

Schedule 5 Notice Consolidated

Summary Sheet

Item	Status & Topic	Doc.	Issued	Closed	Item	Status & Topic	Doc.	Issued	Closed
1.	Completed	AF	Yes		50.	Fault Confirmation	HRA	No	
2.	Completed	AF	Yes		51.	Hydrogeological Model	HRA	No	
3.	Completed	CQAP	Yes		52.	Completed	SCR	No	
4.	Completed	SP	Ready		53.	Completed	SCR	No	
5.	Voided - Completed	NTS	Yes		54.	Completed	SCR	No	
6.	Voided - Completed	NTS	Yes		55.	Completed	SCR	No	
7.	Completed	NTS	Yes		56.	Revised AQIA Needed	AQIA	No	
8.	Completed	NTS	Yes		57.	Description Update	HRA	No	
9.	Completed	NTS	Yes		58.	Reinjection Construction	HRA	No	
10.	Voided - Completed	SWMP	No		59.	Confirm Sidetrack Details	HRA	No	
11.	Voided - Completed	NTS	Yes		60.	Description Update	HRA	No	
12.	Completed	NTS	Yes		61.	Description Update	HRA	No	
13.	Completed	NTS	Yes		62.	Description Update	HRA	No	
14.	Completed	NTS	Yes		63.	Description Update	HRA	No	
15.	Reinjection Treatments	SWMP	No		64.	How to confirm fracture pres.	HRA	No	
16.	Reinjection Treatments	SWMP	No		65.	Confirm procedure issue.	HRA	No	
17.	Completed	WMP	Yes		66.	Description Update	SoM	No	
18.	Completed	WMP	Yes		67.	Description Update	SoM	No	
19.	Completed	WMP	Yes		68.	Description Update	SoM	No	
20.	Reinjection Treatments	SWMP	No		69.	Seismic Lines	OGD	No	
21.	Completed	WMP	Yes		70.	Completed	OGD	No	
22.	Completed	WMP	Yes		71.	Injectivity Test	OGD	No	
23.	Completed	WMP	Yes		72.	Completed	OGD	No	
24.	Completed	WMP	Yes		73.	Completed	OGD	No	
25.	Completed	WMP	Yes		74.	Reinjection Procedure	RP	No	
26.	Completed	WMP	Yes		75.	Completed	GMP	No	
27.	Produced Water SDS	WMP	No		76.	Completed	GMP	No	
28.	Completed	WMP	Yes		77.	Completed	GMP	No	
29.	Completed	WMP	Yes		78.	VOC Scrubber	VRP	No	
30.	Completed	WMP	Yes		79.	Completed	GMP	No	
31.	Completed	WMP	Yes		80.	Completed	OMP	Yes	
32.	Completed	WMP	Yes		81.	Completed	OMP	Yes	
33.	Completed	WMP	Yes		82.	Completed	ERA	Yes	
34.	Completed	WMP	Yes		83.	Completed	ERA	Yes	
35.	Operating Technique	SWMP	No		84.	Completed	ERA	Yes	
36.	Operating Technique	SWMP	No		85.	Completed	ERA	Yes	
37.	Completed	WMP	Yes		86.	Voided - Completed	ERA	Yes	
38.	Monitoring Arrangement	SWMP	No		87.	Completed	ERA	Yes	
39.	Monitoring Arrangement	SWMP	No		88.	Voided - Completed	ERA	Yes	
40.	Completed	WMP	Yes		89.	Completed	ERA	Yes	
41.	Completed	WMP	Yes		90.	Completed	ERA	Yes	
42.	Completed	SCR	No		91.	Completed	ERA	Yes	
43.	Reinjection Procedure	RP	No		92.	Completed	ERA	Yes	
44.	Completed	SCR	No		93.	Completed	WMP	Yes	
45.	Reinjection Procedure	RP	No		94.	Completed	WMP	Yes	
46.	Surface Water Procedure	HRA	No		95.	Completed	WMP	Yes	
47.	Surface Water Procedure	HRA	No		96.	Completed	LDAR	Yes	
48.	Minor Corrections	HRA	No		97.	Discharges	SWMP	Yes	
49.	Minor Corrections	HRA	No		98.	Rainwater Treatment	SWMP	Yes	

Application Form

- Please confirm if you are applying for the Portland formation to be designated as permanently unsuitable or whether you are just providing confirmation of reinjection for production support in the Portland Formation.*

Reason

In section 1a of part 6 of the application form, the Applicant stated that permitted activity they were applying for include "Reinjection of produced water to the Portland Sandstone formation which is considered permanently unsuitable due to the presence of hydrocarbons."

The Environment Agency has not agreed that the Portland Formation at the location proposed for reinjection is permanently unsuitable, nor have we previously been approached by HHDL to make a decision about this.

Confusingly, the Applicant then state that reinjection is for production support in Appendix 1, part 12 of the form below the earlier comment. Production support is also referenced in the Non-Technical Summary in sections 6.1 and 6.3.1, and throughout the Hydrogeological Risk Assessment appended to the Site Condition Report.

Permanently unsuitable as a justification for allowing reinjection to the Portland may be unnecessary in any case, if the Applicant will be using the produced water to support production from the Portland through replacing pressure lost through extraction of hydrocarbons.

Formal Response: Application Form has been corrected to confirm that the purpose of the reinjection is for production support. Reference to permanently unsuitable has been removed.

- Please provide an updated Part C6 of application form that show details of potable water supplies that are within 50 metres of the reinjection well. If there are no potable wells within 50 metres of the reinjection well, please provide a revised part C6 of the application form that includes the correct details.*

Reason

In section 13 of Appendix 1 of part C6 of the application form, the Applicant has ticked 'yes' in response to the question asking if the proposed reinjection well is within 50 metres of a borehole, well or spring that is used for potable water supply or food production. They then clarify in the follow up section of 14 by stating that the wells they are referring to are the "Other Horse Hill Boreholes (Production Wells) only." Clearly these well are not for potable water supply or food production.

Section 13 of Appendix 1 of part C6 of the application form Question 13 asks whether there are potable water supplies within 50 metres of the reinjection point.

Responses to sections 13 and 14 of Appendix 1 of part C6 of application form are intended to enable us to determine whether your application to discharge to a borehole or other deep structure is acceptable and whether we should undertake a groundwater quantitative risk assessment on your behalf in line with the guidance in 'Groundwater risk assessment for your environmental permit' at www.gov.uk/government/organisations/environment-agency. Further information as set out in this section of part C6 is required in order for us to complete the risk assessment and for your application to proceed. To meet this requirement information specific to the site should be provided where it is already available.

If the questions 13 was ticked in error, please provide an amended form with correct details.

Formal Response: Question 13 was ticked in error and any reference to the hydrocarbon wells has been removed. There are still no potable water wells within 50m of the reinjection well.

Secondary and Tertiary Containment Plan (Required)

3. *Please provide updated details of a secondary and tertiary containment plan that will be adopted throughout the life span of the site. The plan must include containment infrastructure drawings, and a CQA plan for the installation of the HDPE membrane under the site extension area.*

The plan, which should be in accordance with the methodology detailed within CIRIA C736 (2014), should include the condition and extent of secondary and tertiary containment systems where all polluting liquids and solids will be stored, treated, and/or handled. The plan must include containment infrastructure drawings, and a CQA plan for the installation of the HDPE membrane under the site extension area. The plan must contain dates for the implementation of individual improvement measures necessary for the secondary and tertiary containment systems previously designed for exploratory activities to be upgraded to ensure that production activities will adhere to the standards detailed/referenced within CIRIA C736 (2014), or equivalent.

Reason

The site was originally construction for exploratory activities, but is now progressing to production. References to containment have been made in the submitted applications that support the application, but these have not been consistent. A clearly detailed secondary and tertiary containment plan is necessary to ensure that secondary and tertiary containment systems meet the standards required of a new oil and gas production site. This will reduce the likelihood of any uncontrolled polluting discharges to the environment.

As the site is moving into production the containment plan should consider new infrastructure that will be incorporated onto the site, and this includes but is not limited to, the storage vessels, separators, bath heaters, bunds, loading and unloading areas, transfer pipework/pumps, temporary storage areas, and liners underlying the site.

Although reference has been made containment within the application supporting documents, these have been ambiguous and have not included adequate details. In order to maintain consistency and clarity, the plan can be referred in the Non-Technical Summary, Waste Management Plan and Site Condition Report where containment measures have not been referred to consistently. The details are required to assess containment structures, detailed drawings and other details that will need to be approved from both the variation of permit BB3300XG (with regard to containment infrastructure), and EPR/BB3691NN (with regard to drainage system design, associated operating techniques and monitoring).

Formal Response: A CQA Plan (HHDL-EPR-HHP-CQA-011) has been produced and outlines the construction details of the current wellsite, construction of well cellars, construction of monitoring boreholes and the integrity testing that will be undertaken by HHDL on the HDPE liner.

HHDL recognise that a secondary and tertiary containment will need to undertake prior to the site being put into production. HHDL request that a Containment Plan is included as a Pre-Operational Condition to the permit so the plan can accurately reflect the confirmed build proposal following Hazardous Substances Notification to the Local Authority etc.

Site Layout Plans

4. Clarify the proposed site layout for the extended well testing phase and provide the corresponding cross sectional drawings *referenced* in each of the proposed layout plans. The cross section drawings should include cross sections of the proposed well cellar construction and of the eastern extension showing the proposed impermeable liner and measures to protect the impermeable liner. All drawings submitted in support of the application need to be legible.

Reason

Drawing Number ZG-HHD-HH-PROD-EPR-03 shows the indicative layout plan for the extended well testing phase. This shows an oil storage tank bunded area for the extended well testing phase on the footprint of the existing site. This contradicts the proposed layout plan for production mode existing well site and process and storage area. The Environment Agency's understanding is that extended well testing will be undertaken following drilling of the wells which will be post construction of the eastern extension of the site. The cross sectional drawings have also not been submitted with the application and it is not clear how the impermeable liner present on site will be tied into the proposed well cellars.

Formal Response: A revised site layout plan of the proposed development has been provided. Cross sectional drawings on the HH-2 well cellar has been provided within the Construction Quality Assurance Plan. Subsequent cellars shall follow the same construction methods.

Non-Technical Summary

- Please submit provide a Non-Technical Summary that relates to the Specified Generator activities. This should simply explain the specified generators covered by the application and should include details and dates of any capacity market agreements, any excluded emergency back-up generators at the site, a summary of the key technical standards and control measures arising from your risk assessment.*

Reason

In section 5a of Part B2.5 MCP/SG of the application form, you indicated that you submitted Non-Technical Summary referenced HHDL-EPR-HHP-NTS-003 to support your application. We noted that this is the same Non-Technical Summary that was provided to support other applications, but it does not include details for the Specified Generator activities.

In the introduction part of the submitted Non-Technical Summary HHDL-EPR-HHP-NTS-003 it states that it does not consider the operation of specified generators for the production of electricity for export as this will be submitted as a separate application. This statement referring to the Specified generator activity as a separate application has been repeated in the Waste Management Plan and Environmental Risk assessments that support applications for other activities on site. As you have opted to indicate the application for specified generators as a separate application you must therefore submit a Non-Technical Summary specific for the Specified Generator activities.

In our pre-application advice email of 11/06/19, we advised that you may wish to incorporate details of the Specified Generator Activities into the non-technical summary that you submit describing all of the activities undertaken at the Horse Hill Well site. If you still wish Non-Technical Summary HHDL-EPR-HHP-NTS-003 to support your application for specified generators, you may wish to update it to amend it and include the relevant details.

Formal Response: HHDL are no longer seeking to incorporate a Medium Combustion Plant as part of its permitted activities. As such the requirement for an additional Non-Technical Summary is no longer required.

Section 4.1.1

- Please amend section 4.1.1. of the Non-Technical Summary to include increase in storage capacity as an additional reason for varying the oil storage permit from a Standard Rules permit to a bespoke permit.*

Reason

An additional significant reason for applying a bespoke permit is that there will be an increase in storage capacity beyond that allowed by standard rules permit to 1100 tonnes. This must be reflected as the Non-Technical Summary serve to clarify the proposed activities to be covered by the permit application.

Formal Response: The storage capacity of the wellsite has been confirmed as being less than 500 Tonnes and shall conform to the current standard rules permit obtained by HHDL.

- Please review and update section 4.1.1.1 of NTS and of the Waste Management Plan to include the use of flare for proposed Extended Well tests.*

Reason

Section 4.1.1.1 of NTS state that "Natural gas is only expected to be incinerated as a safety measure to ensure that excess gas is safety disposed of in an emergency scenario". This is incorrect as the application also covers extended well tests that involve flaring of gas under normal operations.

Formal Response: The NTS has been amended to consider the flare for the purpose of managing waste gas associated with the extended well testing of the additional wells.

- Please update Section 6.1 of NTS to reflect the current permitted activities for the site. 2 boreholes have been drilled on site. Please define the process facility that is referenced in section 4.1.3 of the Non-Technical Summary and ensure the description is consistent with terminology and descriptions in sections 4.1.3 and 9 of the Waste Management Plan, section 6.2 of the Site Condition Report (SCR) and section 3 of the HRA.*

Reason

Section 4.1.3 describes the proposed changes to the site drainage that affect the current surface water discharge activity permitted under EPR/BB3691NN. These seem to be suggesting that the site extension area will be connected to the existing surface water drainage system, and that the 'process facility' will have its own separate system including an additional oil interceptor, that will discharge to a new outfall.

The potential for confusion comes from having to consider what the Applicant mean by the 'process facility', since both the proposed gas engines and the existing oil treatment equipment could be reasonably considered to fall under this description. Discharge from an oil treatment area is potentially unsuitable for discharge to a water course, so further clarification of the drainage requirements will need to be provided elsewhere in the application.

Formal Response: The NTS description has been updated to clarify what activities are being undertaken, together with what permits HHDL currently have in their possession and what permits are being varied to enable addition activities.

9. *In section 5.3 of the NTS please include reference to vacuum testing that done on site.*

Reason

Section 5.3 describes that extrusion welds on the membrane were non-destructively tested using spark test methods. No mention of vacuum box testing was made.

Formal Response: Reference to Vacuum Testing has been included within the NTS as was undertaken during the installation of the HDPE membrane.

10. *In section 5.4 of the Non-Technical Summary, please provide clarity on whether any rainwater collected for addition to the produced water tank will be treated prior to reinjection.*

Reason

Section 5.4 of the Non-Technical Summary confirms that a CQA plan will be submitted to the EA. This section does not, however, make it absolutely clear that any rainwater collected for addition to the produced water tank must be treated prior to reinjection. It states:

“Water will be collected in a below ground tank or sump to enable isolation if required and pumping into a road tanker or pumping to the produced water system for reservoir pressure support if required. In normal operation, water from the holding tank will be discharged from the site via a dedicated oily water interceptor at a maximum flow rate of approximately 5 litre/second.”

We will not agree to water being discharged in the describe manner without being treated.

Formal Response: A Surface Water Management Plan is being developed to explain the storage, treatment and use of rainwater and produced water. The NTS no longer makes reference to the wellsite extension. Surface water is being managed in accordance with its current permit, that is, being discharged via an interceptor.

11. *Please confirm whether the “holding tank” referred in section 5.4 of the Non-Technical Summary is the same thing as the “below ground tank or sump”? If it is, please revise the terminology in all your documents to use a consistent term.*

Reason

We note that section 9.1 of the WMP describes a proposed 'underground holding tank'. This makes it less clear whether the Applicant may just be using 3 different holding tanks or these are 3 descriptions for the same thing. This needs to be clearer in the rest of the application. Consistency and clarity can be maintained if all the techniques are outlined in a secondary and tertiary containment plan, which can then be referenced in all documents.

Formal Response: The NTS no longer makes reference to the wellsite extension as this is no longer being pursued. As such this request is voided.

12. *Please amend Section 6.4.1 that describes acid wash operations at HH-1 and HH-2 to clearly explain that these are considered as exempt groundwater activities based on the de minimis principle only. Please remove suggestions that they are “permitted” activities.*

Reason

Section 6.4.1 describes proposed acid wash operations, which in outline within the Non-Technical Summary, is acceptable in principle. Note that we are clear that existing operations for HH-1 and HH-2 wells are considered exempt groundwater activities under *de minimis* – as such they are not strictly 'permitted' as otherwise suggested in section 6.4.1. Thus whilst the Applicant are seeking for the Environment Agency to 'permit' additional acid washes for the proposed new wells, we may or may not permit them depending on whether we consider the activities to meet *de minimis* or not. If they meet the *de minimis* criteria, they become exempt activities.

The same will apply to the comments made in section 6.4.2 too regarding hot oil washing.

Formal Response: Removal of reference to permitted activities as requested.

Acid wash

13. *Please amend Section 6.4.1 that describes acid wash operations at HH-1 and HH-2 to clearly explain that these are considered as exempt groundwater activities based on the de minimis principle only. Please remove suggestions that they are “permitted” activities.*

Reason

Section 6.4.1 describes proposed acid wash operations, which in outline within the Non-Technical Summary, is acceptable in principle. Note that we are clear that existing operations for HH-1 and HH-2 wells are considered exempt groundwater activities under *de minimis* – as such they are not strictly ‘permitted’ as otherwise suggested in section 6.4.1. Thus whilst the Applicant are seeking for the Environment Agency to ‘permit’ additional acid washes for the proposed new wells, we may or may not permit them depending on whether we consider the activities to meet *de minimis* or not. If they meet the *de minimis* criteria, they become exempt activities.

Formal Response: Removal of reference to permitted activities as requested.

Hot oil wash

14. *Please amend Section 6.4.2 that describes hot oil acid wash operations at HH-1 and HH-2 to clearly explain that these are considered as exempt groundwater activities based on the de minimis principle only. Please remove suggestions that they are “permitted” activities.*

Reason

Section 6.4.2 describes proposed hot oil wash operations, which in outline within the Non-Technical Summary, is acceptable in principle. Note that we are clear that existing operations for HH-1 and HH-2 wells are considered exempt groundwater activities under *de minimis* – as such they are not strictly ‘permitted’ as otherwise suggested in section 6.4.1. Thus whilst the Applicant are seeking for the Environment Agency to ‘permit’ additional acid washes for the proposed new wells, we may or may not permit them depending on whether we consider the activities to meet *de minimis* or not. If they meet the *de minimis* criteria, they become exempt activities.

Formal Response: Removal of reference to permitted activities as requested.

Waste Management Plan

15. *Please amend the WMP to include details of how the discharge from the oil treatment area will be treated prior to discharge.*

Reason

The WMP must fully describe the operations generating all waste streams and any subsequent treatment. It must also contain measures for the prevention of deterioration of water bodies status in accordance with the Water Framework Directive (2000/60/EC). Discharge from an oil treatment area is potentially unsuitable for discharge to a water course, so further clarification of the drainage requirements will need to be included in the WMP or referenced within the WMP if it is provided elsewhere in other application support documents.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.

16. *Please amend section 4.1.4 to include details of how rainwater will be treated prior to discharge. This must include detailed drainage system layout and should ensure that it is clear that any rainwater earmarked for reinjection is suitably treated prior to discharge.*

Reason

Section 4.1.4 concludes that drilling of the additional wells will not constitute a groundwater activity. We agree with this stance in principle, pending review of further details relating to the Waste Management Plan (WMP) and the Hydrogeological Risk Assessment (HRA).

This section also mentions that rainwater collected within site containment bunds may be collected alongside produced water and retained for reinjection. No mention is made about treating the rainwater prior to discharge, which is an absolute requirement under any groundwater activity permit.

The WMP must fully describe the operations generating all waste streams and any subsequent treatment. It must also contain measures for the prevention of deterioration of water bodies status in accordance with the Water Framework Directive (2000/60/EC). Discharge from an oil treatment area is potentially unsuitable for discharge to a water course, so further clarification of the drainage requirements will need to be included in the WMP or referenced within the WMP if it is provided elsewhere in other application support documents.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.

17. *Please reword section 4.1.3 of the WMP and the NTS to ensure descriptions of infrastructure read consistently with section 9.1 of the WMP.*

Reason

Section 4.1.3 describes the proposed changes to the site drainage that affect the current surface water discharge activity permitted under EPR/BB3691NN. These seem to be suggesting that the site extension area will be connected to the existing surface water drainage system, and that the 'process facility' will have its own separate system including an additional oil interceptor, that will discharge to a new outfall.

It is not clear what areas are designated as the 'process facility', since both the proposed gas engines and the existing oil treatment equipment could be reasonably considered to fall under this description.

Formal Response: Section 4.3 (formally 4.1.3) has been updated to consider the surface water discharge arrangements from the existing site, as the extension is no longer being considered. Section 4.3 provides reference to a Surface Water Management Plan which is consistent with Section 9.3.

18. *Revise section 6 of the Waste Management Plan to state the drilling of four hydrocarbon production wells and a single reinjection well.*

Reason

This section of the Waste Management Plan contradicts the Non-Technical Summary which confirms the proposed activities including the drilling of four new hydrocarbon production wells and one new produced water re-injection well.

Formal Response: Section 6 has been updated to make reference to the additional four (4) wells (HH-3 to 6). HHDL may, decide to incorporate one of the wells into a reinjection well, depending on how the development progresses. No definitive arrangements can be made as yet, but any well constructed shall be in accordance with HHDL's Well Planning Design & Operating Standards and undergo independent Well Examination.

19. *Please update Sections 6.1.1 to 6.1.3 of WMP to reflect the current position regarding the existing boreholes.*

Reason

Section 6.1.1 makes reference to HH-1Z. It should be indicated that this has not yet been drilled.

Section 6.1.2 states that the necessary permits are in place for drilling HH-2. This must be expanded to include HH-2Z, which has now been drilled.

Section 6.1.3 describes the proposed drilling activities and should be amended to remove HH-2Z as this has already been drilled.

Formal Response: All statements have been amended in accordance with the above.

20. *Please amend section 6.3.1 to include details of how rainwater will be treated if it is to be included in the fluids collected for use in the proposed reinjection well.*

Reason

Section 6.3.1 does not include confirmation that rainwater will be treated prior to reinjection, which is an absolute requirement under any groundwater activity permit.

The WMP must fully describe the operations generating all waste streams and any subsequent treatment. Further clarification of the treatment activities will need to be included in the WMP or referenced within the WMP if it is provided elsewhere in other application support documents.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.

21. *Confirm the maximum quantities and composition of water and oil based drilling fluids that will be used to drill each section of the production wells and re-injection well.*

Reason

The maximum quantities and composition of both water based drilling fluids and oil based drilling fluids needed to drill the wells have not been included in the Waste Management Plan or Hydrogeological Risk Assessment. The Chemical Inventory (Appendix 1) of the WMP does not state the maximum quantity of every chemical that will be used in the water based fluids and oil based fluids. The weight percentage has been listed for the majority of the chemicals but not the maximum quantity of each chemical.

Formal Response: The Chemical Inventory (Waste Management Plan - Appendix 1) contains the total mud volume for each hole section and the percentage make-up for each hole section. The exact concentrations are not fixed as mud composition shall always need to be adapted to meet borehole stability. The figures presented are indicative and can be considered representative, but not absolute.

22. *Please update section 6.4.1. of the WMP to provide a methodology for injectivity tests that will be carried out on site, with reference to the EA guidance. Please also update this section to refer to the relevant sections of the site HRA that fully describe acid wash and hot oil wash.*

Reason

Section 6.4.1 describes the acid wash process and the expected wastes to be generated. In principle there is no objection because it is similar to what is currently allowed for HH-1 and HH-2. However, what is unclear is whether the 'injectivity' tests referred to here are tests that have already been carried out for HH-1/HH-2, or are proposed future injectivity tests for the new wells. If the latter is correct, then this application must provide a methodology for this injectivity testing that is compatible to the recent EA guidance issued for this activity.

This section should also include references back to the HRA, particularly as this section does mention that the acid wash will be subject to a "push...into the porosity of the formation". Both the acid wash and hot oil descriptions are lacking in detail, which would be acceptable if they included a confirmation that the descriptions are found elsewhere in detail, which it is not the case.

Note that we have no objections in principle to either the acid wash or hot oil wash as these well treatments are currently allowed for HH-1 and HH-2 under the existing environmental permit.

Formal Response: Section 6.5 has been updated to provide further clarity on the well treatment operations and further explains the pre-treatment injectivity test which is very small scale with low volumes.

23. *Confirm when formation integrity tests will be undertaken during the drilling of each production and re-injection well and the procedures that will be put in place during and after drilling to ensure well integrity is maintained at all times.*

Reason

The WMP states that a Formation Integrity Test will be carried out on the casing shoe immediately following the drilling out of the shoe at the start of the next section. It is not clear whether a Formation Integrity Test will be undertaken at the start of every hole section. The embedded mitigation in Table 8 of the HRA states well construction will be in accordance with industry best practice, with the well design incorporating steel casing and the well design, construction and maintenance will be reviewed by an independent well examiner. There is no information in the supporting documents on the specific procedures in place to confirm well integrity during drilling.

Formal Response: Well design, construction and integrity management is conducted on each well in line with HHDL Well Planning Design & Operating Standards and undergo independent Well Examination. This is the overarching technical and operational set of standards that will be applied specifically to individual wells and their characteristics. Each well, prior to construction shall be designed and subject of Independent Well Examination in accordance with the Offshore Installations and Wells (Design and Construction, etc) Regulations 1996. As yet the additional wells have yet to be designed in full and so cannot be confirmed at this time. The results of any FIT can be provided once they have been undertaken. Operators are required under the DCR regs to ensure that each well remains integral and prevents the unintentional release of fluids throughout its life, even after suspension and abandonment.

24. *Confirm the chemicals present in the following products proposed for use in the water based and oil based muds:*

- *Drilling Starch*
- *Flowzan Biopolymer*
- *Duovis NS*
- *Versatrol M*

Reason

The Material Data Safety Sheets and the Chemical Inventory (Appendix 1) do not confirm the chemicals present in these products. The Environment Agency require information about the chemicals that will be used in total and the maximum amount of each chemical for each section of the drilling programme.

Formal Response: The chemicals listed above were approved for use in 2019 at the Horse Hill Wellsite and were used for the drilling of the HH-2 well recently. The Chemical Inventory now considers the anticipated concentrations for each well and hole section for the Drilling Starch, Duovis NS and Versatrol M. Flowzan Biopolymer is contingency only, the volumes cannot be calculated without first attempting to drill each well. The current permit references Waste Management Plan Rev 5.2 as an approved operating technique.

25. *Confirm the specific section of the drilling programme where each contingency drilling additive, completion additive and cleaning additive specified in Appendix 1 may be used.*

Reason

This information is required so that the Environment Agency can be satisfied there are no hazardous substances present in the water based drilling fluids and there will not be a direct input of a hazardous substance to groundwater.

Formal Response: Well design, construction and integrity management is conducted on each well in line with HHDL Well Planning Design & Operating Standards and undergo independent Well Examination. This is the overarching technical and operational set of standards that will be applied specifically to individual wells and their characteristics. However, in light of previous concerns raised by the Environment Agency in 2019, HHDL can confirm that the VersaClean System shall only be used in sections where OBM is being used and shall be at a depth greater than 400m. This has now been marked up within Appendix 1. All other drilling additives were considered suitable for use within other sections of the well.

26. *Confirm the chemicals present in the following products proposed for use in contingency drilling fluids:*

- *Defoamer*
- *Oxygen Scavenger*

Reason

The Material Data Safety Sheets (MSDS) and the Chemical Inventory (Appendix 1) do not confirm the chemicals present in these products. The Environment Agency require information about the chemicals that will be used in total and the maximum amount of each chemical for each section of the drilling programme including contingency chemicals.

Formal Response: The chemicals listed above were approved for use in 2019 at the Horse Hill Wellsite and were used for the drilling of the HH-2 well recently. The Chemical Inventory now considers the anticipated concentrations for each well and hole section for WMB and OBM, presumably. However, as these are contingency only ('Defoam NS' and 'SafeScav CA and NA') the volumes cannot be calculated without first attempting to drill each well. The current permit references Waste Management Plan Rev 5.2 as an approved operating technique where these substances have already been assessed and approved by the EA in the 2019 Minor Technical Variation'. HHDL are not proposing any additional chemicals to those that are already approved.

27. *Provide a Material Data Safety Sheet (MSDS) for Produced Water because this will be produced and handled onsite and therefore requires a MSDS.*

Reason

This has not been included in Appendix 2 of the WMP.

Formal Response: A Safety Data Sheet for the produced water has been provided.

28. *Confirm the maximum quantities of cement additives proposed for use in Appendix 1 of the WMP and the chemicals present in the following cement additives:*

- *Bridge Maker LCM package*
- *CFR-8L*
- *Halad 300L NS*
- *HR-4L*
- *Latex 3000*
- *NF-6*
- *Silicalite Liquid*
- *WellLife 734*

Reason

The chemicals present in these products have not been specified in the WMP or MSDS.

Formal Response: The chemicals listed above were approved for use in 2019 at the Horse Hill Wellsite for the HH-2 well and sidetrack. The HH-2 has now been drilled. The quantities of the cement additives for each well cannot be provided until such a time that the drilling of each well commences and a purpose built cementation engineering report can be developed. HHDL are not proposing any additional chemicals to those that are already gained regulatory approval by the Environment Agency and have been used.

29. *Confirm the purpose of the Fluorodye product and why it is required, the specific section of the well where it will be used, and maximum quantity needed.*

Reason

This information is required for the Environment Agency to be satisfied that the proposed use of this product will not result in an unacceptable input of a pollutant to groundwater.

Formal Response: HHDL are not proposing any additional chemicals to those that are already approved in the 2019 Minor Permit Variation. Fluorodye UC is used during casing cementing operations to detect cement returns and is added to the cement itself. The maximum volume to be used is 40 litres for each cement job, however it shall only be used in hole sections where OBM has been used and shall be used at depths much greater than 400m. See Question 41.

30. *Confirm any chemicals, maximum volumes and frequency that will be used and are needed in the oil production process that may be present in produced water and subsequently re-injected into the Portland Sandstone.*

Reason

This has not been detailed in the supporting documents. Any chemicals that will be needed to facilitate the production of hydrocarbons at the site (for example corrosion inhibitors, oxygen scavengers) where these are added in the process, maximum volumes and frequency of use should be specified in Waste Management Plan or Hydrogeological Risk Assessment.

Formal Response: The Surface Water Management Plan outlines the treatments that may be undertaken as part of the produced water reinjection process. It is anticipated that the following chemical treatments will be required:

- Oxygen Scavenger;
- Hydrogen Sulphide Scavenger;
- Biocide; and
- Corrosion Inhibitors.

The chemicals proposed for the treatment of produced water are the same as those proposed for the drilling operations. They shall be assessed within the HRA and shall be referenced within the Surface Water Management Plan.

31. *Clarify the anticipated extent of the acid wash treatment in the near wellbore formation, whether an acid wash will be required as a well maintenance treatment on the proposed re-injection well and how any spent acid is recovered from the formation.*

Reason

This information is required for the Environment Agency to be satisfied that the acid wash is not a groundwater activity. The WMP states this variation is seeking to permit acid wash activities across all wells. Clarification is required on whether the spent acid is reverse circulated back to the surface if the acid wash is undertaken on the re-injection well.

Formal Response: Section 6.5 confirms that any reinjection borehole shall be the subject of an acid wash only. With acid being applied to the formation at low pressures. The extend of the acid is anticipated to travel 10s centimetres into the formation and shall be recovered through well circulation.

32. *Confirm the maximum volume needed for a hot oil treatment and anticipated frequency of treatment.*

Reason

This information has not been included in the Waste Management Plan.

Formal Response: Section 6.5.3 confirms that the maximum volume of oil is 15m³ per treatment. All of which shall be recovered to surface.

33. *Please update section 7.3.1 to ensure waste packaging used onsite is covered.*

Reason

Section 7.3.1 on non-extractive waste does not include any reference to waste packaging.

Formal Response: Waste Packaging has been included within Section 7.3.1.

34. *Please amend the typographical errors in section 9 so as to provide clarity on actions to be taken*

Reason

In section 9 paragraph 3, it is stated that:

“Surface water will continue to be monitored routinely, with additional monitoring taking place prior to a leak or spillage”.

We presume there is a missing word such as ‘following’ or ‘after’ a spillage, rather than ‘prior’ as written above. It is difficult to predict a spillage or leak event.

Paragraph 8 of Section 9 also has an unfinished paragraph:

“As the production facility will be lined with HDPE to provide tertiary containment, surface run off water will be collected as an unavoidable consequence. In order to manage the levels of surface water captured within the production facility an additional”

The Applicant must confirm what the paragraph is meant to finish saying.

Please update and clarify section 9 of the WMP to be read more consistently with the rest of the application documents.

Section 9 appears to have a contradiction with comments in other parts of the application that suggest a new surface water discharge point (“Outlet 2”) will be constructed adjacent to the existing surface water outfall:

“Discharge from the extension site will be to the same discharge point as the existing well site that is to a field drain system”

We have no objections to the construction of an additional surface water outfall, but the application should read consistently throughout. This part of section 9 at the moment is suggesting something different to other parts such as section 4.1.3 of the WMP and NTS

Formal Response: **Typographical errors detailed above have been corrected. Any reference to the site extension (production facility / Outlet 2 etc.) has also been removed due to this no longer being considered.**

35. Please submit a revised version of the operating technique for surface water management (HSE-HH1-PF-09).

Reason

Section 9.1 of WMP mentions that the operating technique for surface water management (HSE-HH1-PF-09) will be updated to reflect the proposed changes at the site. This is required to clarify the exact scenarios under which the site discharge will operate, to ensure there is no confusion. This intention to detail the proposed surface water arrangements in this document should have been clearly referenced in other parts of the application, such as sections 4.1.3 of the both the WMP and the NTS, and section 6.2 of the SCR, and drawings should have been included in the application.

Formal Response: **Operating Technique (HSE-HH1-PF-09) has been included within the Surface Water Management Plan. Due to the Site no longer being extended the original arrangements (as previously approved) shall remain.**

36. Please provide a ‘Site Surface Water Management Plan’ based on the understanding from the conceptual site model and environmental risk assessment where the risk to the water environment are clearly detailed. The plan should include details of how rainwater is managed, collected, stored and treated where necessary prior to discharge or disposal. The plan should clarify drainage arrangements on site and should be referred to in all relevant documents to ensure that the drainage arrangement design is consistently described throughout this application.

The development of a plan to show how rainfall is managed, is necessary to clarify how the requirements are being met and how the environment is being protected. This must include detailed drainage system layout and should ensure that it is clear and any rainwater earmarked for reinjection is suitably treated prior to discharge.

A surface water management plan is required because the Applicant has not provided adequate details of how surface water will be treated or managed prior to being discharged from the site. The plan must indicate that surface water will always be dealt with in accordance with requirements necessary to protect the environment from uncontrolled contaminated discharges of site surface water.

The submissions made do not consistently identify methods of any treatment that will be done to surface water prior to discharge, which is an absolute requirement under any groundwater activity permit.

There appears to be some contradiction in sections 3.1 and 3.2 of SCR Appendix 1 - Hydrogeological and Flood Risk Assessment (p18-022 HHDL Horse Hill 2018 \ RPT HRAFRA Horse Hill Production V2. July 2019), when describing the drainage arrangements. Section 3.1 says that the drainage at the existing site will be expanded and modified to incorporate the extension area, while section 3.2 says that the drainage system for the extension will be separate and independent. We note this section claims that the discharge point will be the same as for the existing part of the site, which is inconsistent with the descriptions for an all-new “Outlet 2” mention in the NTS and WMP.

Formal Response: **The Site is no longer being extended and as such the HRA and FRA shall be revised to reflect this. Operating Technique (HSE-HH1-PF-09) has been included within the Surface Water Management Plan. Again the original discharge to surface water arrangement shall remain for consistency as no extension area is now being proposed.**

37. *Please update section 9.1. to adopt terminology/descriptions of drainage infrastructure that are more consistent with those given in sections 4.1.3 and 9.1 of the WMP, section 4.1.3 of the NTS, section 6.2 of the SCR and section 3 of the HRA*

Reason

This section does clarify that the site extension area will include an underground holding tank, intended to perform a similar function to the perimeter ditch used around the existing well pad area. This presumably is what has separately been referred to in section 4.1.3 of the WMP and the NTS as a 'holding tank' and 'below ground tank or sump'.

The term 'process facility' is used again, but unlike section 4.1.3, seems to this time be implying this is an alternative description for the new site extension area. As the WMP will constitute operating techniques that will be approved should we decide to grant the variation, it must be unambiguous in what is being proposed.

Formal Response: This section has been amended to read in line with the NTS and SWMP. Any reference to the site extension (production facility / Outlet 2 etc.) has also been removed due to this no longer being considered.

38. *Please review the proposed arrangements for monitoring discharges of surface water and clearly outline the monitoring that might be carried out on site and how the discharges will be carried out.*

Reason

Section 9.1.1 describes the sampling and analysis approach for discharges of surface water. It is stated that the water will be sampled before the initial discharge and then monthly going forwards. If any samples are found to have breached the relevant Environmental Quality Standards, the water will be collected by tanker for off-site disposal.

It is not clear how the discharges are to be managed. It would appear more appropriate to control this by using a batch discharge approach, subject to satisfactory analysis results.

Formal Response: Operating Technique (HSE-HH1-PF-09) has been included within the Surface Water Management Plan. Due to the Site no longer being extended the original arrangements (as previously approved) shall remain. The discharge shall take place in accordance with the current permit, however the Operator is requesting the availability to discharge to surface water during well testing and production operations also.

39. *Please revise section 10.1.1. of the WMP so that it is consistent with descriptions in section 9.*

Reason

Section 10.1.1 describes only the existing surface water drainage requirements, and doesn't seem to marry up exactly with the proposed new drainage requirements described in Section 9.

Section 10.1.2 should make reference to the Environmental Risk Assessment, much in the same way as section 10.1 does.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.

40. *Please update section 10.5 to make it clear that, in the event of an unexpected release of natural gas or oil from the installation, the notification would include details of quantities released, along with measures taken to stop the release and prevent a recurrence.*

Reason

Section 10.5 – This section describes reporting requirements following an unexpected release of natural gas or oil. It says that details of the quantities of materials released, along with measures taken to manage them, will be made available to the Environment Agency upon request. It would be expected that these details would be provided to the Environment Agency as part of the notification process.

Formal Response: Section 10.5 has been updated to include the above details.

41. *Please provide details of the purpose of using Fluorodye UC and the locations where this will be used.*

Reason

We previously reviewed this substance under the July 2019 variation. One ingredient of Fluorodye UC, the violet dye (C.I. Basic Violet 10 (Rhodamine B or D&C Red No 19), CAS 81-88-9) is not listed on JAGDAG list, but it is generally known that rhodamine B is toxic.

We will require information to confirm if it was definitely hazardous or non-hazardous under JAGDAG.

If it is hazardous, we will need a description of the scenario it will be used under, and a method statement of how it will be used. It might be clear from that whether it can be registered as *de minimis* or not.

Formal Response: HHDL are not proposing any additional chemicals to those that are already approved in the 2019 Minor Permit Variation. Fluorodye UC is used during casing cementing operations to detect cement returns and is added to the cement itself. The maximum volume (in the unlikely event it is used) is 40 litres for each cement job, assuming a worst case 20% concentration as per the SDS the maximum volume would be 8 litres. However, it shall only be used in hole sections where OBM has been used and shall be used at depths much greater than 400m. Previously it was considered 'potentially hazardous' by the EA, but can be considered de-minimus.

Site Condition Report

42. *Revise Figures 2 and 3 of the Site Condition Report which confirm the as built construction details of the current permitted area.*

Reason

Figures 2 and 3 are not legible. It is not clear where the perimeter ditch extends to, whether the impermeable liner is installed beneath the perimeter ditch and if the perforated drain pipe is located outside of the lined area.

Formal Response: Figure 2 and 3 have been relocated to Appendix 4 and have been re-printed to ensure they are legible.

43. *Confirm the maximum daily discharge volume and maximum rate of discharge of produced water into the Portland Sandstone.*

Reason

This information is necessary because any groundwater activity permit granted will specify a maximum daily discharge volume and a maximum rate of discharge as a limit for the groundwater activity to re-inject produced water for production support.

Formal Response: This is subject to the results of initial injectivity testing - we do not know until we do injection tests. Ultimately we only need to inject what we are producing which is not significant at Horse Hill. Once a permit to conduct an injectivity test has been authorised such actions, like the reinjection procedure can be produced. HHDL request that the Reinjection Procedure (including the reinjection volumes / rates) is included as a Pre-Operational Condition to the permit.

44. *Confirm whether mouseholes and ratholes will be installed in the drilling cellars and how these will be constructed to prevent a direct pathway to groundwater that may be present in the weathered Weald Clay.*

Reason

The Environmental Risk Assessment states a mitigation measure for surface accidents is where required mousehole and rathole have been installed and have been grouted in place to ensure integrity of the site. However, these are not mentioned in any other part of the application.

Formal Response: Section 6.2.2 has been introduced to discuss the potential for Mouse and Rat hole construction, such descriptions have been provided for similar operations and approved by the Environment Agency in the past. The use of a Rat / Mouse hole is contingent on the selected drilling rig.

45. *Confirm the borehole construction details for the produced water re-injection borehole, including casing depths in metres below ground level and ensure these are consistent throughout the application documents.*

Reason

Section 2.4.2 of the HRA suggests that the reinjection well will be drilled near vertical and a shallow angle side track drilled to target the productive sandstone horizons in the Portland Group. This contradicts section 6.1.5 of the WMP and Appendix E of the HRA which suggests the re-injection borehole will be drilled to the top to the Kimmeridge Clay Formation. There are also contradictions between the text in the WMP, HRA and schematic provided in Indicative Diagram 2 which suggests the re-injection borehole could be drilled as a side-track. The Horse Hill Schematics provided in the WMP and Appendix D also contradict the proposed drilling depths specified in the text.

Formal Response: Water injection will be down HH2z recompleted with a new water injection string for long term if injectivity trials are successful. If a future new injector is required, then it will be constructed specifically for water injection in line with HHDL Well Planning Design & Operating Standards. Construction details of the well shall also be provided to the Environment Agency before reinjection commences.

46. *Confirm how collected site surface water from banded areas on site will be managed and treated before the site surface water is added to produced water and re-injected for production support.*

Reason

At various places throughout the application documents, it is stated that produced water may be re-injected with water collected from banded process areas for production support. Any water that is used to supplement produced water should be clean and uncontaminated. Therefore, any water collected in bands will need to be treated before it can be re-injected for production support because there is the potential for contamination to be present in banded areas. Section 2.1 of Appendix E of the HRA should also be amended because this suggests water collected from banded process areas at the site is also permissible under Article 11 3(j) of the Water Framework Directive since the water will be injected for production support. This is misleading because any water used to supplement produced water for production support must be clean and uncontaminated.

Current Status: A Surface Water Management Plan is being produced and will be used to inform the Hydrogeological Risk Assessment to ensure consistency. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

47. *What procedures will be undertaken to confirm that the integrity of the re-injection well before the groundwater activity commences.*

Reason

The monitoring and maintenance at the site suggests that continuous pressure monitoring will be undertaken which is assumed to be for 'normal operation', however there are no specific procedures documented in Appendix E to confirm that the integrity of the injection well will be verified prior to re-injection occurring.

Current Status: A procedure is being developed to confirm integrity of the reinjection well. It will follow similar procedures previously approved by the Environment Agency. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

48. *Revise section 7.3.3 to remove the reference to any water present in Jurassic Formations is permanently unsuitable.*

Reason

Whilst we appreciate that the groundwater quality in the Jurassic Formations maybe of such that it is hydrocarbon bearing and has no resource value, these formations have not formally been determined as permanently unsuitable for other purposes and therefore does not apply to this site.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

49. *Amend the definition of groundwater in Section 7.1 of the HRA to maintain consistency with the definition of groundwater specified in the Water Framework Directive and Groundwater Directive.*

Reason

Proposing a new definition to standard terms creates confusion and uncertainty with the technical assessments and interpretations presented in the HRA. We understand the intention is to delineate between shallow and deep groundwater, however this does not necessitate redefining the term groundwater which is defined in legislation.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

50. *Confirm the:*

- *Location of identified faults in the reservoir with respect to the location of the re-injection well,*
- *Lateral and vertical extent of these faults; and*
- *Provide an explanation why geological faults are unlikely to provide a pathway for transmission of fluids between the re-injection reservoir and shallow formations containing groundwater.*

Reason

Section 6.2.2 refers to a “Table 4” that shows the site specific geological sequence. There appears to be a typographical error as the table showing this information is called Table 1 instead.

Section 6.2.3 seems to suggest that faults in the area do not penetrate to surface, however as they do seem to reach the unconformity at the base of the Weald Clay there is a possibility for them to provide pathways between the deep strata and the aquifers of the Tunbridge Wells Sand and Ashdown Formations.

It is concluded that most faults terminate at or close to the unconformity at the base of the Weald Clay Group and review of seismic data by HHDL shows that few faults penetrate to the surface. There is no explanation as to why the geological faults are unlikely to be transmissive apart from oil has not migrated to the surface and why the re-injection of produced water would not create a pathway along any identified faults. The lateral and vertical extent of the faults in the reservoir is not clear from the HRA and Geological Parameters Document and where these are located with respect to the re-injection well. Underlying the Weald Clay is the Tunbridge Wells Sand Formation which will contain groundwater. The Environment Agency will need to be satisfied that there will be no impact on formations below the Weald Clay that contain groundwater from the proposed re-injection volume.

Section 2.8 of Appendix 1 also mentions that the majority of known faults in the general area do not penetrate to surface, with most terminating at the unconformity at the base of the Weald Clay. Given this, there is a possibility for such faults to provide pathways between the deep strata and the aquifers of the Tunbridge Wells Sand and Ashdown Formations. This possibility is not directly addressed by this report or any other in the application. It is only indirectly addressed by comments relating to lack of evidence of mixing between oil reservoirs and the confining structure of the reservoirs as evidenced by observed pressures at depth.

Given that HHDL are proposing to introduce reinjection on the periphery of the Portland reservoir, it would seem prudent to have addressed the issue of whether the proposed reinjection well location(s) are relevant to any of the described faults.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment following receipt of fault data and a discussion with the Environment Agency. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

51. Revise the Conceptual Hydrogeological Model in Figure 4b to show any faults that have been identified from the reprocessed seismic data including their lateral and vertical extent and location with respect to the proposed production and re-injection wells. A line of section will also need to be added to the Conceptual Hydrogeological Model because the current south west indicator arrow is confusing with regard to understanding the dip direction of the geology.

Reason

The Conceptual Hydrogeological Model does not accurately represent the structural setting of the production and re-injection reservoir and is not clear how it has been concluded that it is unlikely that faulting will provide a direct pathway for transmission of fluids between the deep, Jurassic water bearing units and shallow groundwater systems, when no faults are shown on the Conceptual Hydrogeological Model. The HRA also concludes based on the hydrogeological setting it is unlikely that produced water would migrate to overlying strata or cause an indirect discharge to groundwater bearing formations above the Portland Group. Fluid migration along a fault and discharging into another formation containing groundwater would be constitute a direct discharge to groundwater and must also be prevented.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment following receipt of fault data and a discussion with the Environment Agency. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

52. Please amend the descriptions on the geological setting given in section 5.2.1, to match the geological sequence that is correctly described in table 5.2.

Reason

We note in section 5.2.1 the second paragraph describing the geological setting says “BGS sheet 286 shows Weald Clay cropping out only to the south-east of the Site, with Upper Tunbridge Wells Sand below it.” We have referred to BGS sheet 286 (Reigate) and to our own GIS mapping data (also provided by the BGS) and find that the Weald Clay is the bedrock geology continuously across the site, with no significant drift deposits matched. Thus we are unsure why the author of this report has written otherwise. We consider this an error, we do not consider this to have a meaningful impact on the rest of the document, particularly as the geological sequence is adequately described in Table 5.2.

Formal Response: Section 5.2 has been updated to refer to the correct geological sequence.

53. *Please update the image of Figure 3 in section 6.1 of the Site Condition Report to provide a more legible image.*

Reason

The image illustration provided is of poor quality and difficult to read.

Formal Response: **Figure 3 has been re-printed to provide a better image.**

54. *Please review section 6.2 of the Site Condition Report so that it matches descriptions of facilities described 4.1.3 of the Non-Technical Summary and in sections 4.1.3 and 9 of the Waste Management Plan, and section 3 of the HRA.*

Reason

Section 6.2 uses the same unclear descriptions of the proposed drainage plans for the extension area as were made in the NTS and the WMP.

Formal Response: **The extension area is no longer being considered and as such is no longer referenced within the application documents.**

55. *In section 7.1 of the Site Condition Report, please include the need for varying the permit to include a groundwater activity.*

Section 7.1 have not made reference to the need to include a groundwater activity into the site environmental permit to cover the proposed use of a well for reinjection of produced water into the Portland formation. This must be included as it is a key activity proposed.

Formal Response: **Section 7.1 now includes reference to the re-injection activity of at least one borehole from the site and makes reference to the current permit EPR/BB3691NN which currently permits surface water discharge only.**

56. *Please amend Table 4.18 in Appendix 2 to remove the Europa site as a site that could have cumulative effects to impacts of air emissions.*

Reason

Please amend Table 4.18 in Appendix 2 lists other permitted sites within 10km that have been considered for cumulative effects to impacts of air emissions. The Europa site at Holmwood is included in this list but the permit has been surrendered. HHDL should update table 4.18 to reflect this.

Formal Response: **Reference to Europa site removed. A revised AQIA has been issued as part of the Waste Gas Management Plan.**

SCR Appendix 1 – Hydrogeological and Flood Risk Assessment

57. *Please provide construction drawings for the new well cellars.*

Reason

Section 2.1.2, as with the WMP, SCR and the NTS, makes reference to the wellsite extension area with additional terms such as “processing facility”, and “compound”. It does seem to suggest that the ‘compound’ contains the ‘processing facility’, but from this it is then uncertain whether the HDPE liner under the ‘processing facility’ will also be present under the ‘compound’, especially as the ‘compound’ will have its own surface water drainage system. The paragraph links to drawing in Appendix B, but this drawing does not provide drainage information.

Current Status: **Section to be update with a revised Hydrogeological Risk Assessment, no site extension is now being proposed. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.**

Section 2.2.2 describes the well cellars, but provides no drawings. Use of precast concrete rings might present a risk from the lifting holes/eyes allowing liquids to pass through – how will this be prevented by the “concrete jacket” described here?

These details can be provided in the secondary and tertiary containment plan and be referenced in in all supporting documents.

Current Status: **Section to be update with a revised Hydrogeological Risk Assessment, No site extension is now being proposed. A Containment Plan is being requested as a Pre-Operational Measure. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.**

58. *Please provide justification for not installing a conductor casing on the reinjection well.*

Reason

Section 2.3.1 states that only the new production wells will have a conductor casing installed. No reasons have been given to explain why there will be no conductor installed on the reinjection well.

Where will the groundwater monitoring boreholes be installed? This section doesn't point the reader to a drawing, which would have been useful.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment, no site extension is now being proposed. Conductor casing is being installed on all wells. Borehole location plan to be redeveloped. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

59. *Please revise the description given in section 2.3.3. of the SCR for further side track drilling to match the drilling activities described in the WMP. Please confirm whether this variation application seeks to include further sidetrack drilling. If so, please provide specific details in the WMP.*

Reason

Section 2.3.3. makes references to further side track drilling. All drilling activities must conform to the approved WMP. Operating techniques to be used on site must conform to those in the approved WMP. The permit and WMP that it approves will not allow for unlimited drilling of sidetracks? Drilling of additional sidetracks not covered in the current WMP will be subject to separate permit variation applications and should not be included as part of this application, unless specific details are provided.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. For clarity each well will have a Pilot Hole and a sidetrack as per the figures within the Waste Management Plan. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

60. *In Section 2.7 please include reference to section 3.2 of the main SCR which provided details of drainage arrangements on site.*

Reason

In Section 2.7 does not confirm that surface water will be treated before inclusion in the reinjection fluid. Section 3.2 confirms that surface water will be treated prior to reinjection. This is acceptable, but should have been clearly referenced in other sections of the application that discussed drainage in the WMP, NTS and SCR.

Section 3.2 seems to describe the drainage arrangements in more detail than those provided in the SCR, NTS and WMP. It confirms that the whole well site extension area will be independently drained, itself being subdivided into 'high risk' and 'low risk' locations.

High risk: tanker loading bays and kerbed pump area, process bund, storage bund, vent kerbed area, well cellars, and production heater bund.

Low risk: All other areas, including gravelled hardstanding, propane tank area, power generation areas, site roads.

In regard to the 'high risk' areas, section 3.2 says that:

"With the exception of the well cellars and production heater bund, each area will have a penstock valve which will normally be closed and will be opened manually to drain rainwater or wash water when required. The penstock valve for the tanker loading bays will be open during tanker loading to allow any spilled oil to run away from parked tankers."

These arrangements may not be compliant with approved containment practices, as the penstock values on the bunds are a point of weakness. It is not clear where the tanker loading area will "run away" to through the open penstock. Again, this may not be suitable.

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

61. *Please clarify drainage arrangements on site and ensure that the drainage arrangement design is consistently described throughout this application.*

Reason

There appears to be some contradiction in this section, when describing the drainage arrangements. Section 3.1 says that the drainage at the existing wee site will be expanded and modified to incorporate the extension area, while section 3.2 says that the drainage system for the extension will be separate and independent.

We note this section claims that the discharge point will be the same as for the existing part of the site, which is inconsistent with the descriptions for an all-new "Outfall 2" mentioned in the NTS and WMP.

The presence of valves to drain bunds is not compliant with CIRIA guidance. To empty rainwater from bunds, a blind sump should be included in the bund design, with water removed via a pump.

Section 4.2 mentions that no contaminated land risk assessments have been made. It could, helpfully, have mentioned that such risks were considered as part of the planning applications for the site, and that baseline soil and groundwater data has and indeed will be collected to fulfil obligations under the SCR and for compliance with the Industrial Emissions Directive.

There is a discussion in 7.3.3 about the salinity of groundwater encountered in the various Jurassic strata beneath the site. Whilst we agree that these formations would not be considered of a water quality likely to make them a target for a potable water supply under current circumstances, we do not agree with the text that by inference these formations are 'permanently unsuitable'. As stated in our comments for the application forms, HHDL have not made any requests for us to determine any formations as permanently unsuitable, nor would this seem necessary given the currently proposed activities on site.

The analysis of local structural geology in section 7.4 seems reasonable. However, we will need to review the information in "Ref 36" for more detail.

Overall section 7 provides reasonable comments, though we felt that more could have been said about evidence from the observed down-hole pressures and reservoir characteristics to help with the evidence of showing lack of fluid movement along the known faults. No risk assessment was specifically directed at looking at reinjection risks either. This is covered in separate reports – appendix E, and the Horse Hill Oil Field Geological Description (Revision 1, document date on EDRM 24/09/19).

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

62. *Please amend reference in Table 7 to the correct method of sewage treatment. If a septic tank, is proposed then the Applicant HHDL will need to provide more information as it will be subject to assessment by the EA.*

Table 7, in section 9.4, provides a risk assessment summary. One row is for the risks associated with domestic sewage generated onsite. The proposed mitigation for the risks includes reference to the welfare facilities using "sealed septic tanks". This is a misnomer, as a septic tank is a device that treats waste water prior to discharge to the environment (usually to ground). A sealed tank for the storage of sewage prior to collection for off-site disposal is a cesspool, as per current arrangements on site. We note this use of terminology is not repeated in Table 8, where instead they refer to a "self-contained sealed storage tanks".

Appendix B – This shows the location of infrastructure clearly, such as tanks, wells, offices etc., but provides no information on drainage outlets. It does not provide any labels indicating the specific areas mentioned in the text, for example the terms "processing facility", "well site extension area", "compound".

Current Status: Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

Appendix E Produced Water Reinjection

63. *Please review and update contradictions in the document by either correcting the text in section 2.2.2 or by amending the drawing used in appendix A*

This document starts by clarifying that produced water and site surface water, will be reinjected for the purpose of production support from the Portland Formation, as opposed to a disposal operation (see discrepancy found above in the application forms).

Section 2.1 fails to mention that any site surface water being reinjected must undergo treatment first in order to comply with the Environmental Permitting (England and Wales) Regulations 2016.

The description of the proposed production and pilot well HH-3 in section 2.2.2 is contradicted by the indicative drawings in Appendix A of this document. Specifically, the drawing shows that HH-3 deviates from vertical around 300 metres below ground level, drilling at an angle until it reaches the Portland Formation, where it again changes angle to nearly horizontal for the producer section of the well. In comparison, section 2.2.2 says that:

“the Horse Hill-3 (HH-3) production well...will be drilled near vertical to approximately 750m bgl”

Note that we have no technical objections to the geometry of HH-3 in either case, we are merely pointing out that HHDL are presenting conflicting information in their application.

Current Status: A Surface Water Management Plan is being developed to explain the storage, treatment and use of rainwater and produced water. Section to be update with a revised Hydrogeological Risk Assessment. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

64. *Please provide information on how you will confirm the formation fracture pressure for the reinjection well.*

Reason

We are not clear on how HHDL will confirm the formation fracture pressure. In section 2.4 of the document they provide an “empirical” value determined from regional well data, rather than from site specific data. We presume that an injectivity test will be carried out, but no method is referred to here.

Current Status: HHDL are liaising with Envireau Water on the method for confirming fracture pressure, however, until an injectivity test can be permitted details are limited. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

65. *References 10, 11 and 12, as detailed below, must be provided to the EA for review. Ref. 10 Well Planning Design and Operating Standards Rev 0. Horse Hill Developments Ltd, June 2019.*

- Ref. 10 Well Planning Design and Operating Standards Rev 0. Horse Hill Developments Ltd, June 2019.
- Ref. 11 Water Injection Procedure HH-PR-q0051. Horse Hill Developments Ltd, April 2019.
- Ref. 12 Routine maintenance of water injection pump. Horse Hill Developments Ltd, April 2019.

Reason

Section 2.5.1 mentions that the reinjection well will be maintained using treatments such as acid washing. There should have been a reference here back to the description of acid wash treatments in the HRA.

This is in order for us to be satisfied that the proposed maintenance, monitoring and operating procedures are robust enough to justify the conclusion that deep groundwater monitoring of the Tunbridge Wells Sand and Ashdown Formation is unnecessary.

Formal Response: The Well Planning Design and Operating Standards Rev 0 is a HHDL standard. Each well, prior to construction shall be designed and subject of Independent Well Examination in accordance with the Offshore Installations and Wells (Design and Construction, etc) Regulations 1996. A copy of the Standards shall be available for viewing at the HHDL site where a copy is stored, however are not being provided as part of the permit application. The Environment Agency will be notified of specific well design via the WR11 Notification Form once designs have been finalised and subject to independent review. The Health and Safety Executive are the principal regulator for well integrity standards.

The Water Injection Procedure and Routine Maintenance Procedure have been catalogued within the HHDL Management System, the procedure are still in development as they cannot be completed until an injectivity test is carried out and the equipment is installed at the site. These procedures cannot be provided at this stage.

SCR Appendix 3 Outline Scheme of Groundwater Monitoring

66. *Please confirm sampling technique with regard to sample stability.*

The proposals are for monitoring of the ‘shallow groundwater system’ beneath the site, in more permeable horizons of the Weald Clay outcrop. The boreholes proposed have a nominal 5m depth – but it is not clear if this depth will encounter any water, and should be subject to change based on observed site conditions. The wells will be of no use if they do not encounter groundwater, so these shallow installations should only continue if a significant body of groundwater is observed.

No confirmation is provided as to how the boreholes will be sampled, for example whether the boreholes will be purged or if flow through cells will be used to establish stable conditions prior to sample collection.

Current Status: Section to be update with a revised Scheme of Monitoring. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.

67. *Please review and amend SCR Appendix 3 Outline Scheme of Groundwater Monitoring so as to outline all groundwater monitoring during the operational and post decommissioning phases of the reinjection groundwater activity. The plan will be based on the hydrogeological risk assessment and conceptual site model including, but not limited to:*

- i) Minimum of 3 months' groundwater baseline data*
- ii) details of the proposed location; depth; and construction method of the groundwater monitoring boreholes*
- iii) number of groundwater monitoring boreholes to be installed*
- iv) details of the geological formation that monitoring boreholes in (ii) are monitoring*
- v) groundwater sample collection procedures*
- vi) details of the proposed monitoring parameters and frequency*
- vii) details of how the data collected will be reviewed and interpreted including setting and reviewing trigger levels*
- viii) details for further investigation if erroneous results are observed*
- ix) Identification of need, or otherwise, for additional boreholes based on data acquired in regard to observed hydraulic gradients,*
- x) Confirmation of whether there are any private water supplies locally requiring monitoring.*

Reason

A revision of the proposed groundwater monitoring plan is necessary because the operator has not specified monitoring of the Tunbridge Wells Sand nor the Ashdown Formation is proposed. Groundwater Monitoring is required at the site because the operator is undertaking a groundwater activity for reinjection of produced water.

We are not satisfied with the proposed monitoring. Section 2.4.3 suggests that groundwater monitoring will be reduced to 6 monthly during the production phase of site operations. Our guidance suggests the minimum frequency should be quarterly instead. HHDL will need to provide a justification for reducing frequencies below our guidance, which would have to be supported by evidence and suitable risk assessment.

The details of the proposed monitoring will need to be reviewed after an initial period of operation and then submitted to the EA for approval and incorporation into the site environmental permit(s) as Operating Techniques.

According to the EA guidance, 3 months of baseline groundwater data as a minimum should be submitted prior to any groundwater activity commencing.

The groundwater monitoring plan, once approved, shall be incorporated into the permit as an operating technique.

Groundwater Monitoring is necessary to help determine whether groundwater activity is affecting the quality of groundwater and whether satisfactory measures are being undertaken to prevent groundwater pollution. Groundwater monitoring is required for the purposes of requisite surveillance in accordance with the Environmental Permitting Regulations 2016. The submission of a groundwater monitoring plan will ensure that groundwater monitoring is based on the site conceptual model and hydrogeological risk assessment.

The HRA considers that the embedded mitigation from well construction systems, integrity monitoring and the reinjection procedures are robust enough to make the addition of monitoring wells unnecessary.

Current Status: **Section to be update with a revised Scheme of Monitoring. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.**

68. *Please confirm if you intend to sample for dissolved methane and put samples through GCMS analysis, or not. If not, you must provide a justification for the EA to review*

Reason

There are no proposals to monitor for dissolved methane in the groundwater. This is an expectation within our groundwater monitoring guidance. The same goes for putting the baseline samples through a GCMS scan to look for a wider range of compounds on a semi-quantitative basis to inform the site conceptual model and baseline conditions.

Current Status: **Section to be update with a revised Scheme of Monitoring. Discussions with the Environment Agency continue outside the scope of the Schedule 5 Notice period.**

Horse Hill Oilfield Geological Description Revision 1

69. *Confirm the key seismic lines which have been re-processed and when the data was re-processed to confirm the structural geological setting of the oilfield.*

Reason

Sections 2.3 and 2.4 of the Geological Description report suggest some seismic lines have been reprocessed since the original data acquisition but does not confirm the specific lines and when this data was reprocessed. An example of a seismic section in Figure 4. Figure 4 is not legible and does not clearly show the geological structure of the oilfield and faults that are present and the extent of these. This information is needed to support the Hydrogeological Conceptual Model.

Formal Response: Figure 4 has been revised and details of the specific lines has been provided in the back of the document.

70. *Revise Figure 14 to show shallower formations including the Tunbridge Wells Sand and Weald Clay.*

Reason

Faulting is discussed of section 2.8 of the report. Most faults terminate at or close to the unconformity at the base of the Weald Clay Group. This point has not been demonstrated effectively in Figures 4 or 14. Figure 14 predominantly shows the deeper geology markers and the Weald Clay has not been included in this Figure.

Formal Response: Weald Clay has been provided within Figures 4 and 14.

71. *Confirm the procedure for the proposed injectivity test on the Portland Sandstone post drilling and well testing, including how the test will be undertaken, fluid and chemicals to be used for the test and duration of the test.*

Reason

This information is needed to decide whether the injectivity test is a groundwater activity or not.

Formal Response: A reinjection procedure cannot yet be developed until the injectivity test is conducted. This permit application seeks to include the injectivity test as part of the permitted activities.

72. *Please provide an improved quality version of figure 4.*

Reason

The seismic cross section presented in Figure 4 is of very poor image quality and therefore difficult for a reader to examine.

Formal Response: Figure 4 has been revised.

73. *Please provide an improved quality version of figure 7.*

Reason

The images in Figure 7 are of very poor quality and therefore difficult for a reader to examine.

Formal Response: Figure 7 has been revised.

74. *Please provide details of the operating techniques for reinjection activities, and monitoring of well integrity.*

Overall – the geological description provides useful background information, though some of it is not strictly relevant to the environmental permitting regime. In outline, it suggests that it is reasonable in principle to carry out reinjection activities safely at the site (from a groundwater risk assessment perspective at least), and clearly presents a case for why reinjection would aid production.

What the report does not do is provide clear operating techniques which can be incorporated into the site environmental permit to clearly define the operations that will minimise the risks assessed elsewhere in the application.

Formal Response: A reinjection procedure cannot yet be developed until the injectivity test is conducted. This permit application seeks to include the injectivity test as part of the permitted activities.

Gas Management Plan

75. Please update your Gas Management Plan by either

- Providing a narrative justifying that the modelled scenarios account for the degree of change in scope of proposed permitted activities; or
- Resubmitting an air quality assessment or addendum providing predictions representing the change in impacts caused by change in scope of proposed permitted activities.

Would a narrative be provided, we recommend including an explanation of the equipment that could operate concurrently with the aim to provide a transparent picture of realistic baseline and worst-case scenarios for short-term impacts. Similarly, we also recommend the operation of each equipment within the year to be explicitly presented in order for us to evaluate baseline and long-term impacts.

Reason

The applications represent a change in scope of permitted activities on site. We are not satisfied that the current air quality assessment explicitly evidences the degree of change of impacts to air quality resulting from the operational permit variation.

There is a need to assess a baseline/existing scenario and compare it with future proposed scenario that includes the rest of activities (e.g. sources associated with drilling while the gas engines operate or vehicles on site – scenarios B/D in table 21 of the Air dispersion model appended to the Gas Management Plan).

Remodelling would imply including predictions of existing and future scenarios. The future scenario must include the additional emissions to air due to new equipment and increased operation of the existing equipment.

Formal Response: A revised Waste Gas Management Plan has been produced. The plan require regular updating as the development progresses, specifically for the introduction of additional production boreholes. The plan currently considers BAT for Well Testing each addition drilled borehole and BAT for Production (HH-1) only. BAT is an ever changing concept and as more wells are brought online BAT will inevitably shift. HHDL shall review the plan and submit it to the Environment Agency for approval prior to undertaking future production activities involving more than just the HH-1 well.

Flare details

76. Please update the Gas Management Plan to provide a detailed BAT assessment (using the above methodology) of the flare system that is proposed to be deployed at the site during both the drilling and production stages. The assessment should take into account the emergency events that the flare will be expected to deal with – in particular the gas flow rate and duration. The selected flare type must have the capacity to deal with the range of flows expected. The use of multiple flare stacks should be considered if a wide flow range is expected.

Reason

It is not clear from the information submitted with the application – specifically the Gas Management Plan – whether an enclosed flare or a shrouded flare has been proposed for deployment at site during the drilling and production phases (an enclosed flare is specified for the extended well test). Additional justification will be required if it's proposed to deploy a shrouded flare at the site. Indicative BAT provided is for an enclosed flare.

Guidance on determining which of the available technologies should be considered the best option at an individual onshore oil and gas is available on GOV.UK at the following web address:

Formal Response: A revised Waste Gas Management Plan has been produced and clarifies that an enclosed flare is being proposed. The plan provides both a quantitative and qualitative BAT Assessment for testing and production.

<https://www.gov.uk/government/publications/waste-gas-management-at-onshore-oil-and-gas-sites-framework-for-technique-selection>

Extended Well Test

77. Please update your Gas Management Plan to include measures that will be taken if gas yields during the extended well test fall below the minimum capacity of the flare to ensure combustion efficiency is maintained and that the release of uncombusted hydrocarbons is minimised?

The PW EWT 9.5 flare, proposed for deployment during the extended well test, has a minimum stated combustion capacity of ~1.0MWth. This equates to ~100Nm³/hr of methane. There is a need to include alternative measures and mitigations that will be adopted if gas flow rates during the well test fall below that of the flare.

Formal Response: A revised Waste Gas Management Plan has been produced, the assessment concludes that for both well testing and production the BAT for the management of the gas is incineration using a flare unit. As such any gas produced as part of the well testing will be co-mingled with the production gas for a short time ensuring that the rate falls within the scope of the flare unit.

Management of vent emissions

78. Please update the Gas Management Plan to include a more detailed assessment of the systems that will be installed to minimise VOC emissions from the site. Provide further details of the proposed VOC scrubber. The assessment should include examples of the type of system that will be employed and should demonstrate that the selected technology is capable of dealing with the expected VOC emission rate from the storage tanks at site. If the preferred technology is incapable of dealing with all the expected emissions consideration should be given to alternative systems. Alternative systems could include destruction of VOCs in the proposed engine or flare units' subject to the incorporation of appropriate safety systems such as flash arrestors to mitigate risks such as "flare-blowback".

Reason

Section 11.1 says that a scrubber is to be installed to capture and recover VOC emissions from the storage tank vents. It is noted that it is proposed to install a VOC scrubber on the proposed single co-joined vent stack to recover VOCs from vapours emitted from the crude oil storage tanks. There is a description of what the scrubber will need to do but no detail of the proposed scrubbing system or what is likely to be installed.

Formal Response: A Vapour Recovery Plan to consider the vapour emissions from the site has been produced.

79. Please revise your gas management plan and the associated air quality impact assessment in Appendix 2 to include assessments of impacts and mitigations associated with the proposed extended well tests for wells HH3, HH4, HH5 and HH6.

Include the increase of storage capacity beyond the limits specified in standard rules permit as the other justification for varying to a bespoke permit.

Formal Response: A revised Waste Gas Management Plan has been produced, this includes a revised Air Quality Impact Assessment.

Odour management plan

80. *Please update your odour management plan and odour risk assessment to include assessments and mitigations that will be taken to manage any odours that may arise in the event of unplanned or unforeseen gas venting incidences and catastrophic tank failure.*

Reason

In section 8.1 you have not included unplanned gas venting and catastrophic tank failure as likely sources of odour emissions. There is a possibility of unplanned gas venting occurring on oil production sites. Any odours associated with such events will need to be considered as part of the odour risk assessment.

The major sources of odour appear to have been considered, although it is unclear whether containment failure includes catastrophic tank failure.

Formal Response: Unplanned gas venting and catastrophic tank failure are not 'likely' sources of odour emissions. The where unplanned venting was to occur it would be at the enclosed ground flare which has been captured in section 8.1. Likewise, a catastrophic tank failure, as the name suggests, would take place at the stock tanks, but could be any part of the production line.

HHDL have included these two instances within the odour risk assessment for the unplanned venting of natural gas and the catastrophic plant failure. In the event of a catastrophic failure Odour would be considered for remediation, but nuisance odour will not take precedent over fire / environmental contamination risk.

Minimising annoyance

81. *Please update your odour management plan to include a discussion on actions the Operator will undertake in interacting with complainants who may complain of odour nuisance from the site.*

Reason

In section 12 of the OMP, you have stated details of the complaints procedure. It is important to ensure that the complaints procedure thoroughly considers and requires action on complaints and produces an outcome which is feedback to the complaints. Further investigation and reporting to the Environment Agency by itself is not appropriate in satisfactorily dealing with the complaints.

Formal Response: Section 12 clarifies that any odour complaint shall be recorded as per the Odour Complaint Form with all information requested on the form to be captured. All actions undertaken to mitigate the risk shall be communicated to the complainant and will work with them so successfully close out the complaint and resolve any issues.

Environmental Risk Assessment

82. *Please clarify the key control measures that will be relied upon to reduce risk for each scenario included in the report.*

Reason

The Risk assessment includes multiple measures for reducing the risk. Many of these appear in most, if not all, entries within the table. It is not clear what the main, critical, control measures are.

Formal Response: All control measures are considered key. They shall be used as necessary to mitigate the associated risk. During the operations the mitigations will be used, If required HHDL will consider additional mitigation, proportionate to the level of risk. The environmental risk assessment will be the subject of revision during operational periods and shall be the subject of review by the Environment Agency should additional mitigation be required.

83. *Please revise your environment risk assessment to include risks and associated mitigations that the proposed permit variation will likely have on key receptors that include surrounding residents and households living in proximity to the site, ancient woodlands such as Wrays Woodland and Bowgardens Woodland which within 500 metres of the site, and Spencer's Gill.*

Reason

There are some residents who live less than a mile from the site. The effect that the proposed activities will have on these residents have not been characterised within the environmental risk assessment. The guidance that you have followed in producing the environmental risk assessment include humans as receptors. If you do not think that the proposed effect will not have any significant risks on human receptors, you will need to state the reasons in your Environmental Risk Assessment.

In Section 4, Table 4.5, the River Mole is on the list of water features, but not the Spencer's Gill, which is the ultimate receiving water for the permitted surface water discharges from the site. This should be amended to include Spencer's Gill as a receptor.

Formal Response: Spencers Gill has now been included within the list of receptors. The Risk Assessment already considers the risk to persons and receptors within 500m of the site. As good practice, we extend the boundary of sensitive receptors to 2,000m. The control measures and risks considered within the risk assessment conclude that the risk is either 'Not Significant' or 'Low' to those receptors within 500m and 2,000m. The methodology used follows the EA's own guidance which has been used successfully countless times. In addition specialist assessments such as Hydrogeological Risk Assessments and Air Quality Impact Assessments have also been provided confirming the level of risk. It is not clear what exactly the EA are asking.

84. *Explain what is meant by the risk management mitigation measure for the acid wash (source) that if groundwater is present in a target formation it will be considered permanently unsuitable due to the presence of hydrocarbons.*

Reason

The Environment Agency would not consider that this to be an appropriate mitigation measure. The direct input of a pollutant to groundwater is prohibited even if a formation has poor groundwater quality.

Formal Response: Reference has been removed. However, by way of an explanation the use of acid (as a deminimis activity) into a formation with poor groundwater quality, would always be considered as having less impact than that of a formation bearing better quality groundwater that may be usable. Again, this reference has been removed.

Assessment of Groundwater Risks

85. *Please remove reference to 'permanently unsuitable' or alternatively provide a justification (that the EA will then have to assess and accept) for designating any local groundwater bearing rock strata as permanently unsuitable.*

Reason

Row 002 makes references to groundwater being within 'permanently unsuitable'. The Environment Agency has not agreed that the Portland Formation at this location is permanently unsuitable, nor have we previously been approached by HHDL to make a decision about this. If you wish to make an application for designating the local bearing water formation, you must provide relevant evidence to justify the designation.

Formal Response: Reference to permanently unsuitable has been removed.

86. *Please amend the comments in row 003 to more clearly and accurately describe current and planned surface water drainage arrangements.*

Row 003 refers to a 'sump' collecting rainwater, in a comment separate to comments about the site perimeter drainage ditch. We presume, from reviewing the application, that this is a reference to the proposed below ground water storage tank for the extended site area, but cannot be certain.

Formal Response: This has been removed due to HHDL no longer proposing an extended site.

87. *Please include a row assessing risks from the proposed reinjection of produced water via the reinjection well*

Reason

The table is missing a row referring to the potential risks from a groundwater reinjection activity.

Formal Response: This row has now been included

Assessment of Fugitive Emissions Risks

88. *Please amend the comments in row 007 to more clearly and accurately describe current and planned surface water drainage arrangements.*

Reason

As with comments above, row 007 makes no reference to the proposed separate drainage system on the extension area of the site, where water won't be collecting in a ditch, but instead will be collected in a below ground tank.

Assessment of Possible Sources of Accidents

Formal Response: This has been removed due to HHDL no longer proposing an extended site.

89. *Please confirm construction details of the proposed new wells (or refer to the diagrams provided in the HRA) and associated infrastructure such as well cellars and mousehole/ratholes.*

Reason

Row 002 refers to grouting of ratholes/mouseholes around the well cellars. We note that no drawings or construction details on the well cellars or associated infrastructure has been provided with this application.

Formal Response: This shall be included within the Site Condition Report and shall be included within a CQA Plan. Please note that a mouse hole and/or rat hole may not be required as it is dependent on the type of rig being used to drill each well.

Assessment of Discharges to Surface Water

90. *In row 001, please include a discussion of removal of water from site, or alternative arrangements for temporary storage of water.*

Reason

Row 001 considers the risk of overflow from site perimeter ditch. There is no discussion or further information of removal of water from site, or alternative arrangements for temporary storage of water.

Formal Response: The mitigation measures explain how water shall be managed in the event overflow is apparent. Should the ditches become full it is important to consider that the site would become flooded before exceeding the site boundary. A vacuum tanker would be brought to site in the event the discharge rate was not sufficient for removing water quick enough in the event of a flood event.

Assessment of Disposal or Recovery of Waste Produced Onsite

91. *In row 004, please define the source of flow back fluid.*

Reason

Row 004 refers to 'flowback fluid' but does not define what the source of flow back fluid will be.

Formal Response: Clarified as 'Produced Water' if not reinjected.

92. Please clarify why "Paper and cardboard from office routines which is described in row 015 is characterised as a "hazardous waste stream".

Reason

Row 015 describes 'Paper and Cardboard from Office Routines' is a "hazardous waste stream". We need to clarify whether this characterisation was made in error as it would seem more likely this would be a non-hazardous waste stream.

Formal Response: Correct this has been correct as a Non-Hazardous Waste Stream

Additional Issues for Waste Management Plan

93. *Please confirm if it is the intention of the operator to carry out composting activities or other waste treatment onsite? If it is the intention to do so, these are permitted activities which will require to be permitted. If they are not being planned for the site, then this section of the WMP must be amended to make it clear that these activities will be done offsite and not part of the activities being covered by this WMP.*

Reason

Section 7.2.4 states that other recovery that recovery to be carried out on site includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste, some backfilling.

If the intention is to carry out anaerobic digestion, gasification and pyrolysis, these are permitted activities which will require to be permitted. If they are not being planned for the site, then the WMP must be amended to make it clear that these activities will be done offsite at an appropriately regulated facility.

Formal Response: Section 7.2.4 has been amended to confirm that composting activities shall not be undertaken at site.

94. *In section 10 of the WMP, please provide details of the procedures for testing the impermeable membrane and subsequent remediation measures if required.*

In section 8 on Environmental and human impact, you have made reference to details of how the site was constructed for the exploratory phase and have stated measures that will be taken to mitigate long term environmental impact. As the site is now moving into production phase, the plan must include specific details of how then site will maintained in the long term to prevent pollution to the environment. In particular, the impermeable membrane will be need to be monitored and remedial action taken throughout the life span of the site in order to ensure satisfactory measures are being undertaken to prevent groundwater pollution. These procedures must be included into the WMP. The WMP will be subject to usual compliance audit in future.

Formal Response: Section 10.1.1.1 has now been prepared to explain how the membrane shall be checked to ensure it has kept its integrity. It is proposed to use a non-invasive method called Electromagnetic Ground Conductivity Survey and/or Ground Penetrating Radar.

95. *Please include the monitoring procedures and testing in place to confirm the integrity of the re-injection well(s) for the lifetime of those wells, monitoring frequency, remediation measures (and reporting procedures) should the integrity monitoring results indicate that a well integrity failure has potentially occurred.*

In section 8 on Environmental and human impact, you have outlined the environmental impact of your operations and how these will be managed. As the site is now moving into a production phase, the plan must include details of how the impermeable membrane will be monitored and remedial action taken throughout the life span of the site in order to ensure satisfactory measures are being undertake to prevent groundwater pollution.

These procedures must be included into the WMP. The WMP will be subject to usual compliance audit in future. (for site condition report??)

There is text missing in section 9 paragraph 8 are some words missing in section to address

Formal Response: Well design, construction and integrity management is conducted on each well in line with HHDL Well Planning Design & Operating Standards and undergo independent Well Examination. This is the overarching technical and operational set of standards that will be applied specifically to individual wells and their characteristics. Each well, prior to construction shall be designed and subject of Independent Well Examination in accordance with the Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR). Such procedures shall not be included as part of the application but the commitment has been made within section 6.1 to design, construct and maintain the well in accordance with the DCR. The standard shall remain at site however and will be present for inspection by the EA compliance officer. DCR, regulated by the Health and Safety Executive, is the overarching piece of legislation with regards to well integrity.

A Secondary and Tertiary Containment Plan shall also be developed to confirm the integrity testing of the membrane throughout the life of the wellsite.

96. *Please provide a written 'leak detection and repair plan', and associated procedures to identify, measure and reduce emissions of volatile organic compounds and other substances to air. The procedures must be appropriate to your operations and must be in accordance with European standard EN15446 or an equivalent standard.*

In section 10.5 of the WMP you state that in the event of any unexpected release of natural gas or oil releases, the Environment Agency will be notified in accordance with the environmental permit requirements. The WMP does not include any precautions that will be taken to minimise the likelihood of natural oil or gas releases.

It is necessary to have a leak and detection plan so as to minimise any unexpected releases of natural oil or leaks. The leak detection and repair plan will be essential in managing fugitive VOC emissions from potential leak points such as seals, flanges, pumps and valves. This standard technique is a method for identifying and prioritising potential sources of leaks, developing a leak detection and repair programme using the monitoring standard EN 15446 including assessing reductions in emissions resulting from the programme and estimation/calculation of any residual emissions. The EN 15446 method is described in the Refineries BRef (2015) as an available method for carrying out monitoring of fugitive emissions. Alternative but equivalent methods can be proposed.

The leak and detection plan can be referenced in section 10.5 and included as an appendix to the WMP.

Formal Response: A Leak Detection and Repair Plan has now been included as part of the permit application and has been made referenced to in Section 10.5 of the WMP.

97. *Please amend the Waste Management Plan (WMP) to include details of how the surface water discharges from the oil treatment area will be treated prior to discharge. You may make reference to the Surface Water Management Plan requested for the groundwater activity permit application EPR/BB3691NN/V003 that outline how rainwater will be treated prior to discharge.*

The WMP must fully describe the operations generating all waste streams and any subsequent treatment. It must also contain measures for the prevention of deterioration of water bodies' status in accordance with the Water Framework Directive (2000/60/EC). Discharge from an oil treatment area is potentially unsuitable for discharge to a water course, so further clarification of the drainage requirements will need to be included within the WMP or referenced within the WMP if it is provided elsewhere within the application support documents.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.

98. *Please amend Section 4.1.4 of the WMP to include details of how rainwater will be treated prior to discharge. You may make reference to the Surface Water Management Plan requested for the groundwater activity permit application EPR/BB3691NN/V003 that outline how rainwater will be treated prior to discharge.*

Section 4.1.4 concludes that the drilling of additional wells will not constitute a groundwater activity. We agree with this stance in principle, pending review of further details relating to the Waste Management Plan (WMP) and the Hydrogeological Risk Assessment (HRA).

This Section also mentions that rainwater collected within site containment bunds may be collected alongside produced water and retained for reinjection. No mention is made about the tests that will be carried out to ensure that the water is uncontaminated before being discharged, or how it will be treated prior to discharge, which is an absolute minimum requirement under any groundwater activity permit.

The WMP must fully describe the operations generating all waste streams and any subsequent treatment. It must also contain measures for the prevention of deterioration of water bodies' status in accordance with the Water Framework Directive (2000/60/EC). Discharge from an oil treatment area is potentially unsuitable for discharge to a water course, so further clarification of the drainage requirements will need to be included in the WMP or reference within the WMP if it is provided elsewhere in other application support documents. Reference can be made to the Surface Water Management Plan requested for the groundwater activity permit application EPR/BB3691NN/V003 that outline how rainwater will be treated prior to discharge.

Formal Response: A Surface Water Management Plan shall be produced and shall be referenced within the WMP. Details of any waste produced as a result of the treatment process shall be captured within the Waste Management Plan.