncemented liner;
- Water-based “spud mud” to be used for the conductor and surface holes, followed by water-based polymer “drill-in” fluid for the intermediate reservoir sections. The drilling mud will include the fluid Pure-Bore, which is a water-based drilling fluid made from natural material. It is non-toxic, biodegradable and the only drilling fluid formally approved by DEFRA for use in public drinking water wells. It is also registered with the UK Government’s Centre for Environment Fisheries and Aquaculture Science (CEFAS) and with PLONOR (Pose Little or No Risk to the Environment, OSPAR list for offshore disposal).
- Installation of tubing completion for EWT.

Phase 4

Restoration of the site to agriculture and woodland.

This Application involves a variation to the permit for the management of the non-hazardous and hazardous extractive waste, should it arise, which may result from the prospecting for oil.

If, following phase 3 described above, the Operator decides it wishes to proceed either full production or to further testing using methods not approved in this permit, a variation of the permit will be required.

Any such application would be determined on its merits and be subject to our normal consultation process. Any application to vary the permit will require an amended Waste Management Plan to be submitted and considered by us.

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 cuttings are considered to be extractive waste and as such will fall under the Mining Waste Directive. There is a possibility the Operator will have to deal with natural gas which will be hazardous waste; and also produced water (saline groundwater in the target formation) from groundwater bearing strata/rocks. The Applicant has considered these scenarios and has provided monitoring and mitigation measures within the Waste Management Plan and Environmental Risk Assessment. We are satisfied that the suggested measures are appropriate.

The activity of managing these extractive wastes under the permit variation 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 (England and Wales) Regulations 2016 (the 2010 Regulations). The Applicant has applied for a permit variation

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.

4. The legal framework

The permit variation is granted under regulation of the Environmental Permitting (England & Wales) Regulations 2016, 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 2016 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.

The regulated facility in question falls within the scope of the Mining Waste Directive, because it involves the management of extractive waste.

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

Description of the site and related issues

5.1 Location

The site is called the Horse Hill 1 Well Site and is located on land to the south-west of Horse Hill, near Hookwood, Surrey. The following receptors are located nearby:

- The nearest residential property is located approximately 300 metres east of the site, with the access road being approximately 50 metres at the junction with the main road.
- The nearest main watercourse, a tributary of Spencer's Gill is situated over 400 metres to the south of the site.
- The nearest protected species is approximately 1.4 km north east of the site;
- The nearest local wildlife site (Wrays Wood SNCI is 415 metres to the north of the site.
- The site sits in between two woodland areas, one 40 metres to the west and one to the east which the access road travels along the boundary, both have a level of protection.
- There are no designated European sites within 5 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 nearest SSSI is approximately 3 km distant.

The Applicant submitted a plan showing the extent of the site. There has been no change to the existing permitted boundary and we are satisfied with this plan. The plan is included in the permit.

5.2 What the regulated facility does

The variation notice will authorise the operation of a regulated facility, namely a mining waste operation for the management of extractive waste not including a waste facility.

See section 5.3 Waste Management Activities for further details of the types of waste to be managed.

5.3 Waste management activities

The original permit was restricted to the management of extractive waste arising from drilling a single exploratory borehole. The Permit is being varied to include management of wastes drilling a side-track from the existing well HH-1, drilling a second borehole HH-2 and those wastes arising from extended well testing of both. During the drilling programme a number of extractive wastes are produced. These principally include drilling muds and drill cuttings. These wastes will be temporarily stored on site in suitable containment before being transferred to an appropriately permitted waste treatment facility.

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

- Well suspension brine (01 05 08) - Non Hazardous
- Spent drilling muds (01 05 04) - 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.
- Waste gas (16 05 04*) - Hazardous.

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

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

5.3.1. Hydrochloric acid

Hydrochloric acid is used to wash and clean out natural fractures within the drilled formations that would have been blocked as a result of the initial drilling operations. The spent hydrochloric acid which will be in the form of calcium chloride, water and carbon dioxide will be reverse circulated out of the well bore for subsequent removal via a licensed haulier to a suitably permitted facility.

5.3.2. Formation water

During well testing operations there is a possibility of formation water being produced together with gas and oil. Formation water, which is water that occurs naturally within the pores of a rock formation, 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 prior to removal off-site by road tanker. Once on the surface and separated from gas and oil the 'formation water' is known as 'produced water'

The ability to prevent or minimise produced water, which is water produced as a result of oil and gas exploratory activities, 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 produced water, a waste should it arise, will be non-hazardous in line with the classification of the proposed activities as non-hazardous mining waste operation.

5.3.3. Waste gas

During extended well tests there is a likelihood of natural gas being produced. The gas 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 an enclosed ground 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 environmental risk 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.

5.3.4. Waste clays, sand and conditioning spacer

The drilling of the HH-2 exploratory borehole will commence with drilling and installation of a casing string known as a surface conductor, whilst the drilling of the side-track will be done from the existing HH-1 borehole.

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.

5.3.5. Drilling muds and drill cuttings

A side track and an exploratory vertical borehole of over 2,600 metres in depth will be drilled through several layers of rock. The process of drilling the borehole will create extractive waste in the form of drill cuttings and spent drilling muds.

5.3.6. 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 oil under formation pressure.

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 drilling mud will be circulated back down the well. The rock cuttings tank is a fluid separator tank, 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 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.

5.3.7. Suspension / Completion fluid

On completion of the extended well tests, the wells will be suspended with suspension fluid, pending decision on whether to progress to production or close the site and restore the land back to agricultural land use. The suspension 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 or other reservoir fluids 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 compliance 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 an 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 land to the south-west of Horse Hill, Hookwood, Horley, Surrey, RH6 0HN, NGR TQ 25258 43591.

6.8.2 Planning permission

Our decision on whether to grant a variation notice 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 the Surrey 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

The site is underlain by an impermeable HDPE geomembrane layer which feeds into an interceptor ditch and protects groundwater from any site leakages or spills. The interceptor ditch encircles the well site, which collects all surface drainage from the lined well site footprint, all collected water will be tankered off site for disposal at an appropriately permitted waste treatment facility.

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 interceptor ditch. During drilling or flow testing operations water in the perimeter ditches will be used to make up the drilling fluid. Oil contamination from the drilling equipment or site traffic will be retained in a Class 1 SPEL oil bypass separator (as the outlet valve will be closed) and tankered off site for disposal at an appropriately permitted waste management facility.

The Operator also has a water discharge activity permit at this site (EPR/BB3691NN). This permit relates to the discharge of site drainage (rainfall related runoff) from the site when the rig and all associated drilling related equipment are not on site. During periods when there is no rig or drilling related equipment on the site, the site drainage will pass through a Class 1 SPEL Oil bypass separator before being discharged to a tributary of Spencer's Gill via a submerged pipe. During periods when the rig or associated drilling related equipment (including the duration of the flow testing period) are on site no discharge shall take place.

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 impermeable HDPE geomembrane layer, which will also provide secondary containment for drilling cuttings from milling out the suspension plugs. These cuttings will be collected in a skip with a capacity of 4m³.

Fluids from the wellbore will pass through the 3-phase separator where produced oil will be stored in the oil tanks and the well test fluids, which include spent acid and brine, will be stored in a separate tank. These waste fluids will then be removed by vacuum loading road tanker to an appropriately permitted waste treatment facility.

The returning cement will be collected in a skip with a capacity of 4m³.

The storage and handling of crude oil produced from the EWT, which is not a waste is controlled under the separate Standard Rule Permit (permit number EPR/SP3339YS).

6.8.7 Air quality management

The potential gas fraction from oil that may be extracted during operations has been considered and calculated. A three phase crude oil separator will be in place,

separating the oil, gas and water fractions of the crude oil. An enclosed ground flare will be installed on site for the incineration of waste gas. The emissions from flaring activities and the on-site combustion plant associated with the well tests during Phase 1, Phase 2, Phase 3 and Phase 4 of the development will lead to increases in pollutant concentrations at existing sensitive receptors. Taking into account the proposed mitigation measures, the effect of these increases in concentrations on existing sensitive human health and ecological receptors has been shown to be insignificant.

An air quality assessment and air dispersion modelling report has been provided in Appendix 6 of the Waste Management Plan. 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 concern for this site considering its location, which is 300 metres from the nearest sensitive receptor. The activity is expected to be of short duration.

A risk assessment was submitted that assess risks of odour. We are satisfied that adequate measures will be in place to manage odour.

6.8.9. Noise management

The applicant has submitted a noise management plan in appendix 10 of the Waste Management Plan. Noise levels arising during the site preparation works may sometimes be audible outside local noise-sensitive dwellings during the daytime only. The amenity of residents will be unaffected provided that construction or similar activities are limited to the normal working day and Saturday mornings.

During the extended well testing, it is unlikely there will be any audible noise from the permitted activities beyond the site boundary at any time.

In the original application the operator provided a revised risk assessment on 16/06/14 that provides consideration of noise. Noise management measures include acoustic shielding via site fencing and soil bunds, equipment specifically selected for low acoustic performance. 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 emanating from the site.

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 facility 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
- Water quality

The detail in this section relates to how we determined these issues.

7.1 Assessment of environmental impact

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

7.2 Scope of consideration

Biodiversity, Heritage, Landscape and Nature Conservation

We have considered the location of the site, the activity taking place and the materials likely to be present within the extractive waste in order to set suitable conditions and limits in the permit.

The application is not within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.

7.3 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 Waste Management Plan in line with the requirements of Article 5. We have approved the plan subject to conditions in the permit. We are satisfied the permit requirements, including the WMP will protect the environment and that Article 4 and 5 of the MWD are met.

The WMP provides that the material inputs 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.

The WMP, together with further clarifications on activities specified in the WMP, 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 2.3.2 enables us to require a revision of the plan to be submitted to us for approval and thereafter implemented. Condition 2.3.3 is a standard condition and refers to an extended time period. Although the condition is used in the permit, the Operator has stated that they do not expect the mining waste operation to extend beyond five months.

7.4 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. Some 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 facility. We have included our generic conditions on fugitive emissions, odour and noise/ vibration to control emissions from the facility.

7.5 Protection of groundwater

We assessed the Flood Risk Assessment referenced HHL-HYD-XX-RA-RP-G-5000_P5 and the supplementary Flood Risk and Ground Water Risk Assessments, Document Number: HH-PR-Q16 that form Appendix 7 of the Waste Management Plan against the requirements of the Water Framework Directive (2000/60/EC) and the Groundwater Daughter Directive (2006/118/EC). More specifically, that hazardous substances must be prevented from entering groundwater and the input of non-hazardous pollutants must be limited to ensure that groundwater does not become polluted. We also assessed if the Operator required a Groundwater Activity Permit due to the proposed change in activity on site.

Groundwater is defined in the Environmental Permitting Regulations 2016 as all water that is below the surface of the ground in the saturated zone and in contact with the ground or subsoil (Regulation 2(1)). There are no restrictions on the quality of the groundwater or the depth of the geological formation that contains that groundwater.

As part of our assessment to ensure the protection of the groundwater environment, we reviewed the following:

- The integrity of the installed wellbore (Please see section 7.5.1)
- The proposed acid wash activity
- The proposed hot oil wash
- The chemicals the operator proposed to use to carry out flow testing on site (Please see section 7.5.2)
- The method on how the chemicals are to be used and whether the risk to groundwater is acceptable (Please see section 7.5.2)

7.5.1 Well integrity

The existing boreholes were constructed in accordance with the requirements of the Health and Safety Executive. They were designed in accordance with industry best practice and in compliance with the Installation and Wells (Design and Construction) Regulations 1996. This requires the design of the well to be such that no unplanned escape of fluids can occur. Cement bond logging was carried out in HH-1 and the assessments of the completed integrity had not shown any issues. The new borehole HH-2 will follow the same process that was applied for the drilled HH-1 borehole and cement logs will be run in both the side-track well and the new well .

Well integrity is regulated by the Health and Safety Executive and they have not raised any issues with regards to the integrity of the well.

We have concluded that the integrity of the completed well is satisfactory for the new flow testing activity on site.

7.5.2 Use of chemicals

Below is the list of chemicals that will be used:

Acidisation

- Potassium chloride
- Hydrochloric acid
- Protect 318
- Protect – 15 plus

Although Protect-15 Plus chemical is a hazardous substance it will only be used inside the casing, thus posing no exposure to formations outside the well bore.

Biocide and corrosion inhibitors

- CT-17/02WT corrosion inhibitor, water based
- CT-31/02WT water based oxygen scavenger
- CT-60/03W Water treatment biocide

Although both CT-17/02WT and CT-31/02WT were assessed as containing hazardous substances, they will not be used during drilling. They will only be used as part of the completion fluid meaning they will only be used inside the casing, thus posing no exposure to formations outside the well bore.

Cement additives

- CFR-8L
- Gasstop liquid
- Halad
- HR-4L
- Lafarge class g cement
- NF-6
- Silicate

Drilling additives

- Citric acid
- Potassium chloride
- Potassium sulphate
- Pure bore EU
- Pure bore LV
- Sodium bicarbonate
- Sodium chloride
- Ultrabore

We have assessed the quantities of the non-hazardous substances that will be used and we are satisfied they will not impact on the groundwater environment. Any products used that contain hazardous substances have been confirmed as only being used within the wellbore after casing has been installed. Therefore these products will be unable to make contact with rock formations outside the wellbore and so no discharge into groundwater will occur. As a result a groundwater activity permit is not required for this use of these chemicals.

7.6 Emissions to air

During the determination of this application, we carefully considered emissions to air that will arise from the incineration of natural gas. Natural gas is separated from hydrocarbon liquids, produced water and oil fluids at surface and diverted via pipe work to an enclosed ground flare located onsite for incineration.

There is a requirement to prevent or minimise the generation of wastes. Due to the absence of infrastructure that would be necessary to allow for storage or utilisation of gas, it is necessary for the gas to be flared initially. Natural gas is considered to be a waste at the point of incineration.

The Operator has provided environmental risk assessments, updated the WMP and associated documents to include the flaring operation which includes monitoring.

An air quality assessment has been carried out using our H1 risk assessment tool to determine 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 flare operation will be established with a permanent pilot flame using propane as a fuel to maintain the operation of the pilot light. When there is a gas flow from the well it will be directed through a separator before being ignited and combusted. We have reviewed the information on flare that is contained in Appendix 3 of the Waste Management Plan and we are satisfied that the design of the flare is appropriate. The flare is an enclosed ground flare with a very high combustion efficiency, which minimises emissions to air. We are satisfied that the combustion of this natural gas will not result in pollution or harm to human health. We have specified emission limits and minimum flare combustion temperature so as to ensure effective combustion.

We have amended condition 2.1.1 as read with table S1.1 of the permit to impose a limit on the total amount of gas that can be flared per day to a maximum of 10 tonnes per day.

The Operator will be required to monitor emissions from incineration activities which will be released into the air. We are satisfied that these measures to minimise the risk of pollution from emissions to air.

7.8 Odour

We carefully considered potential odour emissions from the activity during our determination. Condition 3.2.1 in the permit requires that emissions from the activities shall be free from odour at levels likely to cause pollution outside the site.

We do not consider that the activity will give rise to significant levels of odour. However, we have included condition 3.2.2 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.

7.9 Noise and vibration

We carefully considered emissions from noise and vibration during our determination. Condition 3.3.1 in the permit requires that emissions from the

activities shall be free of noise and vibration at levels likely to cause pollution outside the site.

We have included condition 3.3.2 in the permit. This condition enables us to require the Operator to submit a specific noise and vibration management plan, should noise and vibration 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.

7.10 General considerations

Site stability

The management of waste is limited to waste generated from prospecting without well stimulation. Any waste stored on site will be limited to extractive waste temporarily stored in secure containment pending collection as part of the process of being transported off 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.

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 2016 Regulations 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.

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 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. It also ensures that the Operator follows the techniques set out and that any deviation will require our written approval.

Article 6 – major accident prevention.

The permit does not authorise a waste facility.

Article 7 – Application for a permit

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

Article 8 – public participation

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

Article 9 – classification system for waste facilities

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

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 these requirements based on the information provided and the conditions in the permit.

Article 11 construction and management of facilities

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

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 contained within the permit.

Article 14 financial guarantee

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

8.2 Further legislation

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.

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.

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 feel that any additional conditions are required.

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 feel that any additional conditions are required.

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.

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.

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 2016, 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 RGN6 and the Environment Agency's Building Trust with Communities toolkit.

Section 108 Deregulation Act 2015 – Growth duty

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

Paragraph 1.3 of the guidance says:

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

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

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

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.

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.

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.

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.

There is no SSSI which could be affected by the mining waste activity due to the distance – the site is 3km distant from the nearest SSSI.

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.

Government Planning Policy Guidance 10: Planning and waste management 1999

Under section A28 in Appendix 1 of the Government Planning Policy Guidance 10 the Environment Agency has a duty to consult the Civil Aviation Authority for any new bespoke landfill or waste facility which is within 13km of an aerodrome. This directly relates to the number and movement of some species of birds that may be influenced by the distributions of landfill sites. We have considered the potential for activities being conducted at the site to attract birds as being insignificant, therefore consultation with the Civil Aviation Authority has not been conducted in this instance.

Annex 1: Consultation and web publicising

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 public registers.

The Application was advertised on GOV.UK website at <https://www.gov.uk/government/publications/rh6-0hn-horse-hill-developments-ltd-environmental-permit-application-advertisement/rh6-0hn-horse-hill-developments-ltd-environmental-permit-application-advertisement> from 22/12/2016 to 02/02/2017. The advert 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 local Environment Agency Offices at Environment Agency, Orchard House, Endeavour Park, London Road, Addington, Kent, ME19 5SH.

We sent copies of the Application to the following bodies, including those with whom we have "Working Together Agreements":

- Mineral Planning Authority, Surrey County Council
- Health and Safety Executive (HSE)
- Public Health England (PHE)
- 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.

A. Consultation Responses from Statutory and Non-Statutory Bodies

No objections were received from Surrey County Council who are the Local Planning Authority and Mineral Planning Authority, Health and Safety Executive and Director of Public Health.

Response received from
Public Health England
Brief summary of issues raised
<p>Public Health England recommended that any Environmental Permit issued for this site should contain conditions to ensure that the following potential emissions do not impact upon public health:</p> <ul style="list-style-type: none"> • Emissions to air of nitrogen dioxide and particulate matter arising from flaring operations, a diesel-fired generator and a diesel-fired water heater; and • Fugitive emissions of volatile organic compounds arising from a vent stack on oil tanks are regulated.
Summary of actions taken or show how this has been covered
<p>We have imposed condition 3.1 which require the Operator to implement measures in an emissions management plan that we may specify in the event that emissions from the site are causing pollution beyond the site.</p> <p>We have also imposed condition 3.4, as read with Schedule 3 of the permit which require the Operator to monitor emissions to air arising from the activities.</p> <p>Under the Mining Waste Directive an accident management plan is required when a mining waste operation is considered a facility and Category A, in this instance the site is considered a Mining Waste Operation and as such a comprehensive accident management plan is not required.</p> <p>Fugitive emissions of volatile organic compounds arising from a vent stack on oil tanks are regulated by conditions of the Standard rules permit that has been issued to allow oil storage at the site. This permit require the operator to make provisions to minimise the emissions of non methane volatile organic compounds (NMVOC) and methane from the oil storage tank vent.</p>

B. Consultation Responses from Members of the Public and Community Organisations

i). Acidisation

Concerns were raised on the proposed acidisation of the drilled boreholes would cause harm to groundwater and the environment.

Acid treatments are used following well perforation in the oil-bearing reservoir. The acid treatment is to treat near wellbore blockages and clean up the well perforations. If the 16m³ (100 barrels) proposed treatment of acid travelled equally away from the wellbore in all directions, it would occupy 2m radially in a modest porosity formation, with the volumes used over a perforated interval of 15m. It should be noted that the acid treatment would be directed to the oil-bearing reservoir formation. Ground water will be protected during this acid treatment by three cemented steel casings.

The hydrochloric acid reacts with the calcite through dissolution to produce carbon dioxide (CO₂), water (H₂O) and chloride ions (Cl⁻). The chloride ions exist in water and pair to form calcium chloride (CaCl₂). Calcium chloride (salt) is not a hazardous substance and must therefore be considered as a non-hazardous pollutant. Whilst the injection of hydrochloric acid is potentially a groundwater activity, it is being considered de-minimis as the hydrochloric acid reacts to form a neutral solution which is circulated back out of the borehole. The reaction products consist of non-hazardous substances and the quantities involved would not present a risk to groundwater.

ii) Use of chemicals

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 made a full disclosure of the proposed drilling fluids in which from Appendix 8 of the Waste Management Plan. In section 4 above we have described how these additives will be used. We have assessed all the chemicals to be used using the determination under new Groundwater Directive 2006/118/E which is followed by JAGDAG. The fluids will either be hazardous but only used within the well bore casing (and thus unlikely to be able to contact with groundwater in surrounding rock formations), or will be non-hazardous to groundwater and the permit will limit the composition of the fluids to those disclosed in the Waste Management Plan and approved by the Environment Agency. We do not consider that the approved chemicals, containing non-hazardous substances only, will cause any environmental harm at the rates and levels of use proposed.

iii) Lack of clarity on Applicant's long term intentions

Concerns were raised that the Operator may later switch to using well stimulation techniques as the oil bearing strata expected in the Kimmeridge constitute "tight" deposits of shale, interspersed with two narrow bands of limestone. Calls were made for the applicant to declare their long term intentions and state whether they will be using well stimulation techniques and whether they will be embarking on oil production on the site.

This Application involves a variation to the permit for the management of the non-hazardous and hazardous extractive waste, should it arise, which may result from activities related to the drilling of a side-track, a new borehole and extended well tests. The activities outlined in the Waste Management Plan and any of the application supporting documents does not include proposals for well stimulation techniques above the fracture pressure of the surrounding target formations.

If, following this stage, the Applicant decides it wishes to proceed either to further testing using methods not approved in this permit a variation of the permit will be required.

Any such application would be determined on its merits and be subject to our normal consultation process. Any application to vary the permit will require an amended Waste Management Plan to be submitted and considered by us.

iv) Potential impact of activity on surface water and groundwater

There were several concerns that surface water and groundwater may be contaminated by the proposed well stimulation activities.

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 methods of well construction, including drilling additives and extended well tests, which are controlled by this permit, will not pose a risk to groundwater or surface water given the mitigation measures required. We are satisfied that drinking water supplies are not at risk.

The Waste Management Plan (WMP) and the Environmental Risk Assessment specify the pollution prevention measures that will ensure that surface water and groundwater will be protected. The amended appendix 8 of the Waste Management Plan sets out the nature of the fluids to be used in each process of the proposal. These measures are required through conditions in the permit. The wells at Horse Hill targets the Portland Sandstone, Upper Kimmeridge Limestone, Middle Kimmeridge Limestone and Lower Kimmeridge Limestone reservoirs which are at depths in excess of 2000 metres.

This permit variation does not allow reinjection of water at the site. All produced water will be transported offsite to an Environment Agency licensed disposal site. We are satisfied that we have fully assessed the risk to surface water and groundwater and that there will be no unacceptable impact or risk of pollution

C) 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.

We also received comments from Salfords and Sidlow Parish Council. These comments related to the 24 hour working day, duration of the project, cost of policing and managing protesters, impacts on the highway and loss of the residential amenity value for residential properties in the area.

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.

D) Consultation on the Draft Decision

This section reports on consultation on our draft decision carried out between 10th July 2017 and 4th August 2017. In some cases the issues raised in the consultation were the same as those raised previously and already reported in section A of this Annex. Where this is the case, the Environment Agency response provided in section A of this Annex has not necessarily been repeated and reference should therefore be made to section A in addition to any response below. The exception to this relates to air quality concerns from members of the public. We have sought to amend the original text to provide greater clarity and this is incorporated into the response below.

Oil storage

A number of comments were made in relation to storage of oil on site and venting of gas from oil storage tanks.

Condition 2.1.1 of the permit EPR/BB3300XG to which this decision document relates to only authorise the operation of a mining waste operation for the management of extractive waste, not including a waste facility. This permit does not relate to oil storage activities. A separate Standard Rules 2015No2 permit for storage and handling of crude oil has been granted. The reference number that we have given to the Standard Rules 2015 No2 permit is EPR/SP3339YS. All issues and concerns have been considered under that permit.

Discrepancies with planning permission.

We have received certain representations submitted to the Local Planning Authority in response to the planning applications referenced SCC 2016/0189 and RE 16/02556/CON submitted to Surrey County Council and Reigate and Banstead Borough Council respectively . We have carefully considered any issues raised in those representations to determine if they are relevant to determination of this permit application. Some of the consultation responses received were on matters which are outside the scope of the Environment Agency's powers under the Environmental Permitting Regulations. Our position on these matters which are outside the scope of this permit is as described previously in section C of this annex above.

Below are further matters outside the scope of this permit Application that the public have commented on but which may be more relevant to the relevant Planning Authorities:

Location of the site and industrialization of the countryside:

Decisions over land use are matters for the planning system. Surrey County Council, who are the Mineral Planning Authority, and Reigate and Banstead Borough Council who are the Planning Permission Authority are responsible for determining whether or not the proposed development is appropriate in this location, having regard to relevant policies within the adopted local plan and the National Planning Policy

Framework. The location of the site is a relevant consideration for Environmental Permitting, but only in so far as affects the potential for the site 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 the decision document.

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 of pollutants 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.

Extension of flow testing period to and 24 hour working pattern.

Decisions on the period allowed for the activities to take place are a matter of the Planning Authorities. The environmental permit is valid until it is surrendered. The Operator is required to operate in accordance with operating techniques and standard specified in condition 2.3.

Inadequate site inspections by Health and Safety Executive

It was alleged that HSE had undertaken only one site visit in 5 years.

The permit which is hereby being varied was first determined 04/08/2014 and is less than 5 years old. The frequency with which HSE regulates the site is not a material consideration for the determination of this permit.

Other issues raised

Industry Self Regulation

There were concerns on lack of trust for the Operator to be self-regulating as required by some of the monitoring conditions specified on the permit.

Self-regulation is government policy and we will regulate the permitted activities in accordance with prevailing guidance, which at present is set out in our Enforcement and Sanctions Guidance.

In addition to our compliance work at the site, the Health and Safety Executive will monitor progress on the wells. The HSE will be notified of any unplanned events and will undertake inspections of specific well operations on site.

Where an environmental permit is issued, we have a responsibility and a duty to ensure that it is complied with. Concerns about industry self-regulation are not relevant to our permit determination or the subsequent regulation of any permit.

The industry is not new and has been in the UK producing oil and gas for many decades; as regulators of the refineries and combustion plants using this resource, we have extensive relevant experience. The proposed activities are well regulated by legislation enforced by the Environment Agency, the Health and Safety Executive, the Local Planning Authority and Oil and Gas Authority (OGA).

The waste management activities proposed for this site in terms of storage and processes for recovery and disposal, are well established and the risk management measures in place are commonly used across a variety of industries

The regulatory system that manages this industry and others has also been developed over many decades through global experience. Many of the regulations controlling this sector have been introduced in the last decade and are continually under review both in the UK and EU.

We have stated from the outset that we will take a conservative approach and will require operators to fully risk assess their activities and demonstrate how risks will be managed and mitigated when applying for any permits. We have taken the same position in considering the permit conditions to include in this permit.

Risks to groundwater

Concerns were raised on the potential risks to groundwater arising from the proposed use of chemicals.

In section B subsections i), ii) and iv) to this annex we have outlined how we have considered the risks to groundwater. We are satisfied that we have fully assessed the risk to surface water and groundwater and that there will be no unacceptable impact or risk of pollution.

Noise and vibration

Concerns were raised on the potential for noise and vibration from the proposed activities.

In section 6.8.9 we have outlined how we have considered noise issues related to the proposed activities. In addition, in the event that an Environment Agency officer perceives that activities at the site are causing pollution beyond the boundaries of the permitted site, condition 3.3 of the permit requires the Operator to produce for our approval a noise and vibration management plan. The Operator will be required to implement the approved noise management plan.

Covered flare stack

Concerns were raised on the use of a flare that had not been trialled at any other site, with fears being expressed that the flare's operating conditions were unknown.

The permit requires a combination of procedural, episodic and continuous controls, along with continual supervision, to ensure that the flare is performing optimally, and

that the waste gases are efficiently combusted with the environmental emissions minimised accordingly. In particular, the requirement to measure the actual emissions from the combustion process in combination with the continuous requirement to ensure a high temperature burn at all times will require the operator to demonstrate that they have undertaken the permitted flaring activity in compliance with the requirements of their permit. Condition 2.3.1 of the permit incorporates the operator's approved operating techniques that include the approved procedures for operating the flare. These procedures contain controls which ensure that if for any reason the well does not behave within the design parameters of the flare, then the well will be safely shut in. This requirement will ensure that no unpermitted releases take place, nor that any incompletely combusted gases are released from site.

Fire Risk and lack of incident management plans

Concerns were raised that the local fire services and residents had not been consulted on any fire plans for the site.

In sections 6.4, 6.6 and 8 above we have explained why it has not been necessary to require an accident prevention plan prior to determining the permit application. However, under condition 1.1.1 of the permit, the operator will be required to have a written management system that contains details of how to manage accidents and incidents on site.