

Permitting Decisions- Variation

The permit number is: EPR/BB3300XG/V007

The applicant / operator is: Horse Hill Developments Ltd

The site is located at: Horse Hill –Exploration Well Site
Horse Hill, Hookwood, Horley
Surrey, RH6 0RB

First consultation on application:

Consultation commenced on: 28/10/2019

Consultation ended on: 29/11/2019

Second consultation on application:

Consultation commenced on: 21/03/2021

Consultation ended on: 22/04/2021

Draft decision consultation

Consultation commenced on: 04/03/2022

Consultation ended on: 31/03/2022

Purpose of this document

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

- Highlights key issues in the determination
- Summarises the decision-making process in the decision checklist to show how all relevant factors have been taken into account
- Summarises the engagement carried out because this is a site of high public interest
- Shows how we have considered the consultation responses

The decision document should be read in conjunction with the environmental permit. It explains how we have considered the Applicant's application, and why we have included the specific conditions in the permit we are proposing to issue to the Operator.

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.

In accordance with the Environment Agency's public participation statement, we have consulted on the permit variation notice and provided an opportunity for the public and other interested parties to understanding our thinking and, if they wish, to make relevant representation. This decision document takes into account relevant matters raised in the responses we received.

Use of terms

Applicant

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'.

Regulations

In this document the term 'Regulations' refers to the Environmental Permitting (England and Wales) Regulations 2016 No. 1154, as amended.

Summary of our decision

We have decided to issue the permit. This will allow the applicant to operate a mining waste activity under an environmental permit for the management of extractive wastes arising from prospecting and production of hydrocarbon resources in accordance with Schedule 20 to the Regulations and other relevant legislation and guidance. The variation will also add a groundwater activity to the permit and consolidate the existing standard rules permit and water discharge activity under a single bespoke notice.

The variation will specifically authorise:

- A consolidation of the mining waste permit (EPR/BB3300XG), water discharge activity (EPR/BB3691NN) and oil storage standard rules permit (EPR/SP3339YS) into a single permit notice under permit reference EPR/BB3300XG.
- The constructing of four additional boreholes (HH-3/HH-4/HH-5/HH-6) in addition to two boreholes (HH-1/HH-2) already constructed on site.
- Undertake a 90 day well test for each of the additional wells (HH-3/HH-4/HH-5/HH-6) before being added to the production wells at the site or de-commissioned. It should be noted that no further variation is required to move these wells from exploration to production.
- The incineration of natural gas at a rate not exceeding 10 tonnes per day during production operations.
- The addition of a groundwater activity, as defined by the Groundwater Directive and Schedule 22 of the Environmental Permitting (England and Wales) Regulations 2016, as amended, for the injection of an admixture of produced water and surface water to support the recovery of hydrocarbons from the Portland Sandstone Formation and for the undertaking of injectivity tests.
- Repurposing of one of the existing boreholes (HH-R) and conversion of one additional borehole for the purposes of re-injection. The Environment Agency must be notified prior to the repurposing of the well.
- Undertake an injectivity test within HH-2 as well as a test on the reinjection well HH-R once completed.

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.

Decision document

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

- highlights Key issues in the determination;
- summarises the decision making process in the decision considerations section to show how the main relevant factors have been taken into account;
- summarises the engagement carried out because this is a site of high public interest; and
- shows how we have considered the consultation responses.

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

Read the permitting decisions in conjunction with the environmental permit and the variation notice.

Key issues of the decision

Brief outline of the process

The Horse Hill Wellsite operated by Horse Hill Developments Ltd is an oil and gas exploration well site located approximately 2km West of the town of Horley and approximately 1.7km North West of Gatwick Airport at National Grid Reference TQ 25297 43588.

The well site is located off the A217 and is bound by agricultural land and woodland on all sides. The well site is located at approximately 65m AOD, with the land falling gently to the South towards a water course, Spencer's Gill.

The well site is located on a sealed impermeable platform with a minimum of 300mm of granular material that overlies a High-Density Polyethylene (HDPE) membrane, which continues out to a perimeter interceptor ditch. A non-woven geotextile which sits above and below the membrane has also been installed to provide additional protection. The membrane and geotextile mesh are designed to protect surface water and groundwater receptors from site activities and potential spills.

The specifications of the liner and associated well pad infrastructure were considered by the Environment Agency as part of the initial application that was made by the operator and determined by the Environment Agency in August 2014.

In addition to the assessment made at the time of the application, third party construction quality assurance reports have been submitted to the Environment Agency, following the platform and wellhead developments. These have been assessed prior to this application being made and are deemed to be satisfactory.

At present the site holds a number of environmental permits. These include:

EPR/BB3300XG - A mining waste operation for the management of extractive waste, not involving a mining waste facility

EPR/BB3691NN - A standalone water discharge activity to authorise the release of clean surface water to a tributary of Spencer's Gill during periods of non-operational activity.

EPR/SP3339YS - A standard rules permit (SR2015 No2) for the handling and storage of crude oil with a capacity of no more than 500 tonnes.

EPR/AB3498DZ – A standard rules permit (SR2014 No4) for the accumulation and disposal of radioactive waste from the NORM industrial activity of the production of oil and gas.

Well development

To date the operator has drilled two exploratory boreholes (HH-1 and HH-2) for the purposes of testing the commercial viability of the target reservoir. Following extended well testing, authorised as part of the existing permit, the operator has decided to drill four more wells for the purposes of testing and to bring the site into production.

One of the existing wells (HH-2) will be repurposed to facilitate the re-injection of an admixture of produced water and clean, pre-treated surface water to support the recovery of hydrocarbons. In addition one of the wells to be drilled will be utilised as a re-injection well.

The Environment Agency have considered the proposals for well development within the waste management plan, borehole construction schematics, well planning, design and operating standards and construction quality assurance plan against our published guidance on appropriate measures for the oil and gas sector¹.

The Environment Agency are satisfied that the scope of the works proposed by the applicant and the resulting changes to the environmental permit will not give rise to pollution of groundwater or surface water receptors.

Well testing

Extended well testing will be undertaken following the drilling of each of the proposed additional wells prior to production operations being undertaken. The purpose of well testing is to ensure that the characteristics of the well are understood, which will facilitate greater recovery of hydrocarbons if production activities are undertaken.

During extended well testing gas will be separated from any oil and formation water through a three phase separator, with the gas being diverted to an enclosed ground flare for incineration. Formation water will be reinjected under the conditions of this permit to

¹ <https://www.gov.uk/guidance/onshore-oil-and-gas-sector-guidance>

support further recovery of hydrocarbons and oil will be stored onsite under the requirements of the existing standard rules permit.

Flaring activities

Flaring will be undertaken at the Horse Hill Wellsite for a number of activities which produce natural gas as a waste product. These include waste arising from extended well testing activities, as well as flaring of production gas from wells that prove to be commercially viable. The applicant has set out within the Waste Gas Management Plan (WGMP) the operators approach to the disposal of waste gas.

The WGMP sets out the applicant's best available techniques assessment (BAT) assessment for selecting an appropriate technology for managing waste gasses. The assessment put forward by the applicant considers flaring within an enclosed ground flare as well as other technologies such as onsite power generation or exporting power to the grid. The assessment also considers the cost benefits of alternative technologies. The assessment concludes that due to the low flow volumes of gas likely to be encountered during the extended well testing and production phases that the disposal of waste gasses by flaring through an enclosed ground flare is the only technically and commercially viable solution at present. This assessment has been based on information gained from well testing of the existing HH-1 and HH-2 wells.

The types of flares that the operator proposes to use going forward for incineration of waste gas that arises from enhanced well tests and ongoing production is set out in the WGMP. The proposed flares are listed as a Landfill Systems enclosed flare (LC 500) which is suitable for low flow volumes and a PW enclosed flare (EWT 9.5) which supports a range of flow rates up to a maximum of 250,000 standard cubic feet per day (scfd).

The applicant goes onto state that the PW enclosed flare will only be used where the total volume of waste gas arising from enhanced well tests and / or production exceeds the design capacity of the LC 500 flare. Where this occurs the operator will notify the Environment Agency in accordance with the conditions set out in the permit.

The applicant has also committed to produce a revised gas management plan for approval by the Environment Agency if the proposed wells show through extended well testing operations to generate sufficient gas to change the BAT assessment considered as part of this application.

The Environment Agency have considered the applicants BAT assessment for the use of an enclosed ground flare for the purposes of waste disposal and agree that it can be considered BAT.

Air Quality Risk Assessment (Emissions)

The Environment Agency's Air Quality Modelling and Assessment Unit (AQMAU) have audited the air quality assessment and technical addendums submitted by the applicant as part of this variation. The submission includes supplementary information submitted at a later date to support the report.

The impact assessment is designed to support the permit application and show that the production of oil and gas from exploratory well (HH-1) and to drill, test and produce from

four additional wells (HH-3 to HH-6) will not have an unacceptable impact on human and ecological receptors.

The applicant has identified a number of sources of air emissions from site activities including; operation of diesel fuelled stationary engines, construction and transport vehicles and the disposal of natural gas by flaring during extended well testing as well as disposal of gas during production. The Environment Agency agree that this is an accurate list of probable sources from the site.

The applicant has undertaken modelling to assess the potential long term and short term impacts of nitrogen oxides (NO_x), sulphur dioxide (SO₂), particulate matter (PM10 and PM2.5), carbon monoxide (CO) and Benzene (C₆H₆). The impacts on human health and ecological receptors from emissions arising from the sources identified above were modelled against two scenarios:

- Scenario A: Construction, drilling, testing and oil production. The scenario here assumed that for years 1 to 4 the main activities will be drilling and testing with a lesser component of production.
- Scenario B: As above however the assumption is that from year five onwards that production would be undertaken continuously and be the dominant activity on the site.

The Environment Agency conducted their own audit of the applicants submitted modelling and checked our findings against those of the applicant. The Environment Agency agrees that the modelling shows under the above scenarios that environmental standards for human health and critical levels or loads for ecological receptors are unlikely to be breached.

Well workovers

The applicant has proposed a number of well treatments for use at the well site. These will be used on the existing wells and the four new wells proposed as part of this application. Well treatments include:

- The use of hydrochloric acid and acetic acid at a concentration of no greater than 15% (v/v) for the purposes of removing damage to the wellbore which occurs as a result of the drilling operation. Acid washing will be undertaken on both production wells and re-injection wells where appropriate.
- The use of solvent treatment using xylene to remove paraffin precipitates in order to improve flow of hydrocarbons in the production wells only.
- The recirculation of hot oil, derived from the target formation which is pumped from the surface oil storage to the well perforations at depth. The hot oil treatment is designed to remove the accumulation of waxy precipitates within the production tubing and casing (if affected). Oil pumped into the formation is returned to the surface and co-mingled with existing oil storage.
- Potassium chloride and ORCA B and CS-SAF-2 to remove filter cake that could build up in the near well bore area.

Well treatments outlined above will only be undertaken once a formation injectivity test has been completed to determine the maximum pressure and pump rates and ensure that any well treatment does not extend beyond 10cms of the wellbore. Any chemicals

used for well treatments are recovered from the formation through the re-circulation of fluids to the surface.

The Environment Agency have reviewed the proposed well treatments and have concluded that they meet the requirements of our published guidance².

Chemicals and drilling additives

A complete list of chemicals and drilling additives authorised for use in drilling the proposed wells and supporting the production of oil and gas at the Horse Hill wellsite is set out in Appendix 2 of the Waste Management Plan (Rev 11) which is listed in the operating techniques table of the permit (Schedule 1, Table S1.2). Only those chemicals contained in this appendix are authorised for use at the well site. Any changes to the chemicals used, that requires a reassessment from the Environment Agency, must be made through a permit variation

The Environment Agency is satisfied that the use of chemicals and drilling additives during well development, well work over and in order to support the recovery of oil and gas from the target formation does not amount to a groundwater activity and so will comply with the groundwater activity exclusion under the Environmental Permitting Regulations (2016), paragraph 3.3(b) of Schedule 22. In that any discharge to groundwater that may occur would be of a quantity and concentration so small as to obviate any present or future risk of deterioration in the quality of any receiving groundwater.

It should be noted that although the approved Waste Management Plan (Rev 11) confirms the estimated drilling fluid composition required to drill the dedicated re-injection well, the Environment Agency recognise that this may be subject to change and is dependent on downhole conditions encountered at the time.

The operator is required to notify the Environment Agency of any changes to the operating techniques of the permit, which include fluid composition during drilling.

Groundwater activities

Re-injection of produced water as well as pre-treated and un-contaminated surface water will be carried out through reinjection boreholes with a slotted liner within the Portland Sandstone formation. The re-injection boreholes will be terminated in the Portland Mudstone or Upper Kimmeridge Clay at a maximum depth of 762m below ground level (bgl).

The operator has confirmed the maximum rate of discharge as 2.6 l/s for the groundwater activity to re-inject water for production support. This is based on a maximum daily discharge volume of 80m³/day and the possibility that the operator may operate the field on a 12 hour or 8 hour day i.e. re-injection of produced water would be carried out for 8 hours or 12 hours.

² <https://www.gov.uk/guidance/onshore-oil-and-gas-sector-guidance>

Injunctivity tests will be carried out for 24 hours maximum and at a maximum rate of 2.6l/s (1 barrel per minute). The maximum discharge volume will be 229m³, however the operator expects this to be much lower during the test.

The injectivity test for HH-2z and HH-R is included as a separate groundwater activity in the variation notice because the daily discharge volume is higher than that proposed to be re-injected for production support during normal operations.

The applicant has confirmed that a downhole pressure gauge will be installed to provide continuous monitoring of the injection line to ensure produced water re-injection does not exceed 90% of the formation fracture pressure. Wellhead pressures and annuli pressures will also be monitored and logged hourly. The operator is required to report this information to the Environment Agency in accordance with Schedule 4 of the permit.

Groundwater activity exclusions

The Environment Agency is satisfied the following groundwater activities in the Portland Sandstone formation would not be discernible in the receiving groundwater and should be registered as groundwater activity exclusions in accordance with paragraph 3 (3)(b) of Schedule 22 to the Environmental Permitting Regulations 2016 as amended.

- Use of potassium chloride brine for the purposes of pre-treatment injectivity test.
- Use of acid for the purposes of improving performance of re-injection and production wells during workover.
- Use of potassium chloride and ORCA B and CS-SAF-2 to remove filter cake that could build up in the near well bore area
- Use of a solvent treatment using xylene to remove paraffin precipitates
- Use of oil-based drilling muds and additives as set out in the drilling fluids and chemical inventory for the production intervals for HH-3z, HH-4 and 4z, HH-5 and 5z and HH-6 and 6z.

Discharges to surface water

The Environment Agency have considered the proposed amendment to the surface water discharge activity permit, EPR/BB3691NN, which formally did not authorise the discharge to a tributary of Spencer's Gill brook when well operations were being undertaken.

The consolidated notice, which includes the water discharge activity permit, will now allow the operator to discharge clean surface water, arising from the site during both extended well testing and production activities as well as when the site is non-operational.

The permit will not authorise the discharge of surface water during drilling and any well workovers where the risk contamination of surface water from the site is greater. During these times all surface water will be collected from the perimeter ditch and disposed of offsite by a licenced haulier to a permitted waste facility.

The applicant has also proposed that surface water, once treated, can be mixed with formation waters on site for use in reinjection to facilitate the recovery of hydrocarbons

from the target formation. This activity is covered under the listed groundwater activity as described elsewhere in this document.

The operational practices, including details of the surface water monitoring and associated testing regime are set out in the operator's Surface Water Management Plan, (SWMP), which forms part of the permit.

The Environment Agency are satisfied that the controls set out in the SWMP provides sufficient levels of protection to protect tributaries that feed into Spencer's Gill as well as other receiving water bodies at distance from the site.

Shallow groundwater monitoring

The applicant has proposed to install shallow groundwater monitoring wells adjacent to the well pad to monitor any deterioration in quality which may indicate an emission from the well-pad containment system. The groundwater monitoring program as defined within the approved monitoring plan will complement the surface water monitoring program that will enable the operator to demonstrate that the site activities are not causing emissions to groundwater and surface water receptors which may cause harm.

Monitoring wells will be developed to a nominal depth of approximately 5m bgl to target the shallow groundwater system that underlies the site. Boreholes will be constructed using cable percussion or rotary drilling and located such that two boreholes lie down hydraulic gradient and one up gradient based on the applicant's conceptual understanding of the site.

The applicant has proposed monitoring parameters and frequencies which the Environment Agency have reviewed as part of this determination. We are happy that the proposed shallow groundwater monitoring is sufficient to identify any unauthorised emissions from the site that may impact on groundwater and surface water receptors. The requirements for monitoring are contained within the permit notice.

It should be noted that there is no proposal to monitor the groundwater quality of the other deeper formations that the operator intends to drill through nor of the Portland Sandstone Formation which is the target for oil and gas activities.

The Environment Agency have considered the proposed groundwater monitoring proposals, including the locations and depths of monitoring boreholes against our published guidance. We consider these to be acceptable.

Radioactive substances

The operator of the Horse Hill wellsite holds a standard rules permit for the accumulation and disposal of naturally occurring radioactive materials (NORM) that arise from oil and gas production. The permit sets out a series of conditions that the operator must comply with in full in order to minimise the risk of pollution from occurring. The operator is also bound by duty of care requirements and other relevant legislation when handling qualifying wastes related to this permit. The Environment Agency is satisfied that no pollution is likely to occur providing the operator follows the restrictions set out in the consolidated permit.

Habitats

The Environment Agency has undertaken an audit of the applicant's air quality modelling report to ensure that emissions from site activities are not likely to exceed established critical thresholds for NO_x and SO_x at nearby sensitive receptors. The modelling approach adopted by the applicant takes into consideration the background concentrations of modelled parameters when determining whether the respective critical threshold are likely to be breached. The report (SOCOTEC report LSO 2100118, 21 January 2021 – Annex 2) and technical addendum (NF210716-1 V3) received following a request for further information indicate that the site will not make a significant contribution to exceedances at habitats identified at risk from site activities. The Environment Agency agree with the applicant's findings.

Issues not regulated by the Environment Agency

The following issues have been raised as part of the public consultation but have not been considered further as part of permit application EPR/BB3300XG/V007 given that they fall outside the statutory remit of the Environment Agency. Where relevant the reader should direct comments towards the local mineral planning authority, in this case Surrey County Council, for.

- Land-use and suitability of location
- Traffic management
- Visual Amenity
- Ecological monitoring and aftercare

The lead authority in determining whether a particular land-use is acceptable at any particular location is the local mineral planning authority, in this case Surrey County Council.

The Environment Agency is a consultee in this process. We comment on proposals received through the planning system with respect to the risk to the environment and to ensure alignment with the environmental permitting process. The location of the site in relation to local wildlife sites, ancient woodland, existing infrastructure, other land-use activities and residential properties *etc.* is covered by the planning application process rather than through environmental permitting.

With respect to traffic management, the Environment Agency cannot take into consideration the movement of vehicles and plant outside of the permitted boundary as part of this permit application by virtue of Part 1, Schedule 9 paragraph 4(1)(b) of the Environmental Permitting Regulations 2016 (as amended). The applicant may be obliged under planning to seek approval from the local authority for a traffic management plan and all necessary planning conditions must be discharged before site activities can be undertaken.

Other issues that fall outside of the regulatory scope of both the Environment Agency and local Mineral Planning Authority have not been considered further and the reader should direct comments towards either the Department of Environment, Food and Rural affairs (DEFRA) or Department of Business, Energy and Industrial Strategy (BEIS) as appropriate.

- Sustainability
- Climate change

During the consultation several comments were received from members of the public and local interest groups related to planning applications and environmental permitting of other sites. Only comments relevant to this application, the activity proposed and this specific site have been addressed in determining this application.

Hydraulic Fracturing

Permitted activities at the Horse Hill wellsite do not include hydraulic fracturing or other non-conventional formation stimulation. Where acid is used to improve the performance of the near wellbore environment this is done in accordance with the requirements for an exclusion from a groundwater activity, often referred to as meeting the requirements for 'de-minimis' as set out in our published guidance³.

Seismic Hazards

Concerns over increased seismicity were raised as part of the public consultation. The North Sea Transition Authority, formerly the Oil and Gas Authority, are the lead regulator for seismic hazards.

³ <https://www.gov.uk/government/publications/groundwater-activity-exclusions-from-environmental-permits/groundwater-activity-exclusions-from-environmental-permits#de-minimis>

Decision considerations

Confidential information

A claim for commercial or industrial confidentiality was made with the application received 30/07/2019 regarding the geological reservoir parameters report.

The applicant withdrew their claim for confidentiality on the 24/09/2019.

Identifying confidential information

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

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

Consultation

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

We consulted Surrey County Council, Public Health England, Civil Aviation Authority and Food Standards Agency

The comments and our responses are summarised in the [consultation responses](#) section.

The application was publicised on the GOV.UK website.

The comments and our responses are summarised in the [consultation responses](#) section.

The regulated facility

We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility',

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

The site

The operator has provided plans which we consider to be satisfactory.

These show the extent of the site of the facility including the discharge points and are included in the permit.

Site condition report

The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports.

Waste management plan

The operator has provided a waste management plan which we consider is satisfactory.

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

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

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

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

The decision was taken in accordance with our guidance.

Environmental risk

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

The operator's risk assessment is satisfactory.

Operating techniques

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

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

Pre-operational conditions

Based on the information on the application, we consider that we need to include pre-operational conditions for future development.

We have included a pre-operational programme to ensure that the operator notify the Environment Agency prior to the commencement of groundwater activities as listed in the permit. The measure requires the operator confirm whether any modifications of the boreholes are required to facilitate discharges and whether there have been any changes to the integrity of borehole HH-2z.

In addition the operator is required to provide at least three months of groundwater and surface water monitoring to establish a baseline. This requisite surveillance will be used to determine any changes that may occur as a result of site operations in accordance with Schedule 22, paragraph 7(5) of the Regulations.

Emission limits

The following emissions limits have been added to the permit for the following activities:

AR1 – Disposal of waste gas arising from extended well testing and production activities.

Emission limits for the following parameters have been set by the Environment Agency NO_x, CO and TVOC. The operator is required to monitor the co-mingled feed gas to the flare on a monthly basis or as otherwise agreed in writing with the Environment Agency.

AR2 / AR3 – Re-injection of produced water (AR2) and injectivity tests (AR3)

Emission limits have been set for physical parameters associated with the groundwater activity. Further information is set out in the Key issues section of this document.

No further changes to emission limits have been set for the discharge activity.

Monitoring

Monitoring has not changed as a result of this variation.

Reporting

We have added reporting for parameters listed in Schedule 3 for the following activities:

Flaring, Re-injection of produced and treated surface water, surface water monitoring prior to discharge and shallow groundwater monitoring for parameters listed in Schedule 3 and where relevant management plans listed as operational documents in Schedule 1, Table S1.2.

Management system

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

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

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

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

Previous performance

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

Financial competence

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

Growth duty

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

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 to consider, alongside the delivery of the protections set out in the relevant legislation that all specified regulators should have regard to.”

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 environmental protections.

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

Consultation Responses

The following summarises the responses to the first and second public consultations as well as consultation with specific organisation and the way in which we have considered these in the determination process. The consultation on the draft permit notice and decision document is dealt with separately.

The initial consultation ran from the 28/10/2019 to the 30/11/2019, although representations were received up to the 04/12/2019.

Following a request for further information from the Environment Agency a modified application was received from the applicant on the 01/02/2021.

The Environment Agency decided at this stage that a second consultation should be undertaken. This ran from the 22/03/2021 to the 21/04/2021, although representations were received up to the 27/05/2021.

The number of responses from the public received at the initial and second consultation stages as outlined above was n=494 and n=180 respectively.

We have responded to the points raised at each of the consultation stage in a thematic fashion, rather than respond individually. These common themes have been addressed in further detail within the Key Issues section of this document.

Where responses to both public consultation stages fall outside of identified themes we have set out a more detailed response below.

Responses from organisations listed in the consultation section

Response received from: Surrey County Council on 20 April 2021 as part of the second consultation

Brief summary of issues raised: The council states that it has no views to make on the technical environmental permitting detail submitted for the application. It does point out, however, that the description of the activities as set out in the permit may indicate a material change to the agreed planning permission and the operator should ensure they contact the relevant planning authority.

Summary of actions taken: No further action undertaken by the Environment Agency with respect to planning. It is the responsibility of the operator to hold all necessary permissions to undertake the described activity.

Response received from: Health Security Agency (formerly Public Health England) on 14 May 2021 as part of the second consultation.

Brief summary of issues raised: The UK Health Security Agency (formerly Public Health England) recommend that any Environmental Permit issued for the site should contain conditions to ensure that the following potential emissions do not impact upon public health. It goes onto note that the main sources of pollutant releases during site

operations will be from the use of diesel fuel from stationary engines and construction and transport vehicles as well as the combustion of natural gas. UK HSA state that proximity of residential receptors to the site boundary may cause an exceedance of nitrogen dioxide and benzene above air quality standards at the site boundary during the drilling phase of operations. It recommends the Environment Agency ensure it is satisfied with the modelling undertaken and that the modelling includes all aspects of site activities.

Summary of actions taken: The Environment Agency have performed a full audit of the applicant's air quality modelling, including our own check analysis to validate the conclusions set out in the report. The Environment Agency is satisfied that the modelling which represents a worse-case scenario shows that there are likely to be no exceedances of relevant human health or habitat standards from the activities proposed at the site. Further information on air quality impacts can be found in the Key issues section of this document.

Representations from local MPs, assembly members, councillors and parish/town community councils

Response received from: Salfords and Sidlow Parish Council (262)

Brief summary of issues raised: The parish council raised their concerns around whether the Environment Agency have sufficient resources to make sure all regulations and permissions are properly monitored and enforced.

Summary of actions taken: The Environment Agency undertake regular compliance checks at permitted facilities to ensure that conditions and limits within the permit are complied with. The operator is also obliged to report monitoring results for parameters stipulated within the permit. This work is funded by charges levied to the holders of environmental permits.

Response received from: Chartwood Parish Council (557)

Brief summary of issues raised: The parish council object to the proposed variation on the following grounds:

- Gas flaring should not be considered BAT where the volume of gas likely to be flared is so significant.
- Air quality is already impacted by Gatwick Airport and therefore flaring is unacceptable as it adds to this loading. The EIA also fails to assess greenhouse gas emissions so it is not possible to calculate outputs of pollutants.
- Concerns of seismicity from the reinjection of waste water which it is stated causes earthquakes. They state that a precautionary measure should be applied following the Newdigate earthquake swarm.
- Concern over quality of formation waters which can include chemicals harmful to human health as well as concerns over quality of flowback waters which may be contaminated by chemical residues from the well processes.
- Statement that carbon emissions should be considered in full for the site and that this assessment should include transportation to and from the site for the

duration of its lifespan as well as the cumulative impacts of processing and burning oil or gas produced from the site.

- Acid wash activities should require a groundwater permit at Horse Hill
- General statement about concerns of emissions from the site and increased vehicle movement as well as a reduction in the limits on oil removal by road in the permit.
- Concerns over water disposal from the site both to groundwater through reinjection and surface water pollution of Spencer's Gill. The statement goes on to say that the site is uphill of grazing land and there is therefore a potential for grazing land to become polluted.
- Concern over the lack of clarity in the application and request for up to date detailed contour maps and cross sections of the areas it proposes to drill through, including the paths of every well and sidetrack. In addition the response states that new seismic analysis should be undertaken.
- The council question how the wells will be monitored and managed after the operator has left the site and who will pay for any remedial works required.

Summary of actions taken: Specific responses to the points raised by Chartwood Parish Council have been provided in the key issues section of this document and elsewhere.

Response received from: Salfords and Sidlow Parish Council (537)

Brief summary of issues raised: The parish council seek assurance that the cleanest combustion process for the generation of electricity is used where the BAT assessment shows that this is cost effective to do so.

Summary of actions taken: The Environment Agency have reviewed the proposals for the disposal of waste gas at the site through flaring in accordance with its published guidance on appropriate measures for the Oil and Gas sector.

The Environment Agency agree with the applicant that at present incineration is the most cost effective solution to prevent cold venting of gasses to the atmosphere. The operator has also committed to revisiting this decision if gas flows on site are sufficient to allow for electricity to be generated.

We consider that the proposed method of gas disposal can be considered BAT and will review this during the lifetime of the permit to ensure the operator's compliance with the Environment Agency's published guidance continues.

Representations from community and other organisations

Response received from: Markwells Wood Watch Group on the 25 November 2019 as part of the initial consultation.

Brief summary of issues raised: The group object the issuing of the varied permit on the basis that the operator has not demonstrated how emissions from the site will be kept to a low or very low risk. Specifically they state the following points of concerns.

- Concerns raised as to whether the re-injection activity can be considered de minimis and what volume of chemicals, water and pressures will be used. The response notes that a groundwater permit is sought.
- Concerns raised about acid wash being used for acid stimulation of the formation and that is a loophole in the Environment Agency's guidance and relevant regulations.
- Concerns about the pH of flowback fluid which may have low pH levels which cause harm. Further concern stated about leaching of heavy metals, salts and radioactive material mobilised in the formation.
- Concern raised about the waste facility handling of NORM and whether the SR2014 No4 permit currently operating on site is fit for purpose. The consultee goes onto state concerns as to how often the Environment Agency will monitor production and state that a bond should also be secured in advance of activity of transport of hazardous goods.
- Concern over emissions from gas flaring operations in particular air pollution, toxins, smoke and particulates. They go onto state that dioxins are likely to be present which impacts further on health.
- Concern over cumulative impacts of acid washing and statement that not enough research has been done in the UK on impact on geology, environment or human health.
- Concern over the lack of detailed seismic data necessary to determine safety and risks. Statement that the Geo-Hazards assessment should have been updated in light of proposed variations.
- Concern over hazardous nature of water reinjected into the target formation and the associated concern of well failure leading to long term contamination.
- Concern over reinjection of formation and process waters causing an increase in earthquakes.
- Concern over lack of information on waste disposal and how this is not adequately represented in traffic movements to / from the site.
- Concern over the lack of sufficient risk assessment for proposed well stimulation.
- Concern over the use of chemicals for acid wash and lack of information on interactions between chemicals proposed to support hydrocarbon extraction at horse hill.
- Concern over whether acids used will be fully neutralised.
- Comment on a lack of VOC risk assessment from storage of gas and oil onsite.
- Concern as to whether the operator has appropriate financial provision in place in case of contamination with regards to NORM.
- Concern over a lack of any proper risk assessment for the use of proposed biocides.
- Statement that the operator is not able to demonstrate that they can carry out the activity without risk to the environment or human health and the Weald Action Group find no justification of how HHDL are able to determine a low risk and very low risk assessment across all operations.

Summary of actions taken: The concerns raised by the Markwells Wood Action Group have been addressed within the main body of this document including where relevant the Key Issues section. Where comments relate only to the initial application, these have not been commented on further.

Response received from: BBAG Pollution Watch on the 25 November 2019 as part of the initial consultation.

Brief summary of issues raised:

- Statement that the application form, specifically Part C6 has been incorrectly filled in.
- Statement that the HDPE liner that underlies the site is not expected to last for the timeframe of ongoing development on the site.
- Statement that the geological and hydrogeological reports and conclusions submitted with this application are inconsistent with the information given by shareholding companies.
- Statement that the geological information provided does not provide enough detail of formation thicknesses, dip, faulting and stress specific to the areas above the drilled zone to make an informed risk assessment.
- Statement that there is likely to be a hydraulic connection between the vicinity of the oil well(s) and recharge and artesian conditions around the Mole river and Horley, whether through the Hastings beds aquifers, the shallower Weald clay formation minor aquifers or combinations of both.
- Statement that aquifers feeding stream leading to the Mole river are locally recharged and therefore at risk from pollution incidents or emissions from the site.
- Statement that the Horley area the Tunbridge Wells beds aquifer is of interest to water companies and therefore could be seen to be a future drinking water supply.
- Concern raised over the level of monitoring of waters accumulating at the surface and lack of detail over whether discharges to Spencer's Gill brook will be permitted during EWT procedures and during flood events.
- Statement that BBAG believe HHDL may not be undertaking the EWT for its intended benefit.
- Broad statement over issues with surface water monitoring.
- Broad statement made on air quality emissions and relationship with recent increases in air and vehicle movements and congestion around Gatwick Airport.

Summary of actions taken:

With respect to the statement regarding the incorrect application form. The applicant has confirmed that the answer to Question 13 was intended to relate to the proximity of the site to the Spencer's Gill brook. It was not intended to relate to the proximity of the site to an aquifer used for drinking water or as a statement on the potential usability of formations that have been and intend to be drilled through to reach the target formation.

With respect to the statement regarding the lifetime of the HDPE liner. The operator has stated in section 10.1.1.1 that the integrity of the liner will be tested every three years and remedial action taken. We consider that this is acceptable and in accordance with the Environment Agency's published guidance on the oil and gas sector.

Other concerns raised by BBAG Pollution Watch have been addressed within the main body of this document including where relevant the Key Issues section. Where

comments relate only to the initial application, these have not been commented on further.

Response received from: Weald Action Group

Brief summary of issues raised:

- General statement that the OGA enquiry should not be relied on to determine the risk of oil and gas exploration in the Weald. Recommendation that the applicant should fulfil stated obligations from their PEDL licence and commit to new seismic surveys.
- Statement that the EA should set limits on pressures permitted for acid activities and that quantities are properly recorded and reported.
- Statement of concern that contaminated surface water will be discharged into Spencer's Gill following limited treatment by the oil separator.
- Statement that all water should be properly disposed of in an EA permitted waste facility and not discharged into a stream.
- Statement that a drinking water well is in use at the protest camp situated at the intersection between Horse Hill and A217 opposite the black horse pub.
- Statement that in the opinion of the Weald Action Group that the gas management plan should be re-extended to include estimates of gas associated with oil production from the four new wells when deciding on disposal options for gas generated.
- Statement that in the opinion of the Weald Action Group it is likely that changes in government guidance may mean enclosed flares may soon no longer be considered adequate as BAT for combustion of waste gas from onshore oil and gas sites. The statement goes on to say that the operator has not adequately justified why they cannot utilise gas to generate electricity for the site.
- Statement requesting confirmation of how monitoring will be reported to the Environment Agency and how often the EA will attend the site.

Summary of actions taken: The concerns raised by Weald Action Group have been addressed within the main body of this document including where relevant the Key Issues section. Where comments relate only to the initial application, these have not been commented on further.

Response received from: Residents of Redhill

Brief summary of issues raised:

- Concern raised by residents of Redhill regarding the risk assessment for the proposed activity and specifically
 - The use of acid to extract the oil from the shale
 - Water use and contamination of groundwater
 - Methane gas release
- General point about not needing oil and the negative impact on the countryside from drilling.

Summary of actions taken: The concerns raised by Residents of Redhill have been addressed within the main body of this document including where relevant the Key Issues section. Where comments relate only to the initial application, these have not been commented on further.

Minded-to consultation period

The following summarises the responses to consultation of the draft permit notice and decision document where the Environment Agency stated that we were minded to issue the permit variation based on the information provided by the applicant to date.

The consultation ran from the 04/03/2022 to the 31/03/2022 with all relevant information made available on the Environment Agency's citizens space web portal.

The number of responses from the public received at the initial minded-to consultation stage was n=133. The Environment Agency also received a response from the United Kingdom Health and Security Agency.

With the exception to the UKHSA response we have responded to the points raised at this stage in a thematic fashion, rather than responding individually. These have been set out in further detail within the Key Issues section of this document.

Where responses to both public consultation stages fall outside of identified themes, we have set out a more detailed response below.

Responses from organisations listed in the consultation section

Response received from: Surrey County Council on 30 March 2022 as part of the draft decision consultation

Brief summary of issues raised: The council states that it has no views to make on the technical environmental permitting detail submitted for the application. It does point out, however, that the description of the activities as set out in the permit may indicate a material change to the agreed planning permission and the operator should ensure they contact the relevant planning authority.

Summary of actions taken: No further action undertaken by the Environment Agency with respect to planning. It is the responsibility of the operator to hold all necessary permissions to undertake the described activity.

Response received from: Health Security Agency (formerly Public Health England) on 23 March 2022 as part of the second consultation.

Brief summary of issues raised:

The UKHSA raised a number of points in their response:

1. UKHSA questioned whether documents referenced as part of the consultation were up to date with respect to the Environment Risk Assessment (October 2020) which was submitted in previous consultations in 2021.

2. UKHSA made recommendations that the air quality assessment should provide details regarding peak and average concentrations for each pollutant and how these compare against short-term and long-term Environmental Assessment Levels (EALs) at human health receptors.
3. UKHSA stated that the non-technical summary (NTS) states only a single diesel generator is used, where as the site layout plans indicate more than one generator and a number of point sources.
4. UKHSA stated that it was unclear whether commercial production from other wells not including the four additional wells set out in the NTS were covered under the permit.

Summary of actions taken:

The Environment Agency responded to the points raised by the UKHSA on the 31 March 2022 as follows:

1. The Environment Agency confirmed that although the environmental risk assessment dated 19 October 2019 was produced to complement the air quality assessment (AQA)⁴ submitted with the original application, the audit undertaken by the Environment Agency's Air Quality Modelling Assessment Unit (AQMAU) was completed on a more recent report⁵ submitted by the applicant in response to a request for information made by the Environment Agency through a served Schedule 5 notice.
2. The Environment Agency confirmed that the applicant's pollutant release rates were in g/s as presented in Table 3.6 of the AQA⁴. Pollutant emission rates were derived from European and United States (US) emission standards (i.e. EU Stage III A and US EPA Tier 2). The conversion from emission standards in g/kWh to pollutant emissions in g/s are based on maximum fuel consumption or power output, evidenced in the engines technical specifications and further information submitted by the applicant. Therefore, modelled emissions (g/s) are assumed to be peak emissions. With respect to the query on volatile organic compounds, the Environment Agency confirmed that the applicant assumed that 100% of the VOC emissions were benzene, which we considered to be a conservative assumption.
3. The Environment Agency confirmed that the AQA was based on the operation of a number of diesel stationary engines in table 3.21 {1}.
4. The Environment Agency confirmed based on our understanding that the AQA [1] supports the permit application variation to undertake a 20-year programme of commercial production of oil from one exploratory well (HH-1) and to drill and test four wells (HH-3 to HH-6).

⁴ Air quality assessment of the production of hydrocarbons from an existing well site Horse Hill Well Site, Hookwood. Date: 8th November 2018. Report No. LSO180927.

⁵ Air quality assessment of the production of hydrocarbons from an existing well site Horse Hill Well Site, Hookwood. Date: 2 February 2021. Report No. LSO210118. Issue 2

Representations from local MPs, assembly members, councillors and parish/town community councils

No responses received.

Representations from community and other organisations

Response received from: Brockham Oil Watch on the 30 March 2022

Brief summary of issues raised:

Objections raised about the possibility of increased seismic risk from drilling activities at Horse Hill. The group have provided an operational timeline of seismic activity in and around Newdigate which has been investigated by the Health and Safety Executive and British Geological Society.

Summary of actions taken:

Risks of increased seismic activity resulting from permitting activities is not covered under the Environment Agency's remit. The reader is encouraged to direct questioning on this matter to Surrey County Council and the North Sea Transition Authority (formerly the Oil and Gas Authority).

Response received from: Norwood Hill Residents on the 31 March 2022

Brief summary of issues raised:

The group raise concerns regarding the following:

1. Lack of production / development at the site despite numerous planning and permit variations.
2. Lack of engagement by Environment Agency staff when complaints are made of pollution / emissions from the site.
3. Objection to the Environment Agency giving permission to flare at the site rather than converting the gas to electricity.
4. Objection to self reporting from the operator and statement that Environment Agency staff should be given the resources to complete their inspections in full
5. Concern over the financial security of the operator.
6. Statement that if further amendments to the planning permission are required then the permit variation cannot be issued until this has been resolved.

Summary of actions taken:

1. The commercial viability of the site is not related to whether the Environment Agency can grant a permit for the proposed activities. The Environment Agency are satisfied that the operator is financial capable of complying with the Environmental Permit.
2. The Environment Agency regulate all sites regularly in accordance with our agreed ways of working. Where pollution incidents are reported, the Environment

Agency will investigate and seek remedial steps from the operator where necessary.

3. The Environment Agency have considered the BAT assessment made by the operator when proposing to flare waste gas arising from exploration and production activities. We consider that this approach meets the Environment Agency's guidance on appropriate measures for the oil and gas industry.
4. The operator of any environmental permit is required to discharge the conditions in full unless otherwise agreed in writing with the Environment Agency. The Environment Agency itself can undertake inspections of regulated facilities to ensure that there are no emissions from the site, beyond what has been agreed through the permitting process.
5. As per response [1]
6. The Environment Agency's core guidance on permitting⁶ states if a regulated facility also needs planning permission, it is recommended that the operator should make both application in parallel wherever possible. There is however no obligation on the operator to do so and it is up to the operator to ensure that they have all necessary permissions in place to undertake the proposed works.

⁶ <https://www.gov.uk/government/publications/environmental-permitting-guidance-core-guidance--2>