HORSE HILL DEVELOPMENTS LTD

HORSE HILL

HYDROCARBON PRODUCTION, DECOMISSIONING AND RESTORATION

ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REQUEST REPORT

PROPOSED DEVELOPMENT	THE DRILLING OF FOUR NEW HYDROCARBON WELLS (ADDING TO THE TWO EXISTING WELLS ON-SITE), ONE PRODUCED WATER REINJECTION WELL AND THE SUBSEQUENT INSTALLATION OF SIX SURFACE MOUNTED PUMPS (ONE PUMP PER OIL PRODUCING WELL); THE CONSTRUCTION OF A PROCESS AND STORAGE AREA AND TANKER LOADING FACILITY ON LAND TO THE EAST OF THE EXISTING WELL SITE TO ACCOMMODATE 7 OIL STORAGE TANKS (CAPACITY OF 1,300 BARRELS PER TANK), 2 FIRE WATER TANKS, 2 PRODUCED WATER TANKS, AN ENCLOSED GROUND FLARE, AN OIL HEATER WITH AN EXHAUST STACK, 4 GAS-TO-POWER ELECTRICITY GENERATORS WITHIN ACOUSTIC ENCLOSURES, OIL SEPARATORS, ABOVE GROUND PIPE AND CABLE TRACKS AND ANCILLARY DEVELOPMENT ENABLING PRODUCTION OF HYDROCARBONS FROM SIX WELLS FOR A PERIOD OF TWENTY YEARS FOLLOWED BY DECOMMISSIONING & SITE RESTORATION.
LOCATION	HORSE HILL WELL SITE, HORSE HILL, HOOKWOOD, HORLEY, SURREY, RH6 0RB
DOC REF	HHDL-HH-EIA(SR)-RO
DATE	20TH SEPTEMBER 2018

APPROVAL LIST

NAME		TITLE
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REVISION RECORD

VERSION	DATE	DESCRIPTION
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This document has been prepared for and on behalf of Horse Hill Developments Ltd by Zetland Group Limited.

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1. INTRODUCTION

Horse Hill Developments Ltd ("HHDL") holds a 65% interest and operates Petroleum Exploration Development Licence 137 within which the Horse Hill oil discovery is located.

In 2012 HHDL obtained planning permission from Surrey County Council (SCC) to drill an exploratory well (Horse Hill-1, (HH-1z)) at the Horse Hill well site on land at Horse Hill, Hookwood, Horley, Surrey ("the Site")[1]. Drilling was completed in 2014 allowing initial flow testing in 2016. These tests confirmed the presence of hydrocarbons and indicate that the commercial production of hydrocarbons may be feasible. In 2017, HHDL obtained a further planning permission from SCC[2] to extend testing for a period of 3 years and to drill and test an additional appraisal well (HH-2) and sidetrack well (HH-1z). This permission was implemented in June 2018 and the works are ongoing.

In anticipation of declaring the HH-1z oil discovery commercial, HHDL intends to submit a planning application for the production of hydrocarbons from the Site. The first step in this process is to ensure the environmental effects of development are considered in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 ("2017 EIA Regs"). SCC determined that the exploration, appraisal and testing of hydrocarbons was not EIA development and subsequently granted the above planning permissions having had regard to a number of environmental reports which have been used to inform this Scoping Request Report ("Report").

Hydrocarbon Production and EIA Development

Based on information acquired to date, once operational, the Site could briefly produce in excess of 500 tonnes of petroleum per day for commercial purposes, the threshold at which the proposal becomes a "Schedule 1 development"[3] which means it is "EIA development"[4] and must be supported by an Environmental Statement (ES).

A person who is minded to make an "EIA application" may ask the relevant planning authority to state in writing its opinion as to the scope and level of detail to be provided in an ES[5]. Such a request must include:

i. a plan sufficient to identify the land.
ii. a brief description of the nature and purpose of the development, including its location and technical capacity.
iii. an explanation of the likely significant effects of the development on the environment.
iv. such other information or representations as the person making the request may wish to provide or make.

Purpose of this Report

This Report has been prepared by Zetland Group on behalf of HHDL. It has been the subject of careful consideration and informed professional opinion. It focuses upon the environment impacts likely to be significant in isolation, combination and when considered cumulatively with other relevant proposals and operational developments. It

[1] SCC planning permission RE10/2089: The construction of an exploratory well site to include plant, buildings and equipment; the use of the well site for the drilling of one exploratory borehole and the subsequent short-term testing for hydrocarbons; the erection of security fencing; construction of a new access onto horse hill and an associated access track with passing bays, all on some 1.16 ha, for a temporary period of up to 3 years, with restoration to agriculture and woodland.

[2] SCC planning permission RE16/02556/CON: The retention of the existing exploratory well site and vehicular access onto Horse Hill; the appraisal and further flow testing of the existing borehole (Horse Hill-1) for hydrocarbons, including the drilling of a (deviated) side track well and flow testing for hydrocarbons; installation of a second well cellar and drilling a second (deviated) borehole (Horse Hill-2) and flow testing for hydrocarbons; erection of security fencing on an extended site area; modifications to the internal access track; installation of plant, cabins and equipment, all on some 2.08ha, for a temporary period of three years, with restoration to agriculture and woodland.

[3] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 1 – Description of Development 14: "Extraction of petroleum and natural gas for commercial purposes where the amount extracted exceeds 500 tonnes per day in the case of petroleum…".

[4] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Part 1: General, Reg 2(1)(c).

[5] The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Part 4: Preparation of Environmental Statements, Reg 15(1).

records the methodology to be adopted within each environmental topic and proposes a proportionate and appropriate level of assessment to inform an accurate and complete Scoping Opinion.

2. SITE AND SURROUNDINGS

The Site is a worked farm that accommodates an operational well site which covers 2.08 hectares (inclusive of access track and ancillary development). A secure compound encloses temporary earth bunding and a stable, flat and drained well pad of crushed and compacted stone overlaying an impermeable membrane. The well pad is designed to accommodate the HH-1z and HH-2 wells within sunken concrete chambers. Temporary storage tanks, portable cabins and amenity facilities support the drilling and well testing work. A crushed and compacted stone access track connects the well site to the public highway at Horse Hill, a two-way single carriageway approximately 250m to the east, by way of a tarmac junction.

The Site falls within the County of Surrey and the Borough of Reigate and Banstead situated within a rural area approximately 3.1km west of Horley town centre, 2.3km northeast of the village of Charlwood and 1.6km northwest of the village of Hookwood. Gatwick Airport is approximately 2.2km southeast of the Site.

The Site is bounded by farmland on all sides with areas of woodland to the east, northwest and southwest within a wider landscape of agricultural and forestry. The Site is within the Metropolitan Green Belt but is not within or adjacent to an area of local, national or higher-level natural or built heritage designation. A site location plan is attached at **Appendix A.1**, which identifies the surface area of the proposal within a solid red line and the existing layout of the site is recorded at **Appendix A.2**. The likely extent and deviation of the sub-surface boreholes and the likely area of hydrocarbon extraction are yet to be determined. This detail would be defined as part of any future planning application and it would be used to inform the assessment of environmental impacts consistent with national planning practice guidance[6].

In anticipation of production, the Site will be held in a retention mode consistent with the planning permission of 2017:

- Site Retention Mode (Drawing No. P16 dated: 13th October 2016) attached at **Appendix B.1**; and
- Illustrative Sections Retention Mode (Drawing No. P22 dated: 13th October 2016) attached at **Appendix B.2.**

Upon completion of the current testing and drilling programme, the wells will be suspended with barriers to flow installed. The Site will be cleaned and all plant will be removed leaving a crushed stone surface overlaying an impermeable membrane, drainage ditches and the wellhead assembly covered by a standard shipping container. The boundary fence will be retained along with the secure gates across the entrance.

3. DEVELOPMENT DESCRIPTION

The Site size will increase from 2.08 hectares to approximately 2.6 hectares with the additional land take being directly to the east of the existing well site. The land will accommodate hydrocarbon processing, storage and transportation facilities. No material changes in land take are anticipated for the existing well site or the access track connecting to Horse Hill. Hydrocarbon production comprises the following five phases of development:

Phases of Development	
Phase 1	**Well Site Modifications & New Construction Works:** - Within the existing well site: construction of five new drilling cellars to accommodate four new hydrocarbon production wells and one new produced water re-injection well; - Within land to the east of the well site: construction of an oil processing and storage area, tanker loading facilities and the placement of generator sets for the combustion of natural gas to generate electricity.
Phase 2	**Well Management & Drilling:** five further wells comprising: - four new hydrocarbon production wells (the existing HH-1z and HH-2 wells will be retained and converted for production); - one new produced water re-injection well.

[6] National Planning Practice Guidance, Minerals, Planning for Hydrocarbons, Development Management Procedures (Paragraph: 115 Reference ID: 27-115-20140306) and Environmental Impact Assessment (Paragraph: 119 Reference ID: 27-119-20140306).

Phases of Development	
Phase 3	**Production & Well Management:** the production and export of oil and electricity (through the combustion of natural gas via the generator sets) for a period of 20 years with well interventions and maintenance workovers.
Phase 4	**Plugging, Abandonment & Decommissioning:** the removal of all surface production equipment followed by the plugging and abandonment of the six production wells and one produced water re-injection borehole.
Phase 5	**Site Restoration & Aftercare:** the removal and disposal of all surface bunding and stone surfacing followed by the regrading of the soils and subsequent aftercare monitoring.

3.1 Phase 1: Well Site Modifications & New Construction Works

The existing well site has been constructed to a standard capable of accommodating the further drilling machinery and activity proposed. The well site comprises a stable and flat surface of crushed and compacted stone overlaying a high-density polyethylene (HDPE) impermeable membrane and protective geotextile layers allowing for the containment and controlled drainage of surface water. Water that is not suitable for discharge is contained and taken off-site by tanker for treatment and/or disposal at an Environment Agency permitted waste water treatment facility. The discharge of water at the Site is regulated by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 ("2016 EPR Regs") and this protective and controlling regime will continue.

Phase 1: Well Site Modifications & New Construction Works - Sub-Phases	
1.A	**Construction within the existing well site:** 5 concrete chambers to act as drilling cellars housing four new production well heads and 1 produced water reinjection well. Hard standing to support drilling equipment, pipes tracks and other ancillary equipment.
1.B	**Construction on land to the east of the well site:** installation of retaining walls and a level hard standing area lined with a HDPE impermeable membrane and protective geotextiles, overlaid with compacted stone and concrete bunding to accommodate: – a crude oil processing plant & storage area within a concrete bund; – gas-to-power generating engines; – above ground pipe tracks linking the process and storage area to the producing wells; and a – tanker loading facility and a new internal track layout enabling tankers to enter and exit in a forward motion.
1.C	**Installation of surface conductor casings on four new producing wells**

In anticipation of drilling activity, a conductor casing setting rig will be mobilised to the Site with a mast of up to 15m in height to drill and set the conductor casings for the five new wells to pre-determined depths, isolating the shallow water systems underlying the Site from the hydrocarbons, fluids and other materials generated during deep drilling.

Construction of the new oil processing and storage area requires the targeted excavation of top soils which will then be stored in an earth bund of a similar size and specification as the earth bund of the existing well site. The underlying subsoil will be cut and filled to create a level plateau and a *'v'* ditch excavated around the perimeter. A HDPE impermeable membrane will overly the subsoil and *'v'* ditch, protected above and below by layers of geotextile. Crushed and compacted stone will then overlay the Site providing the same standard of containment and controlled drainage as the existing well site.

Retaining walls will be installed to the west (adjacent to the existing well site), north and east beyond which the land will be graded to match existing levels. The boundary fencing will extend north and east to enclose an additional one-half hectare of land accommodating the process and storage facilities and an earth bund along the northern boundary.

Twelve construction staff will typically be required together with approximately 3-6 security staff accessing the Site via cars and LGV's. Plant, machinery and materials will be delivered by HGV's and LGV's. Foul water, sewage and domestic waste will be collected and contained on site for subsequent off-site transfer to an Environment Agency permitted waste treatment facility. Timber and packaging waste will be segregated for off-site transfer and recycling. The phase 1 programme will be:

Phase 1: Well Site Modifications & New Construction Works Programme	Hours of Operation			Duration	2-Way HGV Movements (In & Out)
	Mon – Fri	Sat	Sun/Bank Hols		
1: Construction Works	08:00 – 18:30	09:00 – 13:00	None	26 Weeks	Maximum 10 per day

The following plans of the proposed development are provided:

- Proposed Layout Plan (Well Site and Process Plant & Storage Area) at **Appendix C.1**;

- Proposed Layout Plan (Process Plant & Storage Area) at **Appendix C.2**;
- Proposed Process Plant and Storage Area Sections (looking North) at **Appendix C.3**; and
- Proposed Process Plant and Storage Area Sections (looking West) at **Appendix C.4**;

3.2 Phase 2: Well Management & Drilling

For the production wells and water re-injection well, the works comprise:

- The mobilisation of a main drilling rig to Site (typically up to 38m maximum height) including diesel power generation, fluid (mud) pumps and tanks;
- Temporary storage of drilling mud and rock cuttings for subsequent off-site disposal;
- Shrouded external lighting attached to the drilling rig which illuminates the mast, the rig floor, mud tanks, pumps and ancillary infrastructure; and
- Delivery of fuels, equipment, materials, drilling chemicals and steel casing/tubing.

Post drilling, the demobilisation of a rig will take up to 5 days.

Phase 2: Well Management & Drilling - Sub-Phases	
2.A	**Workover - Mobilisation**
2.B	**Workover Operation of HH-1z and HH-2**
2.C	**Workover - Demobilisation**
2.D	**Drilling Rig - Mobilisation**
2.E	**Drilling 4 hydrocarbon production wells HH-3 to HH-6 and 1 water reinjection well**
2.F	**Drilling Rig - Demobilisation**

Initial Workovers Operation of HH-1z and HH-2

HH-1z and HH-2 wells were originally drilled to facilitate testing and appraisal. To make the wells suitable for production, initial workovers are required. This will involve the mobilisation of a crane to site with ancillary fluid pumping units and fluid storage tanks. The production tubing installed during testing will be inspected and replaced where necessary and the sub surface formations will be cleaned.

Drilling HH-3 to HH-6

The drilling of a single well is not likely to give rise to significant effects[7]. The adverse impacts derived from back-to-back drilling activity will be experienced sequentially. Drilling will be interspersed between relatively benign periods of rig mobilisation and demobilisation. The staggered nature of a drilling programme that allows only a single rig on-site at any one time will dilute the impact of any continuous or combined adverse effects.

Drilling is a continuous process requiring 24-hour working, which introduces noise, air and light impacts during unsociable hours. Approximately twenty personnel (working back to back 12-hour shifts) will be required with approximately 3-6 security staff. Accommodation is provided for key staff on-call. Cars and LGV's will access the Site during the hours of operation. Plant, machinery and materials will be delivered by HGV's and LGV's. Waste generated during phase 2 works will consist of:

- Extractive Waste: drilling muds, rock cuttings, excess cement, spent dilute acid (salty water), produced formation water and associated natural gas (if not used for electricity generation), which are subject to a mining waste permit under the 2016 EPR Regs. They will be collected and contained on-site for off-site transfer to an Environment Agency permitted waste treatment facility: and
- Non-extractive Waste: foul water, sewage and domestic waste will be collected and contained on-site for off-site transfer to an Environment Agency permitted waste-water treatment facility. Timber and packaging waste will be segregated for off-site transfer and recycling.

Drilling activity will commence with the installation of a water reinjection borehole adjacent to HH-1z and HH-2 to return produced water from whence it came and potentially as a mechanism to maintain well pressure. Once

[7] A finding consistent in principle with Surrey County Council: Environmental Impact Assessment Screening Opinion Report dated 6th December 2016 which found the effects of drilling of HH-1z and HH-2 to be not significant.

completed a further 4.No boreholes will be drilled in a uniform pattern to complete the 6.No producing wells (two rows of three boreholes aligned north-south and central within the existing well site). The phase 2 programme will be:

Phase 2: Well Management & Drilling Programme	Hours of Operation			Duration	2-Way HGV Movements (In & Out)
	Mon - Fri	Sat	Sun/Bank Hols		
2.A/B/C: Workover of HH-1z and HH-2	08:00 – 18:30	09:00 – 13:00	None	5 Weeks	Maximum 20 per day
2.D/E/F: Drilling of 4 hydrocarbon production wells (HH-3 to HH-6) and one produced water re-injection well	08:00 – 18:30	09:00 – 13:00	None	62 Weeks	Maximum 20 per day

3.3 Phase 3: Production & Well Management

Phase 3: Production & Well Management - Sub-Phases	
Production	
3.A	**Installation of production equipment including surface mounted pumps (one/well), 7 oil storage tanks (capacity of 1,300 barrels/tank), 2 fire water tanks, 2 produced water tanks, an enclosed ground flare, an oil heater with an exhaust stack, 4 gas-to-power electricity generators within acoustic enclosures, oil separators and ancillary pumps, above ground pipe and cable tracks.**
3.B	**Production of oil, formation water and associated natural gas.**
3.C	**Re-injection of produced formation water *'from whence it came'.***
3.D	**Electricity generation (gas-to-power) for on-site consumption with excess electricity fed into the national transmission system.**
3.E	**Flaring of natural gas for emergency and maintenance purposes.**
3.F	**Routine inspections and maintenance of the wells and production equipment.**
Well Management	
3.G	**Well interventions and maintenance workovers.**
3.H	**Sidetrack drilling in the event of well repositioning.**

Production

Oil will be brought to surface using either linear rod pumps, electrical submersible pumps, progressive cavity pumps or jet pumps. Formation water and natural gas will also be produced. The co-mingled fluid will be diverted to a bath heater, which increases the temperature of the fluid to aid its separation. A 3-phase separator will then isolate oil from formation water and associated natural gas. These three fluid components are then processed as follows:

- oil is routed via above ground pipework to on-site storage tanks for subsequent off-site export to a refinery;
- formation water is routed to on-site storage tanks for re-injection; and
- natural gas is routed to the on-site gas-to-power electricity generators for use on site or for export by way of a grid connection to the nearest off-site sub-station.

Flaring of natural gas will only occur in an emergency (e.g. if the generators are shut down or if natural gas needs to be removed) or for maintenance purposes. An enclosed ground flare, designed to meet the Environment Agency's best available technique standard, will be installed at the Site to remove natural gas. Should flaring occur, it will introduce noise and air emissions impacts. There is no visible flame with an enclosed flare and emissions are minimised via temperature control.

24-hour working is necessary for production and ancillary operations introducing noise, air and light impacts amongst others (particularly at night). During the mobilisation of production equipment, approximately twelve personnel will be required with approximately 3-6 security staff. During the production phase the Site will operate unmanned, except for routine maintenance. Production could exceed 500 tonnes of oil per day which will require a peak flow of up to 16 two-way oil tanker movements per day[8] but this will reduce with reservoir depletion. Cars and LGV's will access the Site during the hours of operation. Plant, machinery and materials will be delivered by a mix of HGV's and LGV's.

[8] Commercial Delivery Oil Tanker assumed to have a capacity of 44 tonnes (38,000 litres).

Well Management

A well intervention typically involves the lowering of tools into a well on a wire or within coiled tubing suspended from a mobile crane. Immediately prior to production, an intervention will be performed to clean and then pump the well with nitrogen or brine to displace any residual drilling fluid back to surface. A further form of intervention is hot oiling, namely heating a small quantity of produced oil and circulating it down the well bore and back to surface to dissolve/unblock any restriction of flow within the production tubing (such as can be caused by wax).

Maintenance workover may include changing downhole pumps (if installed), changing production tubing or cleaning the formation. Once operational, a workover will typically be required once every 4 years/well (giving rise to the need for five workovers during the 20-year operational life of a single well). Following mobilisation 24-hour working is necessary in the interests of well stability introducing noise, air and light impacts amongst others (particularly at night).

A sidetrack is the drilling of a new section of hole from the main borehole to reposition the well in a new area of the producing reservoir. A sidetrack typically requires the mobilisation of a drilling rig. As the majority of the well has already been constructed, the duration of operation is likely to be less than the main drilling operation but will necessitate 24-hour working in the interests of well stability and control, introducing noise, air and light impacts amongst others (particularly at night).

During periods of well management, approximately twenty personnel/12-hour working shifts will be required with 3-6 security staff and accommodation for key staff on-call. Waste generated will be the same extractive and non-extractive waste as described in phase 2. The phase 3 programme will be:

Phase 3: Production & Well Management Programme	Hours of Operation			Duration	2-Way HGV Movements (In & Out)
	Mon – Fri	Sat	Sun/Bank Hols		
Production					
3.A: Installation of Production Equipment	08:00 – 18:30	09:00 – 13:00	None	3 Months	Maximum 5 per day
3.B/C/D/E/F: Production	08:00 – 18:30	09:00 – 13:00	None	4 Months	Maximum 16 per day
	08:00 – 18:30	09:00 – 13:00	None	24 Months	Maximum 12 per day
	08:00 – 18:30	09:00 – 13:00	None	48 Months	Maximum 8 per day
	08:00 – 13:00	09:00 – 13:00	None	60 Months	Maximum 4 per day
	08:00 – 13:00	09:00 – 13:00	None	104 Months	Maximum 2 per day
Well Management					
3.G: Workover	08:00 – 18:30	09:00 – 13:00	None	1 Month	Maximum 20 per day
3.H: Sidetrack Drilling	08:00 – 18:30	09:00 – 13:00	None	3 Months	Maximum 20 per day

3.4 Phase 4: Plugging, Abandonment & Decommissioning

Phase 4: Plugging, Abandonment & Decommissioning - Sub-Phases	
4.A	**The mobilisation of a workover rig**
4.B	**The plugging and abandonment of the wells**
4.C	**The demobilisation of a workover rig and associated equipment and removal of surface equipment**

A workover rig (up to 38m in height) will be mobilised to set cement plugs (barriers) within the well at predetermined depths to ensure that all distinct permeable zones penetrated by the well are isolated from each other and from the surface by a minimum of one permanent barrier. Permeable zones penetrated by the well which are hydrocarbon-bearing or over-pressured and water-bearing require two permanent barriers from the surface (the second being a back-up to the first). Once the well is abandoned the casing within the drilling cellar will be cut off 1.5m below ground level. A steel plate will be welded over the top of the casing to prevent soil from entering the borehole.

It is anticipated that all of the wells will be abandoned in one visit. 24-hour working will be necessary, introducing noise, air and light impacts. Upon completion, all surface equipment will be deconstructed or dismantled, cleaned and removed from the Site. Approximately twelve personnel will be required with approximately 3-8 security staff. Cars and LGV's will access the Site during the hours of operation. Plant, machinery and materials will be delivered by HGV's and LGV's. Waste generated will be the same extractive and non-extractive waste as described in phase 2. The phase 4 programme is likely to be:

Phase 4: Decommissioning Programme	Hours of Operation			Duration	2-Way HGV Movements (In & Out)
	Mon - Fri	Sat	Sun/Bank Hols		
4.A/B/C: Plugging & Abandonment	08:00 – 18:30	09:00 – 13:00	None	5 Months	Maximum 10 per day

3.5 Phase 5: Site Restoration & Aftercare

The well site and access track will be restored to their pre-development condition. All concrete hardstanding, bunded areas and loading bays will be cleaned prior to dismantling. The concrete chambers housing the well heads will be broken, dismantled (leaving the lowest pre-cast concrete ring in situ) and removed from off-for recycling. Surface aggregates will be inspected prior to removal. Areas of contamination will be removed for off-site treatment and reuse. The remaining surface aggregate will be removed for subsequent off-site reuse.

Phase 5: Site Restoration & Aftercare - Sub-Phases	
5.A	**Site Restoration**
5.B	**Aftercare**

Once the HDPE impermeable membrane has been removed the exposed subsoils will be inspected. In the unlikely event that contamination is observed the affected area will be excavated for subsequent off-site treatment. The subsoil will then be deep-tine cultivated in strips to a depth of 600mm at 1,000mm centres and will not be subsequently traversed by machinery.

Establishing the condition of the soils prior to their replacement will determine what treatments, if any, are required to improve soil condition. Topsoil will be back-tipped from the stockpile onto the loosened strips, graded out to a uniform depth and levelled. All topsoil areas within the Site, including areas not affected by construction will be ploughed and cultivated to ensure that stones, rubble, vegetation and other extraneous material are removed.

Security fencing will be removed. The highway access may be retained subject to agreement with the Highway Authority. A landscaping scheme will be implemented subject to a five-year monitoring plan.

Approximately 12 personnel will be required with approximately 3-6 security staff. Cars and LGV's will access the Site during the hours of operation. Plant, machinery & materials will be delivered by a mix of HGV's and LGV's. Waste generated will be the same as described in phase 1. The HDPE impermeable membrane will be collected for off-site transfer to a recycling facility. The phase 5 programme is likely to be:

Phase 5: Restoration & Aftercare Programme	Hours of Operation			Duration	2-Way HGV Movements (In & Out)
	Mon - Fri	Sat	Sun/Bank Hols		
5.A Site Restoration	08:00 – 18:30	09:00 – 13:00	None	5 Weeks	Maximum 10 per day
5.B Aftercare	No HGV's associated with this Phase				

3.6 Phase 1-5 Development Programme

Year 1: 1st Quarter

Phase 1 commences on the existing well site with the construction of new drilling cellars followed by the installation of new conductor casings for HH-3 to HH-6. Construction of the new oil process and storage area runs in parallel on land to the east of the existing well site. The duration of the construction activity will be approximately 14 weeks with the majority of the work being completed within Quarter 1.

Year 1: 2nd Quarter

Phase 3 commences with the installation of plant and machinery within the new oil process and storage area. The duration of the installation activity will be approximately 12 weeks with the majority of the work being completed within Quarter 2.

Year 1: 3rd Quarter

Having completed the modifications to the existing well site within Quarter 1, phase 2 drilling commences with the completion of the water reinjection well. This allows HH-1z and HH-2 to start producing, engaging the process and storage facilities along with the gas-to-power combustion generator sets; the first export of oil and electricity.

Year 1: 4th Quarter - HH-3 is drilled and starts producing.

Year 2: 1st Quarter - HH-4 is drilled and starts producing.

Year 2: 2nd Quarter - HH-5 is drilled and starts producing.

Year 2: 3rd Quarter - HH-6 is drilled and starts producing.

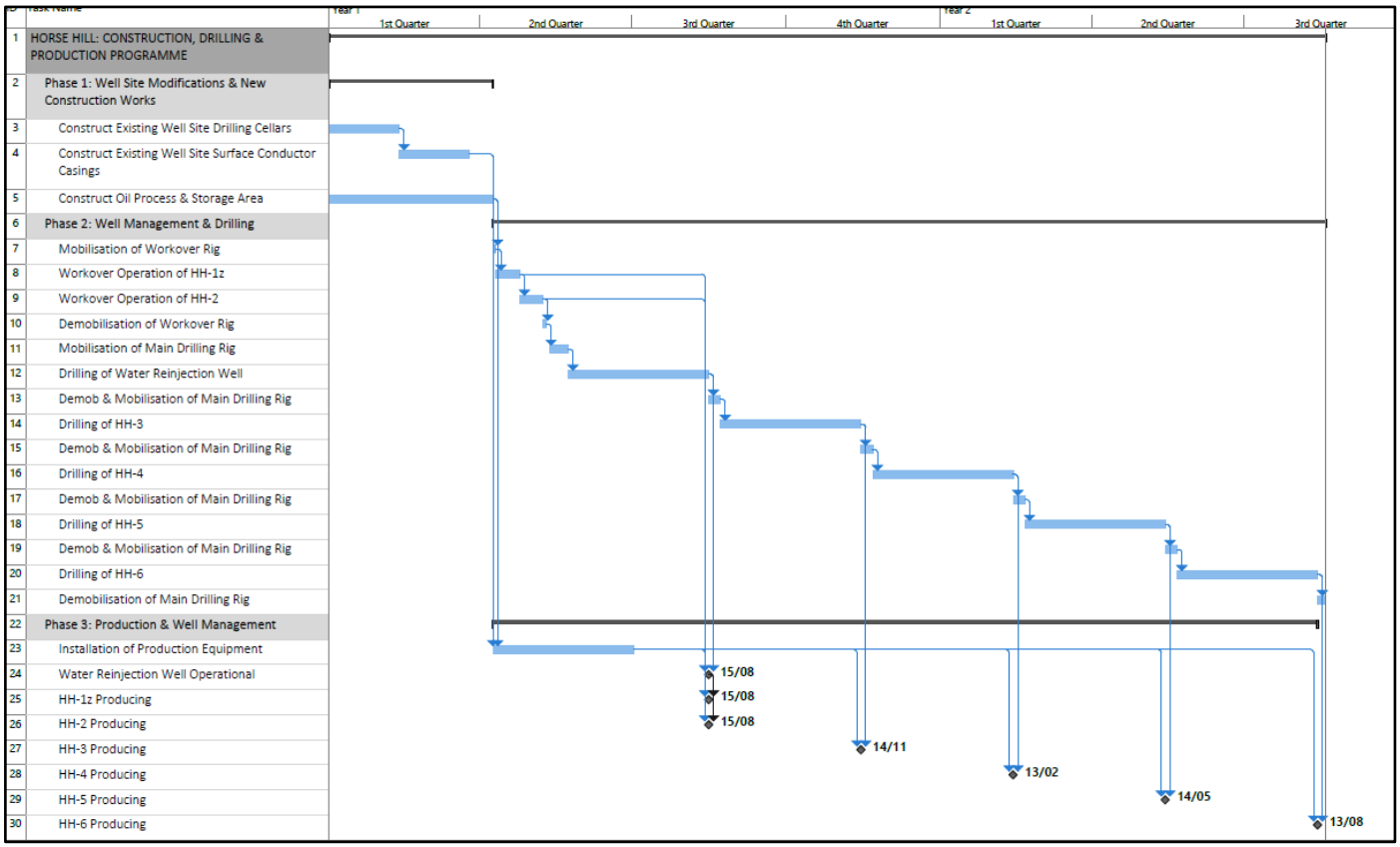
Year 2: 4th Quarter - Year 20

All 6 wells are producing and subject to periodic well interventions, maintenance workovers or sidetrack drilling (if necessary). The water injection well is in full operation. At year 20 the permission will expire and phase 4 decommissioning will commence followed by phase 5 restoration and aftercare.

Simultaneous operations are likely to occur within:

- Year 1: 1st Quarter - when the effects of phase 1 construction on the existing well site could be experienced at the same time as the effects of construction on land to the east of the existing well site derived from the construction of the new oil process and storage area;
- Year 1: 2nd Quarter - when the effects of the phase 2 workover operations (of HH-1z and HH-2) and the drilling of the water reinjection well at the existing well site could be experienced at the same time as the phase 3 installation of plant and machinery associated with the new oil process and storage area on land to the east of existing well site; and
- Year 1: 3rd Quarter until Year 2: 3rd Quarter - when the transport effects of phase 2 drilling HH-3 to HH-6 could be experienced at the same time as the transport effects of phase 3 production.

Phase 1-5 Development Programme



4. ENVIRONMENTAL TOPICS SCOPED IN

Summary Table: Environmental Topics *'Scoped in'*	
Part 4.1	Landscape & Visual
Part 4.2	Lighting
Part 4.3	Noise
Part 4.4	Ground & Groundwater Protection

For each topic scoped-in, further information on the assessment methodology and baseline environment will be recorded along with an initial appraisal of the potential effects and mitigation measures available.

4.1 Landscape & Visual

An assessment will evaluate the likely significant effects of the proposed development within a defined study area, including direct and indirect effects and cumulative effects arising in conjunction with other developments.

Assessment Criteria & Methodology

The *'Guidelines for Landscape and Visual Impact Assessment'*[9] record the emphasis placed upon the identification of likely significant effects by the European Union Environmental Impact Assessment Directive[10]. At the national level, the National Planning Policy Framework (NPPF) recognises the intrinsic character and beauty of the countryside[11] and at the local level the relevant policy context from the Local Development Plan and Minerals Plan will be recorded. The assessment will rely on the following best practice guidance:

- Guidelines for Landscape and Visual Impact Assessment – Third Edition (LI/IEMA, 2013);

[9] Landscape Institute, Institute of Environmental Management and Assessment, 2013 *'Guidelines for Landscape and Visual Impact Assessment'*, (3rd Edition). Abingdon: Routledge.
[10] Directive 2011/92/EU as amended by EU2014/52/EU adopted 12th March 2014.
[11] National Planning Policy Framework (July 2018), para 170(b), page 49.

- An Approach to Landscape Character Assessment (Natural England; 2014);
- Photography and Photomontage in Landscape and Visual Impact Assessment (Landscape Institute Advice Note 01/11); and
- BS 5837:2012 Trees in Relation to Design, Demolition and Construction (BSI, 2012).

Other reference documents used to understand the baseline position will include the Surrey Landscape Character Assessment 2015 and Borough-wide Landscape and Townscape Character Assessment (2008).

The assessment will review landscape character documentation (with on-site corroboration), anticipated changes within the landscape, planning polices and designations, visual amenity and the general visibility of the Site. A three-stage assessment process will be adopted in accordance with the Landscape Institute/Institute of Environmental Management and Assessment guidelines. The likely effects of the proposed development on the landscape resource and visual amenity will be assessed through a number of representative viewpoints (as recorded within the map below) which are consistent with the locations that informed previous consents[12].

The potential for cumulative effects derived from the introduction of the proposed development into a baseline that accommodates other similar consented proposals or developments will be considered.

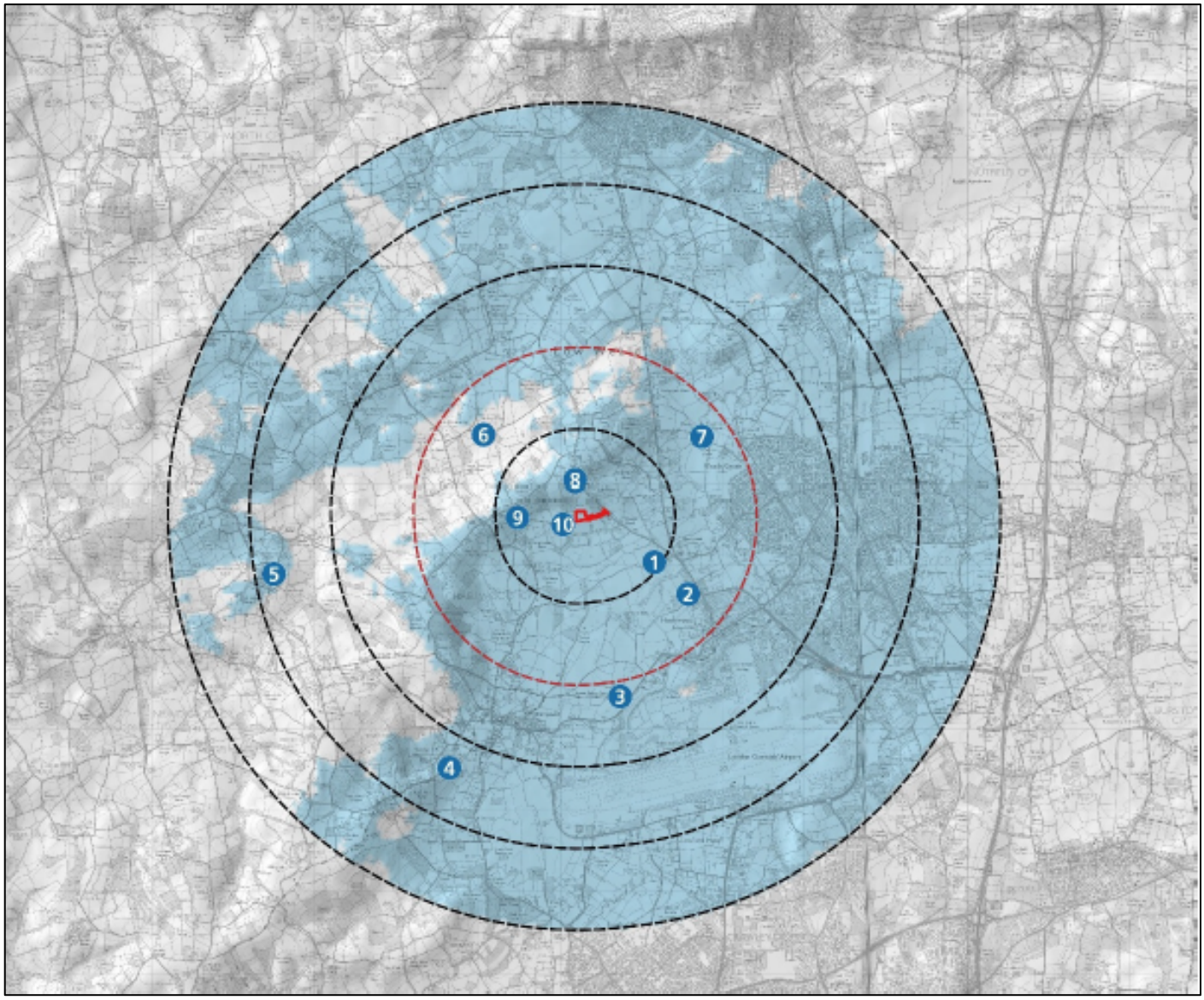
Baseline Environment

Landscape Resource

The Site lies near the foot of a low ridge to the north of Hookwood and west of Meath Green. The Site is flat and enclosed by an earth bund to the north which is a consequence of its previous exploration use. The immediate surroundings comprise gently sloping land that steepens to the north and levels to the south. Access is gained through the woodland to the west making use of an existing track.

The wider area is within the Dorking to Hookwood Low Weald Farmland Landscape Character Area (LCA). It is a low-lying and gently undulating landscape that has an irregular pattern of medium, occasionally large-scale arable fields with smaller pastoral fields located along watercourses, paddocks and smallholdings.

[12] SCC planning permission RE16/02556/CON - see footnote 2.



Proposed Viewpoint Locations Plan: all within a 5km radius of the proposed development site with a focus on viewpoints within 2km (red dashed line).

Visual Amenity

The published character assessment records a landscape in which inter-visibility is restricted. Visual receptors include local users of the public rights of way, the local road network (vehicular and pedestrian) and residents. In addition, views from the Surrey Cycleway will be assessed.

Potential Impacts & Effects

The duration of drilling activity (phase 2) followed by the placement of production facilities for 20 years (phase 3) has the potential to significantly change the landscape and visual baseline giving rise to an adverse effect upon valued landscapes and the visual amenity of the area.

Mitigation Measures & Residual Effects

Embedded mitigation will inform scheme design. The assessment will identify the main views of the Site within its landscape character setting and where further meaningful mitigation measures could be committed. The assessment will then report the residual effects following mitigation.

4.2 Lighting

The Proposed Development will require artificial lighting for site safety (pedestrian and vehicular) and security. The sensitive receptors are human (primarily residential), ecological, the landscape (designations being the Surrey Hills

Area of Outstanding Natural Beauty (AONB) approximately 5.2km to the west and the High Weald AONB approximately 8.6km to the south east) and astrological. The potential effects are:

- Light spill - light beyond the boundary or the area intended to be lit;
- Glare - the degree of discomfort derived from a light source when viewed against a darker background; and
- Sky-glow – the effect of artificial lighting on the natural night sky-glow derived from upward or reflected lighting.

Due to the separation distances, intervening landform, buildings and vegetation it is proposed that light spill and glare affecting the Surrey Hills and High Weald AONB and any astrological receptors are scoped out. Glare and sky-glow are not included within the assessment of ecological receptors as such parameters are not material.

Assessment Criteria & Methodology

The potential impacts of the proposed developments artificial lighting will be informed by the following:

- review of pertinent legislation, policy and guidance;
- review of the Site and surrounding assessment area using aerial photography and OS mapping;
- undertaking of a baseline light survey and a characterisation of the prevailing baseline conditions;
- setting out pre-mitigation potential obtrusive lighting impacts for all phases by qualitative means;
- specification of outline mitigation measures;
- assessing the post-mitigation residual lighting effects by qualitative means and professional judgment;
- undertaking detailed 3D modelling of an outline scheme of lighting across all phases; and
- assessing the residual obtrusive lighting effects by quantitative means.

Baseline Assessment

A lighting environmental report that assessed the effects during the exploration, appraisal and testing of hydrocarbons[13] included:

- Baseline Assessment: of prevailing lighting conditions from ten viewpoints with daytime and night-time photography from the Site and distant sky views; the lighting conditions were described and any significant discrete sources of artificial lighting identified; and
- Baseline Survey: establishing the levels of horizontal and vertical illumination (lux) at each of the viewpoints together with the Environmental Zone (consistent with The Institute of Lighting Professionals (ILP) Guidance Notes for the Reduction of Obtrusive Light) for the Site surroundings based on quantitative and qualitative assessment. ILP Environmental Zone E2 was adopted for the assessment.

The baseline survey will be repeated to re-establish the ILP Environmental Zone at 2018. Daytime photography will be undertaken from the Site and the immediate study area using HDR imaging techniques that allow for an improved reproduction of shadows and highlights when compared against standard imagery. In addition, a baseline light survey will be undertaken. Vertical illuminance (E v - lux) measurements will be made using a suitable UKAS calibrated illuminance meter capable of accurately measuring low light levels down to 0.01 lux.

Production Phase Assessment

A lighting model will be based on a reasonable worst-case scenario. Mitigation measures are inherent in good lighting design and therefore, a pre-mitigation lighting model is not necessary. The assessment approach will present the potential impacts by qualitative means prior to mitigation and then the presentation of residual effects by quantitative means based on the lighting model outputs.

[13] SCC planning permission RE16/02556/CON - see footnote 2.

Non-production Phases Assessment

The day time activity of well site modifications and construction within phase 1 and the restoration work of phase 5 means no light modelling is necessary. Due to the modelling of a similar height rig for the drilling phase 2, no light modelling is necessary for decommissioning phase 4. All non-production phases will be assessed on a qualitative basis.

Criteria (Human)

In the absence of statutory guidance, ILP Guidance Notes for the Reduction of Obtrusive Light will be adopted as criteria against which to assess the effects of artificial lighting on residential receptors. The Environmental Zone (EZ) classification area with regard to suitable obtrusive lighting limits are reproduced below:

EZ Classification	Surrounding	Lighting Environment	Examples
E0	Dark	Dark	UNESCO Starlight Reserves
E1	Natural	Intrinsically Dark	National Parks, Areas of Outstanding Natural Beauty
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

For each EZ, obtrusive light limits for exterior lighting installations have been determined. The limits support decision makers in determining whether the effects of artificial lighting are acceptable. The EZ criteria are reproduced below:

Environmental Zone	Max Sky Glow[(a)] (%)	Light Trespass (into windows) E v (lux)[(b)]		Source Intensity I (kilo candelas – kcd)[(c)]	
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew
E0	0	0	0	0	0
E1	0	2	1[(d)]	2.5	0
E2	2.5	5	1	7.5	0.5
E3	5	10	2	10	1
E4	15	25	5	25	2.5

(a) Upward light ratio (ULR) of the installation – maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.
(b) Vertical illuminance measured flat at the glazing at the centre of the window.
(c) Light Intensity (cd)
(d) From public road lighting installations only.
There are no set time periods for lighting curfews; however, 23:00 is often used as adopted criteria (Ecological)

Criteria (Ecological)

There are currently no definitive guidelines setting out absolute light pollution limits for ecological receptors. However, research has been undertaken and potentially suitable light spill level limits exist. For the purpose of this study, commonly adopted ecological lighting assessment criteria will be adopted unless specific criteria are requested.

Potential Impacts & Effects

An initial assessment finds that significant effects upon human receptors are likely in the absence of mitigation. The effects derive from light spill, glare and sky-glow. In addition, significant effects upon ecology receptors are likely derived from light spill in the absence of mitigation. No significant effects are anticipated for the AONB's or astrological receptors. The impact assessment will address the effects upon human and ecological receptors only.

Mitigation Measures & Residual Effects

Mitigation will inform scheme design. The use of angled and variable intensity lighting will be considered and a lighting management plan designed to minimise effects while remaining consistent with other regulations. The assessment will then report the residual effects following mitigation.

4.3 Noise

Each phase of development has the potential to generate noise effects upon nearby sensitive receptors and will therefore be assessed. Residents along with natural and built heritage receptors will be considered and assessed in

accordance with the relevant guidance. The assessment will be based on background noise measurements undertaken at positions representative of the nearest noise sensitive properties to the well site. The background sound levels measured at these properties will be used to develop noise limits in line with National Planning Practice Guidance (NPPG) and any other relevant standards or guidance.

Assessment Criteria & Methodology

The assessment will be informed by the requirement in the Noise Policy Statement for England (NPSE), DEFRA, March 2010. It will identify thresholds of "significant adverse effect" and "adverse effect". These are SOAEL and LOAEL respectively (Significant Observable Adverse Effect Level and Lowest Observable Adverse Effect Level).

The well site modification and construction works will be temporary activities which will be assessed according to *BS 5228-1:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.*

The production phase comprises longer term activities (inclusive of intermittent flaring, periodic well maintenance and possible side-track drilling), which will be assessed in accordance with NPPG Minerals guidance. This establishes that during daytime and evening periods, noise from normal operations should not be more than 10dB above the background noise level, $L_{A90,1hr}$, and should not exceed $L_{A90,1hr}$ 55dB. During the night time period operational noise should not exceed $L_{A90,1hr}$ 42dB at a noise sensitive property.

Given the longer-term duration of production in this case (up to 20 years) the noise assessment will be informed by BS 4142:2014 methods for rating and assessing industrial and commercial sound and also the Guidelines for Community Noise (World Health Organization (WHO), 1999) and Night Noise Guidelines for Europe (WHO, 2009).

Any noise impacts resulting from decommissioning and well site restoration will be similar to the phase 1 well site modification and construction works and the phase 3 production works. Therefore, an additional assessment of these activities has been *'scoped out'* of this assessment.

During each phase, a number of vehicles will access the Site during the hours of operation, primarily associated with personnel attending Site for work and the delivery of materials/equipment. Road traffic noise calculations will be carried out in accordance with the procedures set out in *Calculation of Road Traffic Noise* and *Design Manual for Roads and Bridges*. Consideration will also be given to road traffic noise from the access road, as appropriate.

To assess the significance of effect, sensitive receptors will be identified and a quantitative prediction provided for each of the identified impacts. Predictions will be based on measured or specified plant and equipment noise levels, associated with operations. Threshold limits will be established based on the relevant standards and guidelines and an assessment made as to whether such thresholds will be breached. Proposals for mitigation measures will be outlined, should they be required to avoid breaching the thresholds.

A predictive noise model will be prepared by a specialist noise consultant, using octave band noise data for the proposed drilling and normal operational activities. This will predict noise levels at the nearest sensitive receptors.

Noise levels will also be predicted to the nearest ecological designations and issued to the ecologist for assessment. An initial search has indicated that the nearest designations are:

- International Designations: Mole Gap to Reigate Escarpment Special Area of Conservation located approximately 8km to the north;
- National Designation: Glovers Wood Site of Special Scientific Interest approximately 2.8km to the south west;
- Local Designation: Edolph's Copse Local Nature Reserve approximately 1.5km to the south west

At these distances, it is sufficient to carry out hand calculations to establish the predicted noise levels. Any other locations material to the ecological impact assessment will be addressed. An assessment of noise to nearby heritage and recreational assets will be carried out where these receptors are identified.

Baseline Assessment

The nearest noise sensitive properties to the Site were identified in the noise assessment report which accompanied the planning application for the exploration, appraisal and testing of hydrocarbons in 2016[14]. They were as follows:

Reference	Location	OS Grid Reference	Distance from Site (m)
R1	**High Trees Court**	525315 E, 143929 N	321
R2	**Wrays Farmhouse**	525627 E, 143612 N	368
R3	**Five Acres**	525657 E, 143509 N	411
R4	**The Bungalow**	525681 E, 143552 N	426
R5	**Phoenix Lodge**	524828 E, 143953 N	549
R6	**Brittleware Farm**	524558 E, 143269 N	781
R7	**Rushmead Cottages**	525572 E, 143280 N	457
R8	**Rowgardenswood**	524666 E, 143804 N	623

These receptors will be used as the basis for the assessment of the proposed development. A baseline noise survey was acquired over the period 16th and 17th August 2016, at three locations representative of the surrounding noise sensitive receptors covering a single daytime and night time period. The noise monitoring locations used were as follows:

Reference	Location	OS grid reference	Distance from Site (m)
N1	**Main measurement location, Horse Hill**	525564, 143620	305
N2	**High Trees Court, Horse Hill**	525287, 143968	368
N3	**Phoenix Lodge, Collendean Lane**	524789, 143989	602
	Wellhead on Application Site	525259, 143613	-

The results of the 2016 baseline survey will be augmented by an additional two days (daytime and night time periods) of attended noise monitoring carried out at the same monitoring locations to provide a total of three days of baseline data. This will provide a robust data set from which to establish the baseline condition. In addition, baseline monitoring will be carried out at an additional location representative of receptor R6 (Brittleware Farm) to better establish the acoustic environment to the south west of the well site.

Potential Impacts & Effects

The activities likely to cause significant noise effects upon residential receptors are the well site modification and construction works (phase 1) given that the well site is to be extended to accommodate an oil processing and storage facility placing construction and operational activity closer to receptors east of the well site. In addition, drilling (phase 2) and the well management component of phase 3 could give rise to significant noise effects. No significant noise effects are anticipated for:

- the production component of phase 3: given the benign nature of the activity; and
- decommissioning (phase 4) and restoration (phase 5) given the shorter duration of these phases and noise generating activities they include.

Mitigation Measures & Residual Effects

Mitigation will inform scheme design. The mitigation successfully deployed during the exploration, appraisal and testing (i.e. an agreed schedule of operating hours, a noise management plan and the use of silencers) will be considered again amongst other measures. The assessment will then report the residual effects following mitigation.

4.4 Ground & Groundwater Protection

The proposed development has the potential to affect surface water and groundwater systems. Therefore, an assessment based upon a review of published information sources and data held by HHDL will be undertaken.

[14] SCC planning permission RE16/02556/CON. Noise assessment report prepared by ACIA Engineering Acoustics, Oct 2016), see footnote 2.

Assessment Criteria & Methodology

A hydrogeological risk assessment (HRA) will be conducted in accordance with the Environment Agency's technical guidance and the risk assessment methodology set out by DEFRA, together with proposals to mitigate hydrogeological risk. In both cases, the HRA will be a quantitative (Tier 1) assessment and will include:

- A review of the baseline hydrology, geology and hydrogeology;
- Identification of surface water and groundwater features close to the Site, together with Groundwater Dependent Terrestrial Ecosystems (GWDTE) and with field verification of relevant features;
- A conceptual hydrogeological model;
- A description of the development plan and proposals for how water will be managed during all phases of the development;
- A hazard assessment based on an analysis of Source-Pathway-Receptor linkages; and
- Where necessary, a description of the mitigation and monitoring measures that will be incorporated into the development to ensure that risks are reduced to acceptable levels.

A Flood Risk Assessment (FRA) will be prepared in accordance with the NPPF. The FRA will include:

- A review of baseline hydrology focussing on surface water catchments, water features, artificial infrastructure and runoff routes;
- Calculation of greenfield runoff rates;
- Details of the discharge of water from the Site during the different phases of the development, supported by necessary calculations and indicative drainage details; and
- An assessment of flood risk as a result of the development and mitigation measures that may be needed to reduce the risk of flooding on and/or off the Site.

The assessments will be prepared taking account of (but not necessarily limited to) the following legislation, regulations, policies and guidance:

- Water Framework Directive;
- Groundwater Directive;
- Water Resources Act 1991 (as amended) and associated regulations;
- Flood and Water Management Act 2010;
- Water Act 2014;
- Environmental Permitting Regulations;
- DEFRA Guidelines for Environmental Risk Assessment and Management: Green Leaves III;
- DEFRA Flood Risk Assessment Guidance for New Developments;
- Environment Agency River Basin Management Plans;
- Environment Agency technical guidance for groundwater and surface water risk assessment;
- National Planning Policy Framework; and
- UKOOG and other industry guidelines.

Baseline Environment

The baseline hydrology, geology and hydrogeology of the Site can be summarised as follows:

- The existing well site covers an area approximately 2.08 hectares in size within land that slopes to the south towards Spencer's Gill, which confluences with the River Mole approximately 1.5km to the east of the Site;
- Within Flood Zone 1 (less than 1:1000 annual probability of flooding from fluvial and tidal flooding);
- Not within a groundwater Source Protection Zone, a ground/surface water Drinking Water Safeguard Zone;
- Not within or sufficiently close to statutory natural heritage designated to give rise to any significant effects;
- The bedrock geology comprises approximately 600m of the Cretaceous Wealden Group and Purbeck Group overlying Jurassic strata to a depth of approximately 2500m. There are no superficial deposits present above the bedrock geology; and

- The top 150m of bedrock comprises the argillaceous Weald Clay Formation which has limited groundwater potential and essentially acts as Unproductive strata. Groundwater may be encountered in water bearing formations beneath the Weald Clay but is likely to be poor quality and of limited or no resource value.

Potential Effects

The Proposed Development includes the use of drilling muds, cement and well development fluids. The wells will produce oil (to be exported off-site) and water (which may contain low levels of Naturally Occurring Radioactive Materials and is to be re-injected through a dedicated injection well for pressure support). Variable quantities of hydrocarbon gases are likely to be recovered during production activities. The proposed drilling, injection and production activities, together with the handling and storage of associated materials at surface have the potential to give rise to significant effects on the groundwater and surface water environment in the absence of mitigation.

Mitigation Measures & Residual Effects

Mitigation will inform scheme design to address effects where a need to do so is identified as a result of the initial appraisal. The mitigation successfully deployed during the exploration, appraisal and testing of hydrocarbons (i.e. an agreed drainage management plan and the use of construction method working statements) will be considered again amongst other measures. The assessment will also report the residual effects following mitigation.

5. ENVIRONMENTAL TOPICS SCOPED OUT

Summary Table: Environmental Topics *'Scoped out'*	
Part 5.1	Air Quality, Climate & Climate Change
Part 5.2	Ecology, Nature Conservation, Biodiversity & Arboriculture
Part 5.3	Transport, Traffic & Access
Part 5.4	Socio-economics
Part 5.5	Vibration
Part 5.6	Cultural Heritage & Archaeology
Part 5.7	Agricultural Land & Soils
Part 5.8	Waste
Part 5.9	Population & Human Health
Part 5.10	Residential & Recreational Amenity
Part 5.11	Risk of Major Accident &/or Disaster

For each topic scoped out of the ES, further information on the assessments to be performed and the details to be submitted as part of the planning application are set out below.

5.1 Air Quality, Climate & Climate Change

The proposed development will give rise to releases of pollutants to atmosphere during the five phases of the project. The combustion of natural gas (within gas engines for electricity generation) and flaring (when disposal of excess gas is required) will be the primary sources. However, the use of fuelled mobile and non-mobile equipment will also produce emissions to atmosphere. Therefore, the following pollutants will be assessed:

- Nitrogen oxides (nitrogen monoxide (NO) and nitrogen dioxide (NO_2));
- Carbon monoxide (CO);
- Sulphur dioxide (SO_2);
- Volatile organic compounds (VOCs); and
- Particulate matter (PM10) where diesel fuel is employed.

Experience from similar assessments suggests that nitrogen dioxide will be the predominant pollutant of concern with regard to ambient air quality and the achievement of ambient air directive limit compliance.

Construction activity has the potential to give rise to releases of dust. An assessment of the risk of dust impact will be undertaken using the methodology published by the Institute of Air Quality Management (IAQM) in *'Guidance on the assessment of dust from demolition and construction'*. Where required recommendations for mitigation measures to minimise dust impact during these activities will be identified.

There is the potential for releases of odour, both from combustion activities and from fugitive releases of natural gas by leakage or emergency venting. The effects of fugitive releases will be addressed within the air quality assessment of releases to atmosphere. There could, however, be the potential for a loss of amenity due to the odorous nature of some releases. An odour risk assessment will be undertaken using the methodology published by IAQM in *'Guidance on the assessment of odour for planning'*. The assessment will also use ADMS 5 to model the dispersion of odour releases to predict the likely process contribution to ambient odour concentrations at sensitive receptors and to determine significance based on assessment criteria published by the Environment Agency.

The gas-to-power engine will be subject to the emission limit values within the Medium Combustion Plant Directive (MCPD). Road vehicles and non-road mobile machinery will be subject to the applicable emission limit values within the relevant European Union Directives. For the purposes of the air quality assessment releases will be assumed to be at the applicable emission limit value. Emission limit values are not currently available for natural gas flaring. Flare emissions will therefore be estimated using the widely accepted emission factors published by the United States Environmental Protection Agency[15].

Change in road traffic on local access roads will have a corresponding impact on local air quality. Changes will be assessed initially for significance using the Highways England Design Manual for Roads and Bridges. If the changes exceed the threshold criteria a detailed assessment of road traffic emissions will be undertaken using the ADMS-ROADS model. The assessment will include verification of the model using baseline data and air quality monitoring.

The release and dispersion of pollutants from the sources identified will be modelled using ADMS 5 system which is approved by the Environment Agency and UK Local Authorities for air quality assessments. Releases will be considered alongside plant specific factors, local topography and meteorological conditions to determine pollutant dispersion and subsequent ambient impact. Topographical data will be obtained from the Ordnance Survey. The modelling will consider five years (2012 - 2016) of meteorological data from the Charlwood station as recommended and supplied by the Met Office.

Modelling will predict the process contributions of selected pollutants over the immediate area surrounding the Site and at sensitive receptors (neighbouring residential locations and nature conservation areas). The results will be presented as contour plots of process pollutant concentrations over the local area and as specific ambient concentrations at the sensitive receptors. The significance of the predicted process contributions (in terms of the effect on human health and ecological) will be assessed using methodology and criteria published by the Environment Agency.

The Site is not within an Air Quality Management Area (AQMA). The nearest AQMA for nitrogen dioxide is approximately 2km to the south east of the well site at Horley (Horley AQMA No. 3). This is not expected to be within the area of influence of well site releases. While Reigate and Banstead Borough Council undertakes both automatic and non-automatic ambient monitoring there are no current measurement sites within 2km of the Site.

For the purposes of the air quality assessment background ambient concentrations available from the DEFRA air quality archive will be employed. Values currently available (2015) indicate relatively low concentrations of all relevant pollutants within 1km of the Site. The maximum annual mean background concentration of nitrogen dioxide is equivalent to around 46% of the ambient air directive limit. In view of the low background concentrations of all pollutants of interest it is not proposed to undertake any baseline air quality monitoring.

The Site (as extended) would be approximately 225m from the nearest residential location in an area of dispersed individual farmsteads and dwellings. The nearest medium density housing is approximately 2km from the Site. The nearest sensitive nature conservation site is approximately 1.5 km from the Site (Edolph's Copse Local Nature Reserve). It is not expected that air quality at either the nearest residential location or nature conservation site will

[15] United States Environmental Protection Agency - Compilation of Air Pollutant Emission Factors (AP-42).

experience a significant impact from Site operations. This finding is consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[16].

Given the activities to be undertaken and the separation distance achieved to the nearest sensitive receptors the effects of the proposed development are not significant. The air emissions and climate change effects of the proposed development are a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.2 Ecology, Nature Conservation, Biodiversity & Arboriculture

The most recent Phase 1 Habitat survey of the Site was completed in April of 2016[17] with the well site is situ. It identified potential ecological constraints in accordance with standard methodology[18]. This was followed by a suite of protected species surveys[19] performed as part of an ecological impact assessment[20] which failed to identify any significant effects on statutory/non-statutory nature conservation designations, habitats or protected species. No objections to the initial construction of the well site were received from Natural England.

The Phase 1 habitat survey and the protected species surveys will be retained as part of the baseline given that they were undertaken in 2016 (and 2017 for great crested newts). The habitats within and adjacent to the Site and the location of protected species is well known and sufficient data is available to support an updated ecological impact assessment. Reasonable avoidance and mitigation measures have been adopted during construction without the need for a Natural England licence. The mitigation embedded within the Site design for great crested newts, badgers, reptiles and breeding birds will be applicable to the proposed development.

An ecological impact assessment will be performed in accordance current guidelines[21] to identify pathways for impacts on ecological features and to assess the significance of effects resulting from such impacts.

The proposed development allows for production up to 20 years in contrast to the previous assessments of exploration, appraisal and testing of up to 3 years. The following potential sources of impact will therefore be scoped into the ecological impact assessment having regard to the longer duration of works now being proposed:

- Changes in air quality (dust deposition and emissions arising from the flaring of gas on the well site);
- Noise impacts during mobilisation of drilling equipment, well drilling, well testing, production and vehicle movements;
- Changes in surface water quality; and
- Changes in hydrology and hydrogeology (surface and groundwater).

Consultations will be undertaken with the SCC and Natural England. Desk study data will be obtained from the following sources:

- The Multi-Agency Geographical Information for the Countryside (MAGIC) database for statutory designated sites and ancient woodland sites within 2km of the well site[22]; and
- Surrey Biological Information Centre (care of Surrey Wildlife Trust) for non-statutory designated sites and protected species records within 1km of the well site.

As the Site is an existing constructed well site it is reasonable to expect that it will not support any protected species. Extending the well site to the east to accommodate an oil processing and storage facility would involve the

[16] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-1.5 (page 14) and E-2.8 (page 16).
[17] Ashgrove Ecology Ltd - Horse Hill Preliminary Ecological Appraisal (October 2016).
[18] Joint Nature Conservation Committee, Handbook for Phase 1 habitat survey - a technique for environmental audit (2010)
[19] Ashgrove Ecology Ltd - Protected Species Survey Report (October 2016).
[20] SCC planning permission RE16/02556/CON recorded at footnote 2.
[21] Chartered Institute of Ecology and Environmental Management, Guidelines for Ecological Impact Assessment in the UK & Ireland (January 2016).
[22] The Search area to be extended as necessary for consideration of potential air quality and hydrological effects.

development of land with no habitat value. Accordingly, no additional species survey work is proposed and the rationale in support of this approach is attached at **Appendix D.**

In view of the construction and operational activities to be undertaken, the existence of an established well site and the distance to the nearest sensitive receptors the potential effects of the proposed development are not significant. This finding is consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[23]. However, the impacts upon ecology, nature conservation, biodiversity and arboriculture are material planning considerations and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.3 Traffic, Transport & Access

During well site modification and construction works (phase 1) the flow of Heavy Goods Vehicles (HGV's) generated by each sub-phase in isolation would not be significant. There would be a 5-week period where the combined HGV flows of phase 1.A & 1.B and 1.B & 1.C would be between 19 and 22 movement per day. With appropriate traffic management to stagger these flows the effects would not be significant.

During well management activity (phase 2 and phase 3) HGV movements of up to 28 & 29 per day would be experienced during rig mobilisation and demobilisation respectively but these periods are limited to 2 and 3 days in duration and with appropriate traffic management to stagger these flows the effects would not be significant. Staggering the flows would mitigate any significant cumulative effects when phase 2 flows are considered in combination with phase 3 flows generated by the installation of the production equipment. Overall, the magnitude of changes proposed will be reduced by the temporary nature of the impacts and further diluted as a result of:

- Embedded mitigation: on-site holding bays to ensure delivery vehicles do back-up into the public highway (a system successfully deployed during the appraisal and testing of hydrocarbons previously consented); and
- Committed mitigation: active traffic management measures deployed during the life of the construction works (e.g. timed exit and entry to be managed by way of a Large Vehicle Communication Strategy, traffic routing, construction vehicle highway signage and highway cleaning regime).

During production (phase 3) the Site becomes fully operational and produced oil will be exported by way of 16 tanker collects per day for a period up to 20 years. This amounts to an average of 1 tanker collection every 45mins within standard operating hours; a flow rate which is not significant.

The effect of mitigation is predicable, tried and tested and can be relied upon to reduce the potential for adverse effects to non-significant levels. This finding is consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[24].

A Transport Statement will accompany any future planning application and record the traffic movements during the phases of the proposed development and assess the effects of this activity on the local road network. The landscape and visual assessment, ecology, noise and air emission assessment will include consideration of effects resulting from the anticipated traffic movements.

5.4 Socio-economics

At a national level, the benefit derived from indigenous hydrocarbon development is considerable. It provides the raw material for many productive sectors and the UK as a whole derives benefit from the security and certainty of the energy it supplies. At the local level hydrocarbon development will generate employment in related trades, benefit the local economy through the procurement of services and supplies and support agricultural diversification. The potential for adverse effects on local tourism and other sectors is low given the remoteness of the well site and

[23] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-2.6 & 2.7 (page 16).
[24] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-1.5 (page 14) and E-2.8 (page 16).

it's effective screening from the majority of public vantage points. Overall, at a local level the effect of hydrocarbon development is likely to be beneficial but not significant.

It is anticipated that the production phase will not give rise to any effects materially different from those previously considered. The socio-economic effects of the proposed development are a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.5 Vibration

Vibration has the potential to adversely affect structures and disturb ecology. However, due to the large separation distance between the nearest sensitive receptors and the well site, effects are not likely to be significant.

Vibration will be assessed in accordance with *BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*. The site modification works (phase 1) may include the installation of pile foundations to create internal retaining walls. Vibration effects emanating from piling and other activities are likely to be contained within the compound and within surface layers enabling rapid dissipation. During drilling operations (phase 2), vibration derived from ancillary equipment, such as the shakers used to process returned drilling fluids, will be contained to the surface of the operational machinery and very unlikely to be detected beyond the Site boundary. Vibration arising from a drill bit as it travels through the sub-surface geology can occasionally be detected on the drill floor because of direct transmission up the drill string (steel pipe). However, none of this vibration passes through the ground and vibration during rig operations is very unlikely to be detected beyond the Site boundary.

The effects of vibration are not likely to be significant, a finding consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[25]. Vibration is a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.6 Cultural Heritage & Archaeology

There are listed buildings located near to the Site. The effect of hydrocarbon exploration, appraisal and testing upon the setting of these assets was found to be acceptable[26]. The National Monuments Record establishes that there are no monuments within 500m of the Site. The National Heritage List for England establishes there are no world heritage sites, scheduled ancient monuments, registered parks or gardens or battlefields near to the Site which means that the proposed development is unlikely to compromise the significance these assets derive from their setting. Given that the Site size will not material change there are no new impacts or effects anticipated upon buried archaeology, other non-designated heritage assets or the surrounding historic landscape character.

The effects upon archaeological features and cultural heritage assets are not likely to be significant, a finding consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[27]. Built heritage is a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.7 Agricultural Land & Soils

The Site size will increase from 2.08 hectares to approximately 2.6 hectares giving rise to an additional loss of half of one hectare of agricultural land. The loss is not significant and it will not materially affect the agricultural resources of the wider area.

[25] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-1.5 (page 14) and E-2.8 (page 16).
[26] SCC Planning & Regulatory Committee Report dated 18th October 2017 – ITEM 9: Minerals/Waste RE16/02556/CON – MO/2016/1813/SCC, page 245/6 para 389, Conclusions on Archaeology.
[27] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-1.4 (page 14).

5.8 Waste

Well site modification and construction works (phase 1) and drilling (phase 2) will generate waste but the effects of this activity and their subsequent treatment processes will not be significant. As demonstrated during the exploration, appraisal and testing of hydrocarbons, the adverse effects of well construction activity can be mitigated to acceptable levels through the adoption of considerate construction management plans and method working statements.

Drilling will generate produced drilling muds and rock cuttings of such low volumes that they can be temporarily contained on-site prior to removal and off-site processing. Produced water will be re-injected from whence it came via the re-injection well for pressure support.

The waste effects are not likely to be significant, a finding consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[28]. Waste is a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.9 Population & Human Health

Well site modification and construction works (phase 1) and drilling (phase 2) engage construction activity and engineering processes that could potentially impact upon human health (primarily that of on-site workers). However, as demonstrated during the exploration, appraisal and testing of hydrocarbons such effects are not significant and can be managed and mitigated to acceptable levels.

Phase 2 and 3 will give rise to new impacts derived from the recovery, temporary storage and transportation of hydrocarbons via tankers. However, these activities will be consistent with relevant health and safety protocols, Environment Agency permits and Highway regulations to ensure the health of on-site operatives and the wider general population is not materially compromised. Decision takers can assume that these non-planning regimes will operate effectively[29] to address the impacts and effects of oil production.

Accordingly, human health effects are not likely to be significant, a finding consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[30]. Tried and tested mitigation measures, considerate on-site construction techniques and the governance derived from non-planning regimes address the impacts of hydrocarbon production.

5.10 Residential & Recreational Amenity

Amenity could be compromised by noise, odour, vibration, light-spill or glare. In addition, the outlook from a dwelling, private garden or cherished viewpoint could be adversely impacted by operational development. Given the relative remoteness of sensitive receptors, the limited number of viewpoints which overlook the Site and the temporary nature of construction and drilling activity the effects are not likely to be significant. However, amenity is a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

5.11 Risk of Major Accident &/or Disaster

Risk derived from issues such as sub-surface instability, surface contamination or unplanned operations is not significant, a finding consistent with the Screening Opinion Report adopted by SCC 6th December 2016 in response to hydrocarbon exploration, appraisal and testing[31]. The Site has been the subject of hydrocarbon exploration, appraisal and testing which involved deep drilling and the limited recovery of resource at surface with no unplanned effects or events that varied materially from those predicted. At all stages of the development, independent over-

[28] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-2.10 (page 17).
[29] National Planning Policy Framework (July 2018), para 183 page 53 and National Planning Practice Guidance: Minerals - What is the relationship between planning and other regulatory regimes? Paragraph: 012 Reference ID: 27-012-20140306.
[30] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-2.9 (page 17).
[31] SCC Environmental Impact Assessment Screening Opinion Report adopted 6th December 2016 assessment at E-1.6 (page 17).

sight ensured compliance with the regulatory regimes in place to secure site safety and environmental protection. In taking the Site forward to the production phase, the same environmental management systems and non-planning regimes will be in place to ensure that risks are managed to acceptable levels.

5.12 Airport Safeguarding

In advance of hydrocarbon exploration, appraisal and testing Gatwick Airport Safeguarding were consulted and found the placement of a rig up to 37m in height to be acceptable subject to a condition to secure an aviation warning light. In addition, the British Standard Code of Practice for the Safe Use of Cranes, was engaged calling upon crane operators to consult the Gatwick Airport before the commencement of activity.

On the basis that the proposed development intends to utilise the same drilling rig complete with the same aviation warning light and that the operation of cranes on site will be consistent with the British Standard Code, significant effects are not anticipated.

6. Assessment of Cumulative Effects

The Screening Opinion adopted by SCC on the 6th December 2016 in response to the exploration, appraisal and testing of hydrocarbons identified the proposed development to be located 0.16km to the north of the Lomond Equestrian Centre. The centre has been granted planning permission for the importation of 44,000 tonnes of inert soils for land improvement purposes. The report found that, subject to the timing of the two developments, there could be scope for cumulative effects in terms of HGV traffic on the local road network. The development at the equestrian centre is expected to generate up to 60 HGV movements/day (Monday to Friday) for a period of twelve months.

A Transport Statement[32], dated April 2017, submitted as part of the proposal for hydrocarbon exploration, appraisal and testing considered the effects of the proposed development added to a baseline environment including the activity at the Lomond Equestrian Centre. It found the impacts of the proposed development to be non-significant. Any assessment accompanying a planning application for hydrocarbon production will consider a-fresh the potential for significant cumulative effects resulting from consented proposals and committed developments as at 2018.

7. Environmental Statement Structure

The ES will comprise three volumes as set out in the table below together with a Non-Technical Summary.

Environmental Statement: Chapters		
ES Volume 1: Main Text		
Chapter	**Title**	**Description**
1	**Introduction**	
2	**EIA Assessment Methodology**	Consistent with the 2017 EIA Reg 18(3)(b).
3	**Site & Surroundings**	Consistent with the 2017 EIA Reg 18(3)(a).
4	**Proposal Description**	Consistent with the 2017 EIA Reg 18(3)(a).
5	**Siting, Design Evolution & Alternatives**	Consistent with the 2017 EIA Reg 18(3)(d).
6	**Landscape &Visual**	Consistent with the 2017 EIA Reg 18(3)(b-c & f) and information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.
7	**Lighting**	
8	**Noise**	
9	**Ground & Groundwater Protection**	
10	**Summary of Mitigation Measures & Residual Environmental Impacts**	Consistent with the 2017 EIA Reg 18(3)(c).
ES Volume 2: Figures, Plans, Photography & Plans		
ES Volume 3: Technical Appendices, Data & Supporting Documents		
Non-Technical Summary		Consistent with the 2017 EIA Reg 18(3)(e).

ES Chapter 2: EIA Assessment Methodology, will reconcile the ES to the scoping opinion. The ES when read as a whole will include information reasonably required for reaching reasoned conclusions on the significant effects of

[32] SCP Transport Statement – Horse Hill (Addendum), April 2017 (Doc ref: SRE/16286/TSA/5), Chapter 5: Cumulative Traffic Impact.

development. It will pay proper regard to the results of any relevant UK environmental assessment consistent with EIA Reg 18(4).

The ES assessments will use topic-specific criteria to determine the magnitude of the change introduced, the sensitivity of the receptors in each case and the significance of the effect. This will be explained in the relevant chapters. Each ES chapter will follow the headings set out below in the interests of consistency:

Environmental Statement: Chapter Content	
Introduction	A summary of what is being considered within the ES chapter.
Policy Context	A summary of European, national, regional, local and neighbourhood plan policies and legislation relevant to the ES and the environmental topics considered.
Assessment Methodology	An explanation of the methods used to undertake the technical studies with reference to legislation, published standards, guidelines, best practice and any relevant significance criteria.
Baseline Conditions	A description of the environmental conditions against which the likely significant environmental effects of the proposed development have been assessed.
Likely Significant Effects	Identification of the likely significant effects on the environment resulting from the phases of development.
Mitigation Measures & Enhancement Opportunities	Adverse effects will be addressed by mitigation where practicable and appropriate to do so. Measures may include design or operational change or (where change is not possible or practicable) compensation. Mitigation may be *'embedded'* within the site design or *'committed'* for implementation/adoption prior to the commencement of development or operations. The extent of the mitigation measures proposed and how they will be managed and monitored to maintain effectiveness will be discussed along with opportunity for enhancement measures where appropriate.
Residual Effects	A summary of the effects of the proposed development assuming implementation of proposed mitigation and enhancement opportunities. The residual effects represent the overall likely significant effect of the development on the environment having taken account of practicable/available mitigation measures.
Cumulative Effects	Identification of the likely cumulative effects to arise as a result of the introduction of the proposed development within a landscape that already carries other committed development (built, under construction or consented and yet to be built).
Summary	A summary of the key finding.

Any future planning application will be accompanied by a Planning Statement complete with information sufficient to establish compliance between the proposed development and the over-arching planning policy framework taking account of all other material planning considerations.

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ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REQUEST REPORT	
PROPOSED DEVELOPMENT	THE DRILLING OF FOUR NEW HYDROCARBON WELLS (ADDING TO THE TWO EXISTING WELLS ON-SITE), ONE PRODUCED WATER REINJECTION WELL AND THE SUBSEQUENT INSTALLATION OF SIX SURFACE MOUNTED PUMPS (ONE PUMP PER OIL PRODUCING WELL); THE CONSTRUCTION OF A PROCESS AND STORAGE AREA AND TANKER LOADING FACILITY ON LAND TO THE EAST OF THE EXISTING WELL SITE TO ACCOMMODATE 7 OIL STORAGE TANKS (CAPACITY OF 1,300 BARRELS PER TANK), 2 FIRE WATER TANKS, 2 PRODUCED WATER TANKS, AN ENCLOSED GROUND FLARE, AN OIL HEATER WITH AN EXHAUST STACK, 4 GAS-TO-POWER ELECTRICITY GENERATORS WITHIN ACOUSTIC ENCLOSURES, OIL SEPARATORS, ABOVE GROUND PIPE AND CABLE TRACKS AND ANCILLARY DEVELOPMENT ENABLING PRODUCTION OF HYDROCARBONS FROM SIX WELLS FOR A PERIOD OF TWENTY YEARS FOLLOWED BY DECOMMISSIONING & SITE RESTORATION.
LOCATION	HORSE HILL WELL SITE, HORSE HILL, HOOKWOOD, HORLEY, SURREY, RH6 0RB
DOC REF	HHDL-HH-EIA(SR)-RO
DATE	20TH SEPTEMBER 2018

APPENDIX A: SITE LOCATION DETAILS

APPENDIX A.1: Site Location Plan (Site of Application) - Scale 1:2,500 @ A3 **–** Drawing No: ZG-HHD-HH-PROD-SR-01 R0

APPENDIX A.2: Existing Layout Plan - Scale 1:2,500 @ A3 **–** Drawing No: ZG-HHD-HH-PROD-SR-02 R0

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ENVIRONMENTAL IMPACT ASSESSMENT SCOPING REQUEST REPORT	
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APPENDIX B: SITE RETENTION MODE DETAILS

APPENDIX B.1. Site Retention Mode Layout Plan (consented as part of Surrey County Council Planning Approval RE16/02556/CON dated 1st November 2017) - Scale 1:2,500 @ A3 **–** Drawing No: ZG-HHD-HH-PROD-SR-03 R0

APPENDIX B.2. Illustrative Sections Retention Mode (consented as part of Surrey County Council Planning Approval RE16/02556/CON dated 1st November 2017) - Scale 1:500 @ A3 **–** Drawing No: ZG-HHD-HH-PROD-SR-04 R0

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APPENDIX C: PROPOSED SITE LAYOUT DETAILS

APPENDIX C.1. Proposed Layout Plan - Scale 1:500 @ A1 **–** Drawing No: ZG-HHD-HH-PROD-SR-05 RO

APPENDIX C.2. Proposed Layout Plan - Scale 1:250 @ A1 **–** Drawing No: ZG-HHD-HH-PROD-SR-06 RO

APPENDIX C.3. Proposed Process Plant & Storage Area Sections (looking North) - Scale 1:500 & 1:250 @ A1 **–** Drawing No: ZG-HHD-HH-PROD-SR-07 RO

APPENDIX C.4. Proposed Process Plant & Storage Area Sections (looking West) - Scale 1:250 @ A1 **–** Drawing No: ZG-HHD-HH-PROD-SR-08 RO

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APPENDIX D: ECOLOGICAL SURVEY PROGRAMME

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HORSE HILL WELL SITE PROPOSED ECOLOGICAL SURVEY PROGRAMME (July 2018)			
Survey	**Methodology**	**Update**	**Rationale Scope & Method**
Extended Phase 1 Habitat Survey (dated 2009).	All habitats within the proposed well site boundary and within 250 m where accessible.	✗	Proposed well site located in improved grassland habitat of limited ecological value. Mature woodland and hedgerows present in surrounding habitats.
Extended Phase 1 Habitat Survey (dated 2016).	All habitats within the well site boundary and within 250 m where accessible.		Well site located in improved grassland habitat of limited ecological value. Access track crosses area of mature woodland, with two ponds identified within 250m.
Badger (May-Aug/2016).	Inspection for setts and evidence of badger activity (footprints, hair, snuffle holes) within the well site boundary and within 250 m where accessible. Five surveys in total.	✗	No evidence of badgers within proposed well site boundary. Evidence of badger activity (latrines and hairs) in woodland to the north, but no setts identified within 100 m of well site. Mitigation already engaged includes the adoption of Reasonable Avoidance & Mitigation Measures (RAMM's) to ensure precautionary pre-construction survey to check for newly established active setts within 100m of the well site. These RAMM's will re-evaluated to ensure they are fir for purpose, added to if necessary and re-adopted as part of the new proposal.
Great crested newt (GCN) (dated Spring 2009, April-June 2016 & May-June 2017).	Spring 2009 - GCN survey prior to initial well site construction.	✗	Small population of GCN present in two ponds in woodland to the north-east of the proposed well site. It is assumed that these are Ponds 1 and 2, which have been subsequently re-surveyed (see below).
	April-June 2016 - HSI assessment of all ponds within 250 m of the well site. Six surveys to establish population size class estimate of Ponds 1, 2 and well site ditch.		Pond 1 – small GCN population Pond 2 – no GCN recorded Well site ditch – small GCN population
	May-June 2017 - Six updated surveys to establish population size class estimate of previously surveyed ponds, as well as one additional pond identified within 250m (Pond 3).		Pond 1 – no GCN recorded Pond 2 – no GCN recorded Pond 3 – medium GCN population Well site ditch – no GCN recorded Mitigation already engaged includes the adoption of RAMM's to: • deliver toolbox talks to all staff on site; • manage the installation of secure boundary fencing; • manage the works to re-align access track; • manage the removal of trees; • control the storage of materials on site; • manage the drainage of the ditch on site; • manage excavation sites; • ensure contingency plan in place should GCN be found; and, • grassland management plans. These RAMM's will re-evaluated to ensure they are fir for purpose, added to if necessary and re-adopted as part of the new proposal.
Dormouse (dated April-Aug 2016)	Five surveys using nest tubes (75 No.) of the woodland to the north of the well site.	✗	No suitable habitat for dormouse within the well site. No evidence of dormouse recorded.
Bats (dated April 2016, April-Sep 2016 & April-Sept 2017)	April 2016 - Initial appraisal of the bat roost potential of trees close to the well site.	✗	12 trees with moderate bat roost potential adjacent to access track. 2 trees with high bat roost potential adjacent to access track (with bat boxes installed as part of the mitigation strategy for a planning condition attached to the 2012 permission).

HORSE HILL WELL SITE PROPOSED ECOLOGICAL SURVEY PROGRAMME (July 2018)			
Survey	**Methodology**	**Update**	**Rationale Scope & Method**
	April-Sept 2016 - Monthly deployment of static bat detectors in 2 locations for a minimum period of 5 nights.		Recorded mainly common pipistrelle and soprano pipistrelle with other records of noctule, brown long-eared, *Myotis* species, serotine, Daubenton's and Leisler's.
	April-Sept 2017 - Seven bat activity transect surveys.		Foraging common pipistrelle, soprano pipistrelle and brown long-eared bats in woodland and grassland around the well site. Commuting noctule and *Myotis* species. Mitigation already engaged includes the adoption of RAMM's in the design of site lighting to reduce spillage onto habitats outside the well site boundary. These RAMM's will re-evaluated to ensure they are fir for purpose, added to if necessary and re-adopted as part of the new proposal.
Reptiles (dated April-Sept 2016)	Seven presence/ absence surveys using artificial refuges in grassland surrounding the well site.	✘	No suitable habitat for reptiles within the well site. Slow worm and grass snake present in grassland and scrub around the well site. Mitigation already engaged includes the adoption of RAMM's to ensure precautionary checks of vegetation for reptiles prior to any clearance and translocation of any found to a place away from the works. These RAMM's will re-evaluated to ensure they are fir for purpose, added to if necessary and re-adopted as part of the new proposal.
Breeding birds (dated Sept 2011) Habitat appraisal.	Habitat appraisal	✘	No suitable habitat for breeding birds within the well site. Hedgerows and woodland surrounding the proposed well site have the potential to support breeding birds. Mitigation already engaged includes the adoption of RAMM's to time the removal trees to avoid the nesting season together with precautionary checks of vegetation for breeding birds prior to any clearance. These RAMM's will re-evaluated to ensure they are fir for purpose, added to if necessary and re-adopted as part of the new proposal.

Report End