

North Lincolnshire Council
Civic Centre
Ashby Road
Scunthorpe
North Lincolnshire
DN16 1AB

For the attention of Shaun Robson, Development Management and Building Control

Our Ref: SJW\2018s1208-L-L001-4

16 October 2018

Dear Sirs,

Wressle - New Application Review (Planning Reference PA/2018/1316)

JBA have undertaken a review of the following new documents submitted to the planning portal with regard to the Wressle Well site:

1. Hydrogeological & Flood Risk Assessment – Wressle-1 Well, Wressle Wellsite, Lodge Farm, Appleby, Scunthorpe, North Lincolnshire, Envireau Water, 4 July 2018.
2. Civil and Structural Design Statement, Wressle Well Site, Alan Wood & Partners, 25 May 2018.

These documents have been reviewed in the light of the findings of the Public Inquiry undertaken in 2017 with regard to this site, which concerned risks associated with potential water pollution at the site. Only parts of the Design Statement relevant to groundwater/surface water protection have been reviewed.

A summary and suggestions regarding planning conditions is given at the end.

1 JBA Review

1.1 Planning Inspectorate Requirements

There were three main groups of issues that the planning inquiry identified (APP/Y2003/W/17/3173530):

- hydrogeology conceptualisation,
- containment design,
- and monitoring requirements.

The decision is appended to this letter.

JBA Consulting have reviewed the new application (see Section 1.2) and then assessed the new application against the issues identified in the last planning enquiry (see Section 1.3).

The technical appendix to this letter provides JBA Consulting detailed review of the application.

1.2 Conclusions of Review of New Application

Overall the new documents provide considerable additional information in terms of:



1. New ground investigation data, including some geotechnical data;



Salts Mill
Victoria Road
Saltaire
SHIPLEY
West Yorkshire
BD18 3LF
United Kingdom

+44 (0) 1274 714 269
info@jbaconsulting.com

www.jbaconsulting.com

Follow us:  

Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

Jeremy Benn Associates Limited
Registered in England 3246693

JBA Group Ltd is certified to:
ISO 9001:2015
ISO 14001:2015
ISO 27001:2013
OHSAS 18001:2007

2. Additional mitigation measures;
3. Assessment of the conditions on site;
4. Additional design regarding the site bearing capacity.

The ground conditions are more adequately characterised and this information has been included in the site design.

The following information was not provided:

1. Bulk permeability testing (such as packer testing or pump testing) in the Great Oolite Formations regarding the degree to which these formations provide protection for the Lincolnshire Limestone at an aquifer scale.
2. Plate CBR tests on the granular layer on site to establish the on-site load bearing capacity over the whole of the site.

The overall conclusions of the risk assessment are probably unduly optimistic with more Source-Pathway-Receptor linkages assessed with risk as 'very low' or 'none', when they could be 'low' or 'very low' respectively (see appendix A for further discussion). However, we would not propose that any risks are medium or high. So changing the risk assessment would change the emphasis but not the overall conclusions. A reasonable level of containment and other mitigation has been proposed.

However, it is very important that the proposed measures for the site are enforced via planning conditions. If the containment system fails then the choice of location means that there is a contaminant pathway to the underlying aquifer systems and the British Steel boreholes.

1.3 Review Against Planning Inspector's Decision

The following table provides a summary of the revised documentation with regard to the points raised by the Planning Inspector at the November 2017 Enquiry (Appeal Decisions by Mr K L Williams BA, MA, MRTPI, 4th January). The assessment has been divided into the areas of issues identified in Section 1.1. In order to understand the context of some of the points, the Planning inspector's decision is appended to this letter and should be read in conjunction with this review. Further detailed assessment is provided in the Technical Appendix.

Table 1 – Summary of JBA Review against the Planning Inspector Requirements

Requirement Group	Inspector Requirements (4/1/18)	2018 Envireau Report (4/7/18)	JBA Review Comment	JBA Conclusion of Requirement Group
<p>Hydrogeological conceptualisation and hydrogeological risk assessment</p> <p>-The inspector's decision raised a series of issues related to the interpretation of the hydrogeological setting and the hydrogeological risk assessment</p>	<p>Para 18. Evidence for a upward/downward hydraulic gradient particularly regarding artesian conditions.</p>	<p>Table 17 page 31 provides details of water levels in the Lincolnshire Limestone and shows artesian conditions are not present in 2017 and there is currently a downward hydraulic gradient. It is stated that the existence of historic artesian conditions means that the Lincs. Lst. is "sealed". Table 18 gives 2018 ground-water levels.</p>	<p>There is good evidence for a current downward hydraulic gradient, with the gradient increasing with depth to the Lincolnshire Limestone. Artesian conditions are common in undeveloped aquifers over-lain by lower permeability strata, and do not imply that the aquifer is completely sealed.</p>	<p>Our review identifies several limitations to the new assessment however, these are not sufficient to change the overall conclusions.</p>
	<p>Para 19 Engineered logs should be provided.</p>	<p>Engineered logs have been provided for new boreholes DSI1 and DSI2 and WS01-06. Core testing of No. 6 clay/mudstone samples for permeability (a measure of the ability for a rock to transmit water and pollutants) has been undertaken.</p>	<p>These provide a reasonable description of the site geology. The main omission is on-site permeability testing in the boreholes such as packer/pump testing which would be more informative than core permeability testing which is what has been undertaken in this case. The direction of the core testing relative to the sample (vertical or horizontal) is not clear, but is potentially vertical. It would be expected that vertical permeabilities in the clay which has been subject to testing would be very low. However, flow through fractures and horizontally along more sandy/ permeable horizons is usually the most significant flow in low permeability strata.</p>	
	<p>Para 19 Clarification of the Kellaways Formation role as a potential capping layer as it only covers half the site.</p>	<p>Borehole (BH) logs for DSI1 and DSI2 both show a 1.4m clay horizon at the base of the Kellaways Formation. Analysis of No. 2 core samples within the Kellaways Clay in DSI2 indicated permeabilities of 1.9×10^{-10} and 3.1×10^{-11} m/s. The Kellaways clay observed in BH DSI1 is also confirmed at a similar depth in the base of BH WS01.</p>	<p>The borehole logs indicate that there are clays (probably Kellaways Clays, or possibly glacial origin) across the majority, but possibly not all of the site. These are thin - only 1.4m thick, but have a low core permeability. No in-situ permeability tests within the boreholes were undertaken so the bulk permeability of the Kellaways Clays is not known. Low permeability strata generally permit water flow through fractures or discontinuities rather than through their matrix.</p>	
	<p>Para 19 clarification of the nature and effectiveness of the capping layer above the Lincs Limestone.</p>	<p>Borehole DSI1 has No. 3 core samples of mudstone and clay within the Blisworth Clay/Limestone/Rutland Formation which gave low permeabilities. One sample from the same horizon in DSI2 gave similar low permeabilities.</p>	<p>This confirms the low matrix permeability of the samples as analysed. No borehole permeability testing was undertaken, so the bulk formation permeability is not known. Packer/pump testing would have been more informative. The coring indicated some level of fracturing within the Blisworth Clay/ Limestone /Rutland Formation but again the data are not available for all horizons. Some sand horizons are present and some horizons had no core return: possibly due to poorly cemented permeable sands washing out. Measured groundwater levels in the Lincs Limestone appear to vary very significantly beneath the site: 25.38mbgl 21/2/17 BH4, 17.1m bgl (part way through the Lincs Limestone) 23/3/18 DSI1, 6.7mbgl top of Lincs Lst, 28/3/18, DSI2. This may be related to drilling effects in DSI1 and DSI2, pumping influences in the Limestones and/or to interlaying/fracture intersection in the aquifer.</p>	
	<p>Para 20 Connection between site and British Steel borehole through the Great Oolite Secondary aquifers.</p>	<p>2018 borehole data appear to show that there is a clay horizon (1.4m thick) across much of the site. This has the potential to protect the Great Oolite to some degree. The report recognises (page 34, second para.) there may be a connection between the superficial sands and the Great Oolite (Cornbrash/ Blisworth/Rutland Formations) at the very western edge of the site.</p>	<p>The Kellaways Clays thin out across the site. The Envireau report suggests they thin out at the western end of the site. BGS mapping suggests the clays thin further east. There may also be glacial clays present. Where the Kellaways Clays are absent there will be a pathway to the Cornbrash Formation and also a downward gradient to move contamination towards the British Steel BHs either along the Cornbrash horizon or vertically down through the other Oolite aquifers via fractures.</p>	

Containment Design -The inspector's decision raised a number of issues related to how the site containment had been designed, constructed and its current state.	Para 23 The existing perimeter containment ditch would be re-lined with new geosynthetic clay liner (GCL).	A new HDPE (High Density Poly Ethylene) liner is proposed instead of repairing/upgrading the existing GCL liner. The HDPE Carbofol impermeable membrane and protective geotextiles will extend to cover the existing perimeter containment ditch system, which will be piped with a 300mm ø perforated drain and backfilled with a porous drainage material (single size 40mm – Design Statement) up to finished ground levels to form a French drain.	Use of a new liner/containment system to replace the existing bentomat layer is acknowledged. Drainage material for this layer should be free of contamination, single size and fines free and not subject to silting. A maintenance plan should be included with regular, yearly, inspection and jetting of pipework to ensure pipework remains debris free. A camera survey or similar test should be undertaken prior to operation to ensure the as built specification. As the GCL layer is proposed to remain on site it would provide additional site protection if it is repaired (if required) when exposed during the site re-engineering, so as to provide an additional level of site protection.	The new application deals with the containment design through a new design based upon geotechnical data and which will be verified through CQA. We recommend that the CQA process is formalised as a planning condition to ensure that the site is built as proposed.
	Para 24 Provision of a ground investigation report.	A ground investigation report has been provided, including engineered logs for 5 new shallow boreholes and two deeper bedrock boreholes, (Opus March 2018).	The new data provide a reasonable level of geological data.	
	Para 24 Acceptability of ground conditions and risk of settlement of geosynthetic clay liner (GCL) needs to be demonstrated.	Cone penetration tests (turned into a CBR ratio) indicate a range of bearing capacities some of which are very low. The bearing capacity calculations indicate that 0.28m of soil is required without a geogrid. So, the 300mm aggregate layer which is proposed is only just enough. There is no margin for error.	The bearing calculations should be undertaken on the lower bound of the CBR values determined on site, not the average as presented. Whilst it is accepted that some of this material was disturbed prior to testing, given the importance of this protective layer in preventing contamination from migrating downwards JBA recommend that plate CBR tests should be undertaken on site, ideally on an off set 2m grid to confirm the on-site conditions prior to finalising site design. Bunding on site should be compacted sufficient to mitigate long term settlement. If the bund is trafficked, or has crossing points, these should be reinforced.	
	Para 26 Adequacy of the covering of the GCL including with regard to EA and manufacturers guidance and passage of traffic.	Cylinder tests have been undertaken with proposed new membrane and on-site stone to check suitability (Appendix 1, Alan Wood Report). Reinforced concrete is proposed for high load areas of truck access and storage tanks.	It will be important during the life of the site to ensure that the thickness of 300mm cover material outside of areas of concrete hardstanding is maintained and is not rutted or reduced. The aggregate used for the cylinder test was well rounded with considerable fines. The existing aggregate on site is not all well rounded and it should be clean with limited fines (to facilitate drainage and flood storage). The picture of the test material contains a high level of fines which is not considered representative. In addition, it is noted the test does not allow for repeat loading cycles which may result in damage to the liner where one cycle of loading does not.	
	Para 27 requirement for a thicker layer of stone on site to ensure GCL integrity.	The same stone as at present is proposed but regraded to exclude sizes over 125mm (Alan Wood para 3.3 page 11). An additional HDPE liner proposed under the stone and associated geotextiles above Naue Secutex 301 and below Naue Secutex 801 or similar.	This approach justifies the use of the thinner thickness of stone layer than ideal through the use of site specific testing. The proposed use of concrete roadways for site traffic will also reduce the risk of liner puncture. It is recommended that the roadways are fenced and there is no vehicle traffic outside of the reinforced areas, except low ground pressure/light tracked vehicles. The volume of storage required on site within the perimeter bund means that a thicker stone layer could require raising the bund. The angularity of the stone aggregate used on site should be checked that this is compatible with that specified for use with the HDPE liner. The material which is used to form the stone layer should be free from contamination.	
	Para 28 potential for leakage through the GCL.	An additional HDPE Carbofol 2mm membrane is proposed with Construction Quality Assurance (CQA) as per EA Earthworks in Landfill Engineering Ch 6. Contamination testing on site shows some contamination, potentially attributed to the source of stone in the near surface granular layer but none deeper.	The HDPE liner is relatively impermeable but is more vulnerable to localised puncture than a bentonite based GCL. However, reasonable CQA is proposed and 2mm is a reasonably thick liner for this type of material. It can be susceptible to UV degradation so any exposure e.g. at the edge of drainage ditches (where the existing liner has been exposed) should be avoided. The source of stone for the granular layer on site above the liner should be tested regarding contamination.	
	Para 29 details of the type of interceptor required to achieve clean water to be agreed in a planning	Kingspan Klargester full Retention Separator NSFP006 Class 1 with oil alarm including alarm beacon and audible alarm.	Whilst the interceptor may be suitable for light hydrocarbons (it is used in garage forecourts) it may not be so able to retain denser oils/crude hydrocarbon, or formation/produced water contaminants. Use a silt trap in addition upstream of the interceptor could be useful. The interceptor performance is not related to the determinands specified for analysis in the monitoring samples – which are related to potential site contaminants. Further information should be provided by the applicant on	

<p>Monitoring -the decision identified issues with the construction and location of monitoring boreholes</p>	<p>condition. Para 39 appropriate design and screening of monitoring boreholes (could be addressed by condition).</p>	<p>One new borehole location is proposed between the site and Ella Beck. The existing boreholes are to be re-drilled to screen the whole of the superficial sands with boreholes penetrating 0.5m into the underlying clay.</p>	<p>the performance of this interceptor to capture the full range of potential contaminants from the site. It is important that the boreholes which are specifically for monitoring of shallow groundwater conditions below the site do not to puncture the 1.4m clay and provide a pathway for contamination directly to the underlying permeable strata (Cornbrash).</p>	<p>The issues regarding monitoring appear to be addressed by new monitoring boreholes to replace the existing ones and an additional borehole to cover a gap in the monitoring coverage. This can be verified through condition</p>
--	---	---	---	---

2 Planning Conditions

There are a number of aspects of the proposals regarding site engineering and mitigation which are proposed but have not yet been implemented. As identified in the section above, it would be prudent to capture these through planning conditions to ensure that these aspects of the development are undertaken as planned, and if required the proposed working methods are clarified and approved. The following aspects, in particular, should be assured by conditions and the actual measures undertaken approved prior to site usage for hydrocarbon extraction.

1. Monitoring boreholes: it is proposed to reinstall the existing monitoring boreholes so as to monitor the whole of the saturated thickness of the superficial sands (down to 50cm within the first clay horizon).
2. Provision of an additional monitoring borehole between the site and Ella Beck.
3. Additional on-site plate CBR testing should be undertaken to confirm the bearing capacity on site to confirm the design of the containment system.
4. If the cylinder test results are to be used, these tests should be repeated with the final screened aggregate and repeat loading cycles.
5. The quality assurance of the proposed mitigation should be provided for approval by the Council. In particular, the installation of the HDPE liner and interceptor are both critical to the functioning of the mitigation system. Full CQA documentation for this should be provided. Testing should be provided to demonstrate that the aggregate used on site is free of contamination. This should include a maintenance plan and a camera survey to confirm as-build specification.
6. The mechanism for re-engineering the site containment whilst occupying the site is not clear, (e.g. where is the stone layer to be stored while the new liner and geotextiles are installed? Are the final tanks new, or are the existing 4 tanks reused? How is the sub-base to be removed so as to retain the GCL layer?). These points could be clarified in terms of a condition regarding provision of the working methods proposed for re-engineering the site (See Technical Appendix of this letter for further discussion). Similarly, the size, angularity and quality of the final stone layer should be confirmed as suitable for use with the liner and as a free-draining layer. Measures to repair the GCL liner where it may be damaged should also be provided for.
7. No trafficking should be allowed outside the reinforced concrete area, except low ground pressure/light tracked vehicles, or in exceptional circumstances in response emergencies such as response to spills. If in such circumstances the liner is trafficked where it is not reinforced its condition should be checked afterwards.

3 Summary

In comparison with the previous applications, in the new documentation the main weaknesses identified by the Inspector appear to be have addressed, or can be addressed in planning conditions. Section 1.3 of the letter provides a detailed review of each issue related to the potential for groundwater pollution raised. Below is a summary of that assessment.

The first issue regarding hydrogeology conceptualisation has been addressed through a new hydrogeological risk assessment. Our review (Section 1.3 and Technical appendix below) identifies several limitations to this assessment however, these are not sufficient to change the overall conclusions.

The new application deals with the second issue (containment design) through a new design based upon geotechnical data and which will be verified through CQA. We recommend that the CQA process is formalised as a planning condition to ensure that the site is built as proposed.

The issues regarding monitoring appear to be addressed by new monitoring boreholes to replace the existing ones and an additional borehole to cover a gap in the monitoring coverage. Again, this can be verified through condition.

We would be willing to discuss the implications of this review with the Council, its officers and/or councillors.

Yours faithfully,
For **Jeremy Benn Associates Limited**

Susan Wagstaff
Technical Director Hydrogeology
susan.wagstaff@jbaconsulting.com

Michael McDonald
Technical Director Hydrogeology
michael.mcdonald@jbaconsulting.com

Alexander Jones
Chartered Senior Hydrogeologist
alexander.jones@jbaconsulting.com

Encs. Technical Appendix A
JBA Appendix C Interpretative Geological Cross section
Envireau BS Clapgate Boreholes, Figure 4,
2017 Public Inquiry Inspector's Decision
Envireau Water Figure 17, 19, and 20.

TECHNICAL APPENDIX A

1 Hydrogeological & Flood Risk Assessment, Envireau, 2018

1.1 Proposed New Liner

Para 3.1.1, page 7 of Envireau's report discusses the proposed new surface design of the site including a revised tertiary containment system. This provides for new geotextile layers underlying and overlying a new 2mm HDPE membrane. 300mm of regraded granular material will be placed on top (see Figure 7 Envireau 2018). Some concrete areas will be provided beneath product storage and trafficked areas.

This is an alternative design from that previous discussed at the planning inquiry where placement of a thicker stone layer on site was considered. It does provide an additional low permeability membrane in addition to the existing membrane (which may have been subject to wear/overloading). It should be noted that the existing membrane appeared during site visits to be exposed in the perimeter ditches and subject to weathering. It appears that the existing GCL membrane will not be replaced in the ditches as originally proposed with reliance now made mainly upon the new HDPE membrane. Para 3.1.3 page 8 suggests that the ditches will be lined with the new HDPE but the existing GCL membrane will not be upgraded or repaired.

The use of a reasonably thick HDPE liner with an adequate covering and geotextile protection should, if correctly installed, provide good tertiary protection of the strata underlying the site from spillages on site. The correct installation needs to be demonstrated through appropriate CQA (Construction Quality Assurance), which was absent from the previous liner design. However, it would be beneficial if the existing GCL membrane were also repaired so as to provide additional site protection. The bentonite GCL liner has the benefit that it can self-seal small holes. HDPE liners don't have this characteristic.

1.2 Geological and Hydrogeological Understanding

The site is underlain by a series of aquifers, as designated by the Environment Agency (see page 25 Envireau, 2018). These include, from the ground surface down to the base of the Inferior Oolite:

- Sutton Sand Secondary A Aquifer,
- Kellaways Formation, Secondary A Aquifer,
- Great Oolite Group
 - Cornbrash Formation, Secondary A Aquifer,
 - Blisworth Clay, Secondary B Aquifer,
 - Blisworth Limestone Formation, Secondary B Aquifer,
 - Rutland Formation, Secondary B Aquifer,
- Inferior Oolite Group
 - Lincolnshire Limestone, Principal Aquifer
 - Grantham Formation Secondary Undifferentiated Aquifer,
 - Northampton Sand Formation Secondary A Aquifer.

Given the predominance of aquifers beneath the site, combined with limitations in the previous site investigation data (specifically the standard of the borehole logs provided)

there was uncertainty regarding whether the Lincolnshire Limestone principal aquifer was protected from contamination by the overlying strata. The Envireau report (2018) provided additional borehole logs and permeability testing to address this.

There is some level of uncertainty remaining regarding the geological interpretation of the site although this probably doesn't significantly affect the results of the assessment. The lithological descriptions given in boreholes DSI2, GWMBH3 and GWMBH4 are not entirely the same at similar depths. Table 10 para 5.4.2 page 21 gives the shallow geology interpretation from the deeper DSI boreholes drilled in 2018 (Appendix B). There is a difference in interpretation between the DSI geological logs and Table 10 in the report regarding the thickness of the Sutton Sands Formation relative to the Kellaways Formation in DSI2. This appears to be because it is difficult to distinguish these strata in the field.

It is not totally clear if the core samples were analysed for permeability in the vertical or horizontal direction, although Envireau page 37 (final line) appears to indicate that they are vertical permeabilities. In interlayered samples, e.g. DSI1 11.00-11.35m, there is likely to be significant difference (up to several orders of magnitude) between the vertical and horizontal permeabilities of core samples.

Additionally, although the vertical permeabilities of the clay cores analysed are very low, in practice groundwater flow through low permeability strata is typically via discontinuities such as fractures (vertically) and higher permeability horizons (horizontally/down dip).

1.2.1 Aquifer Designations

There is considerable discussion in the Envireau report regarding the hydraulic properties and effectiveness of various aquifer units, especially the Great Oolite which comprises the Cornbrash Formation, Blisworth Clay Formation, Blisworth Limestone Formation and Rutland Formation. In Table 13 Envireau Water have developed their own aquifer designations and have designated the Rutland Formation as unproductive strata although the lithology found on site is not significantly different from the BGS lexicon lithology and so likely to be fairly typical of the Formation elsewhere. The Rutland Formation is designated by the EA as a Secondary B aquifer.

The Cornbrash Formation is also designated Secondary B by Envireau Water rather than given the EA Secondary A designation. This degrading of aquifer designations does not appear to be justified.

There are some losses of core in the deeper DSI boreholes 1 and 2 which are probably associated with sandstone rich, poorly cemented or fractured horizons which disintegrate during drilling. It would be prudent to assume that the horizons with no core recovery are reasonably or highly permeable and not clay/mudstone. Clay/mudstone usually has good core recovery. If (as is likely) the no-core recovery horizons are permeable sands this would result in the Great Oolite horizons (Cornbrash, Blisworth Clay, Blisworth Limestone and Rutland Formations) being much more permeable and a more significant aquifer than has been allowed for in the Envireau report.

1.2.2 Aquifers on Site

The Envireau report details (para 5.5.5 page 31-32) some groundwater levels within the Lincolnshire Limestone around the site, from various dates, and states that as artesian

conditions were present in the past then there must be aquicludes (low permeability horizons) overlying the Lincolnshire Limestone. There was some discussion in the 2017 Inquiry regarding the level of permeability contrast needed to generate artesian conditions. JBA would propose that a significant contrast in permeability (such as between mudstone and limestone) would be sufficient to result in artesian conditions developing, and that the presence of artesian conditions does not mean that the aquifer is sealed. The presence of fractures (observed in the cored boreholes DSI1 and DSI1, Envireau Report Appendix B) within the strata overlying the Lincolnshire Limestone mean that there may be some limited permeability through these strata, including in the vertical direction.

The sandstone and limestone horizons (including the horizons logged as no core recovered) could provide significant horizontal permeability and confirms the potential for these horizons to function as aquifers.

Although core plugs have been analysed to indicate permeability of some specific in-tact mudstone/clay horizons, no bulk permeability assessment has been undertaken. Typically, core samples exhibit much lower permeabilities than wider aquifers¹. This is due to macro permeability provided by fractures and higher permeability horizons and there is evidence from the boreholes that these exist. This aquifer-scale permeability can be investigated by packer testing or pump testing of boreholes screened over the horizon of interest.

The fact that the clay/mudstone cores show a very low permeability is not surprising, but this doesn't guarantee that the overall sequence is sealed with no vertical leakage.

Allowing for fracture permeability would not raise the Envireau risk assessment results matrices to a significant level. But the report does provide an overly optimistic assessment of the contamination risk regarding the Great Oolite aquifers and associated British Steel abstractions.

1.2.3 Cornbrash Formation

The Envireau report (para 5.5.6 page 33-34) indicates that there may be sub crop of the Cornbrash Formation in the western end of the site beneath the superficial sands with no overlying Kellaways Clay. The new boreholes do indicate a 1.4m clay layer at the base of the superficial sands over much of the site.

The Envireau report maintains that there is less connection with the Cornbrash in the east of the site as groundwater levels in the DSI2 are lower. However, the piezometer installed in DSI2 is correspondingly around 3m lower within the Blisworth Clay/Limestone/Rutland Formation than that in DSI1. As these formations are highly interlayered with more and less permeable lithologies it would be expected that there would be a level of hydraulic gradient within them.

Envireau state that the gradual lowering in head with depth through the Blisworth Clay/Limestone/Rutland Formations is indicative of a very low vertical permeability. In our view the gradual lowering of the groundwater head through the Blisworth and Rutland Formations is indicative that although they have low permeability units there is some

¹ DJ Allen, LJ Brewerton, LM Coleby, BR Gibbs, MA Lewis, AM MacDonald, SJ Wagstaff and AT Williams, The physical properties of major aquifers in England and Wales, 1997.

vertical leakage (Table 18 Envireau 2018). Although leakage may be limited, as these formations contain some lithologies with intergranular permeability (sandstones) and all the other lithologies are likely to have some fracture permeability there is the potential for leakage over a long time.

The connection of the Cornbrash Formation to the superficial deposits is important as this provides a direct pathway from the sands beneath the site to the British Steel borehole which is screened within the Cornbrash Formation.

1.3 Hydrogeological Conceptual Model (HCM)

Wressle Well Site HCM

Envireau's Hydrogeological Conceptual Model of the well site is given in Figure 19 (see Box 1 below). This is an improvement on the conceptual model presented in the previous reports as it provides more detail on the near surface strata beneath the well site based upon new ground investigation data. However, we would disagree with a number of aspects of it.

1. The clay layer (layer 2) beneath the top sand layer is termed an aquiclude². The thickness of this layer is only approximately 1.4m from the geology logs. An aquiclude is very rare in geology and implies a completely impermeable horizon. The report indicates that this horizon (probably Kellaways Clays) is probably absent from the far west of the site, and so is not likely to provide a totally effective seal for the underlying horizons. A more reasonable term would be aquitard³ which implies a layer which limits groundwater flow but which over longer timescales may allow some leakage.
2. The 3rd layer from the top labelled Aquifer – Sandstone relates to the Cornbrash Formation which has a likely thickness of 0.9-1.3m on site. However, the relative thicknesses of these 2nd and 3rd layers in the conceptual model give the clay layer as over 5 times thicker than the sandstone layer 3. This is highly misleading.
3. A number of other strata (including 4th and 6th layers from the top which relate to the Great Oolite strata) are designated aquicludes. This is not reasonable given that both the Environment Agency and BGS designate these strata as productive aquifers.
4. The sandstone horizons within the Blisworth Limestone/Rutland Formation are designated as aquitards. This again is incorrect when the EA and BGS designate these as aquifers and the lithologies present on site are not markedly different from those typical of these strata. These aquitard designations are also not consistent with the site-specific aquifer designations given in Table 13. Therefore, the conceptual model is both misleading and not consistent with the rest of the report text.
5. It would have been useful to include all the observed water levels in the conceptual model figure including those in the Great Oolite.
6. There are no groundwater flow pathways indicated on site. A conceptual model should indicate groundwater pathways, recharge areas and discharges⁴.
7. The distribution of clay and sand in the layers 4, 5, 6 and 7 is misleading. At these depths borehole DS11 shows a succession of clay, silt, mudstone, silt clay,

² BGS Glossary Aquiclude – An impermeable layer of rock which water cannot flow through because there are no pore or fracture voids, or such voids are not connected together.

³ BGS Glossary Aquitard – A rock with limited permeability that allows some water to pass through it, but at a very reduced rate.

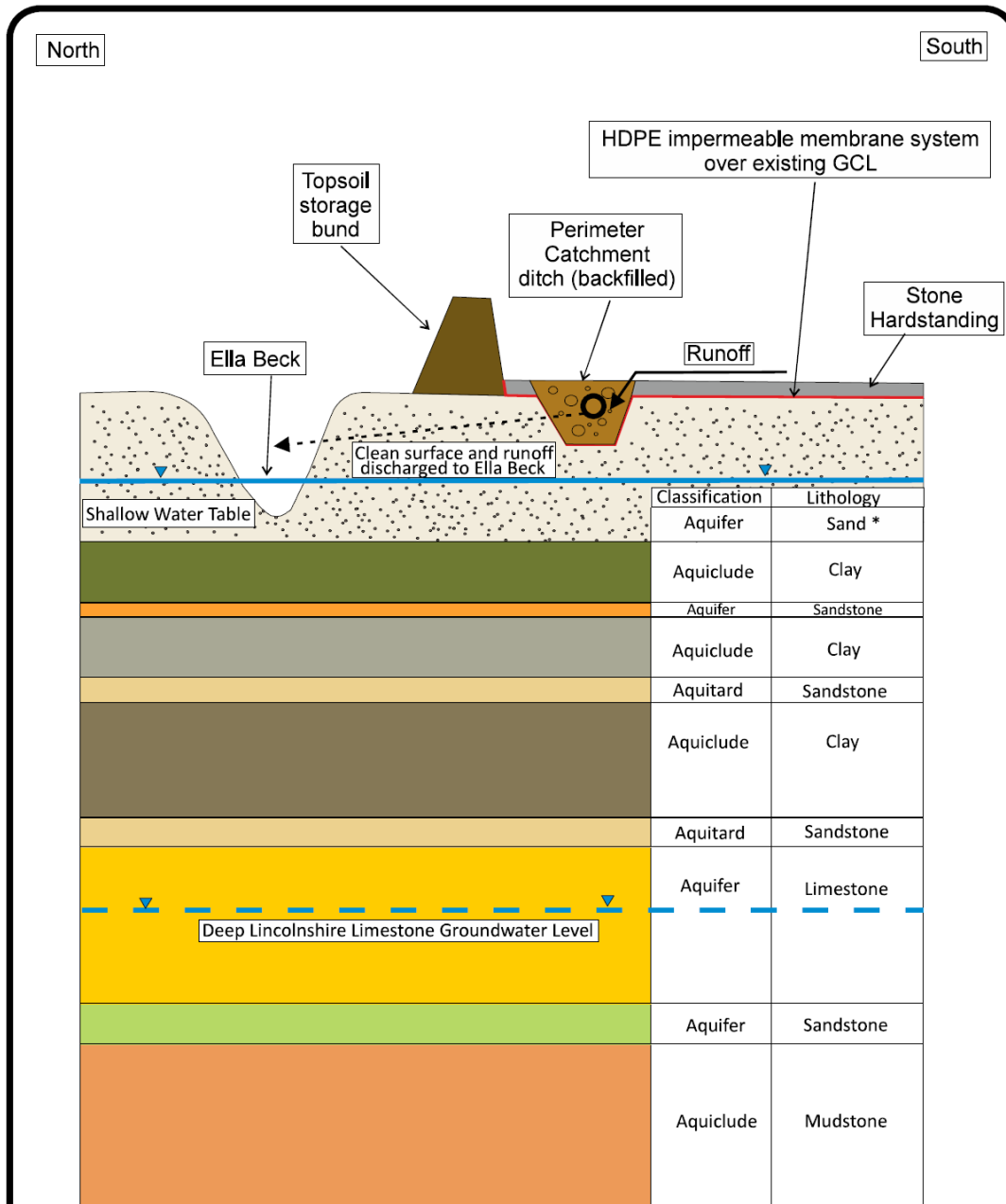
⁴ EA H1 Annex J Groundwater, v2.1, 2011.

silt, mudstone, sand, with the final sand horizon being 5.5m thick (with some unrecovered horizons where the sand probably washed out). Where the sand was sufficiently friable to wash out it is probably poorly cemented and so may have significant permeability. This horizon is termed an aquitard by Envireau which is misleading.

8. Borehole DSI2 shows a succession of clay, sand, mudstone, sand, mudstone, silt sand and mudstone for the horizons represented in the layers 4, 5, 6 and 7. Again this does not correlate well with the conceptual model. Neither do the conceptual model's 4 layers (clay, sandstone, clay, sandstone) relate well to the three named aquifer units: Blisworth Clay, Blisworth limestone, and Rutland Formation.
9. Although conceptual models are often not to an exact scale, an approximate scale or proportion is usually indicated to aid understanding and to ensure the correct perspective. This has not been provided. The cross section in Figure 17 provides this and should have been used as the basis for the conceptual model as it has a more realistic relative thickness for the permeable and less permeable layers. Figure 19 Conceptual Model has much thicker clay layers relative to the sandstone layers. This provides an impression of an unduly low permeability representation of the sub-surface.

Overall, the limited correlation between the on-site borehole logs, nearby BGS logs and the conceptual model provided means there can be limited confidence in the conceptual model.

Box 1 – Reproduction of Envireau Water Figure 19



* Sutton Sand Formation & Kellaways Sand Formation (the Unconsolidated Sands Aquifer)

Not to scale



Ref: P:\Egdon Wressle 2018 (2355)\40 - Reporting\HRA\Figures\Final submission Date: June 2018

Egdon Resources U.K. Limited - Wressle HRA 2018

Figure 19

Wressle Wellsite Hydrogeological Conceptual Model (HCM) Sketch

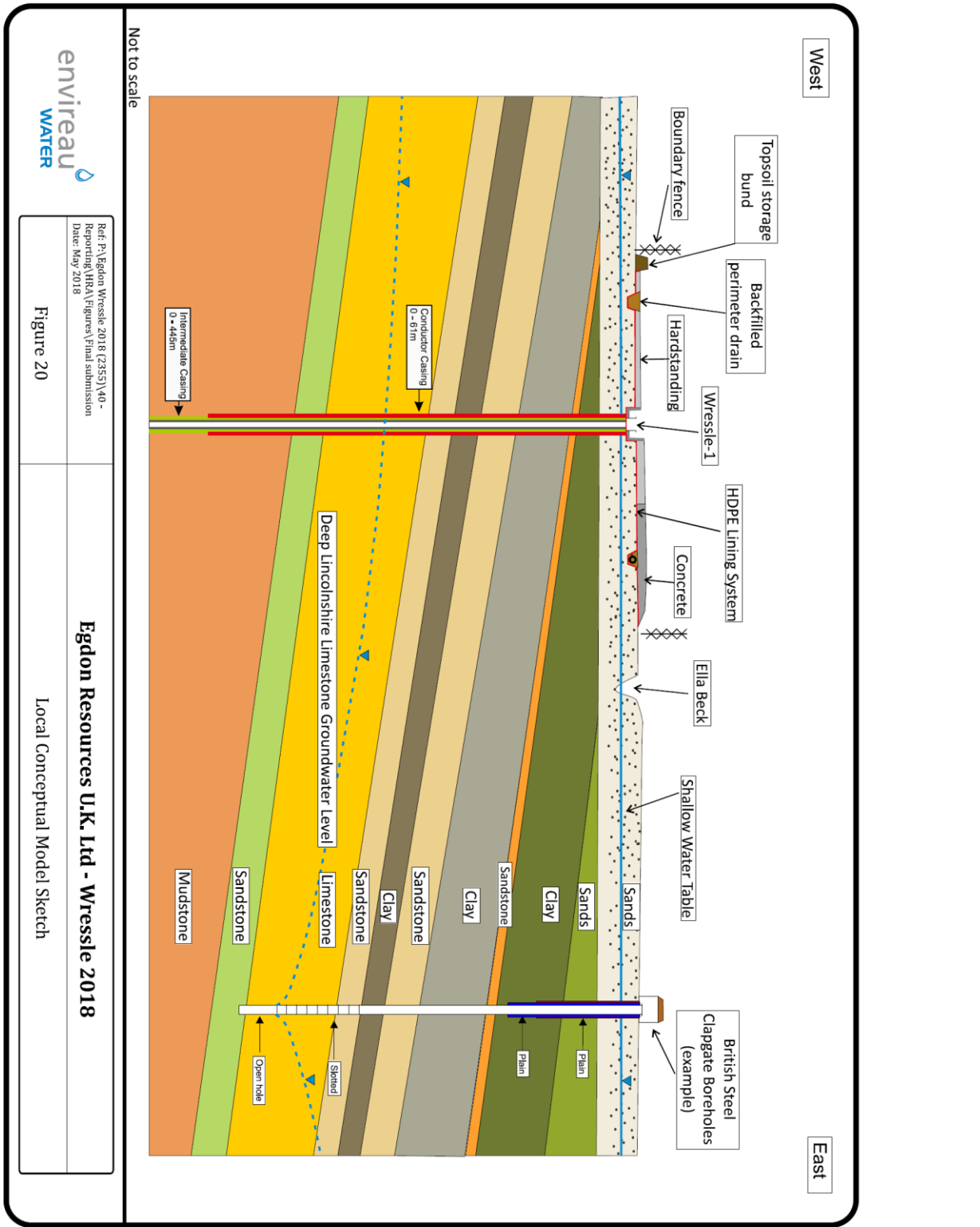
Local Conceptual Model

The Local Conceptual Model Sketch is given in Figure 20 (see Box 2 below). This duplicates the same geological layers as in Figure 19 and has the same problems with regard to the representation of the Blisworth Limestone/Clay/Rutland Formations. The more geologically accurate layers shown in Figure 17 would have been better.

An example of the Clapgate boreholes (British Steel supply) is given in Figure 20 which is only screened in the Lincolnshire Limestone. Previously Envireau provided screen details of the Clapgate boreholes (Inquiry documentation) which showed that the boreholes G1 and G5 were screened in the Great Oolite Group, with G5 screened to just above the top of the Great Oolite, i.e. screened throughout the Cornbrash Formation. Details given elsewhere in the report (Table 21 page 39) indicate that G1 is 400m from the site and G5 is 1.9km from the site. This means that there is hydraulic connection between the site and the Clapgate Boreholes which has not been shown in Figure 20. [See JBA Appendix C Interpretative Geological Cross Section enclosed and Envireau Figure 4 British Steel as built construction enclosed.]

Whilst the requirement for a revised conceptual model was not included in the Inspector's decision considerable discussion was had at the inquiry regarding conceptual models. It is very important that the conceptual model is robust as the assessment of the risk of groundwater/surface water contamination depends upon the accuracy of the conceptual model and associated pathways between sources and receptors. The inaccuracies and omissions within the current conceptual model could lead to the omission of the pathway from the site, through the Cornbrash Formation to the British Steel Clapgate boreholes. It is essential that this pathway is considered fully in the risk assessment.

Box 2 - Reproduction of Envireau Water Figure 20



1.4 Risk Assessment Tables

Envireau's Appendix D contains the Risk Assessment Matrix which gives the details of how the final risk analysis is obtained. There is some scope for professional judgement and interpretation in the development of risk assessment tables, particularly in terms of how likely a pollution/contamination event is. All the occurrences are given likelihoods of unlikely or very unlikely. However, we would disagree with some of the uses of 'very unlikely' as defined.

Envireau (main report page 53, Table 30) have defined 'Very Unlikely' as 'essentially no risk', and 'fully mitigated low or medium risk'. The risks on site whilst unlikely to be realised do have a definite level of risk as fuels, hydrocarbons and chemicals will be present on site for most of the site's lifetime. The term 'unlikely' is said to relate to a mitigated higher risk. On the basis of this definition the use of 'unlikely' rather than 'very unlikely' would appear to be appropriate for most of the SPR linkages assessed where high risks are mitigated but some residual risk remains.

The next category of likelihood is moderate, which relates to events that are equally likely and unlikely.

Specific Source Pathway Receptor Linkages within the assessment tables are discussed in the following paragraphs. There is some degree of inconsistency when the potential impact on a water abstractor receptor is given as lower than the impact on the aquifer receptor in which the abstraction is located.

Mobilisation of contaminated soils during removal of platform (no HDPE liner)

- The risk of contaminating the Secondary bedrock aquifer (The Great Oolite) above the Lincolnshire Limestone Formation (including the Cornbrash Formation) is given as unlikely. But the risk of contaminating the British Steel boreholes which are known to be screened within the Cornbrash and which are the key local groundwater abstractor (where most of the bedrock groundwater is discharging) is given a likelihood of 'very unlikely'. If the Cornbrash Formation is contaminated the contamination is highly likely / certain to end up in the British Steel boreholes as these are the major local discharge from this aquifer.
- Similarly, the risk of contamination of the shallow sands aquifer is given as unlikely. But the risk of contamination of potential PWS which may be within the sands, or the secondary aquifers (or in fact the Lincs. Limestone) is given only as very unlikely. This is inconsistent.

Fuel Spillage from plant and machinery during site works (no HDPE liner)

- A likelihood of runoff to surface waters is given as 'very unlikely', but this is probably only 'unlikely' given the vehicle movements along Ella Beck and outside the site containment and as the interceptor needs upgrading during these works.
- Similarly to the points made above the receptors in both the sands (PWS) and the secondary aquifers (BS borehole) are given a risk of 'very unlikely' whilst the risk to the aquifer is 'unlikely'. This is inconsistent.

The operation of a hydrocarbon site for around 15 years using and producing hydrocarbons and fuels and chemicals is probably not 'very unlikely' to result in a contamination event, but unlikely given good site management and mitigation. It is noted that most sites which manage, store and use hydrocarbons over significant periods of

time e.g. petrol stations, fuel depots etc. are generally associated with residual ground contamination. So to state that contamination is very unlikely (given the Envireau definition of 'very unlikely' as essentially no risk) is in our opinion over optimistic. However, changing 'very unlikely' to 'likely' only changes the outcome from 'Very Low' to 'Low', so this is probably not a significant change. But in our view a number of the final risks should be 'low' rather than 'very low' or 'none'. The activities proposed on site are associated with significant mitigation but the site is located in an area with considerable groundwater resources, immediately adjacent to a surface water course and it is not inconceivable that spillage does occur either within the site area or off the well site on the access track or during the site reworking or decommissioning when the full level of mitigation is not present on site. The location of the site relative to the surface geology/hydrogeology/hydrology and overlying multiple aquifers is key to the risks posed by the site.

1.5 Minor Inconsistencies in the Envireau Water report

Page ii states that recharge to the layers in Layer 1 is via direct infiltration at surface into the outcrop of the permeable layers. There may also be potential for recharge via leakage through overlying layers.

Figure 5 gives details of the boreholes present in and around the site. However, the boreholes installed in 2018 appear to be labelled as installed in 2017. This is confusing.

Para 5.3 page 14 the average monthly rainfall is given in the text as varying between 45 and 55mm but the range given in the table is 38.4 (Feb) to 62.8 mm (Aug) per month.

Page 43, Table 24 Surface water Features: Ella Beck is given as 100m from the site. It is located just adjacent to the north of the site at the site boundary (as is stated elsewhere in the report).

Appendices to Hydrogeological & Flood Risk Assessment

1.6 Appendix A3

This provides the borehole logs for the boreholes WS1-5 located within the site and drilled in February 2018; the boreholes predominantly encountered sand. Locally some clay was observed in WS1, WS2 and WS3 at the western side of the site. WS4, WS5 and WS6 in the centre to the east of the site showed only 10cm of clay in WS04. None of the boreholes encountered groundwater. All were terminated as the drilling rig could not progress further.

These boreholes suggest that sand is the predominant lithology beneath the site to depths of 4 to 6m, especially in the centre and east of the site. No significant peat is seen. The domination of sand is consistent with reasonable load bearing conditions provided that the sand is not subject to liquefaction. Cone SPT (Standard Penetration Test) readings from the boreholes ranged in value from 9 to 50 (at the refusal at the base of the holes). This relates generally (BS3930/1377) to loose to very dense sand.

The absence of groundwater is not consistent with the location of the superficial water within 2 to 3m of the ground surface – at a similar elevation to Ella Beck and observed ground water levels in the existing monitoring boreholes on site (Appendix a4 Envireau). It is possible that the groundwater table was missed as all the boreholes were drilled and

backfilled on the same day and not allowed to stand to allow a static groundwater table to be observed.

1.7 Appendix A4

These are the drillers' borehole logs submitted to the planning inquiry.

1.8 Appendix B1

This provides the log of the borehole DSI1 drilled in March 2018. This is very close to GWMBH1 and WS01 location. The Sutton Sand Formation is seen to around 4m depth then the Kellaways Formation is present for 1.4m comprising a light greyish brown CLAY with occasional angular calcareous rock fragments.

Groundwater was encountered at 2.8m bgl with a static water level at 2.46m bgl on 29/3/18. A deeper water level of 6.95m bgl drilling at 8.5mbgl in the Great Oolite (just above a zone of no core recovery) was observed on 21/3/18. This is indicative of water bearing horizons separated by lower permeability strata. No 3 core samples were taken for permeability analysis from clay and mudstone horizons which gave values of 1.1×10^{-11} m/s to 8.4×10^{-11} m/s (9.5×10^{-7} m/d – 7.26×10^{-6} m/d). This is very low permeability. However, in lower permeability strata and in many forms of bedrock such as mudstones and cemented limestone generally most permeability is provided by fractures rather than the rock matrix which is typically very low permeability. The absence of any down-hole permeability testing means that the permeability of the rock mass including any discontinuities has not been determined. The core shows some degree of fracturing. There was good core recovery for much of the borehole but around 4m had no recovery. The borehole was completed with a piezometer at around 10m bgl within the Blisworth Clay/Limestone/Rutland Formation. There was no core recovery at the depth of the piezometer so the lithology encountered is not known.

1.9 Appendix B2

This provides the log of the borehole DSI2 drilled in March 2018. This is very close to GWMBH3 and GWMBH4 locations. The Sutton Sand Formation is seen to around 6m depth then the Kellaways Formation is identified as present for between 5-10.5m bgl comprising mostly sands with a grey slightly gritty clay observed for 1.4m at the base. Two core samples were obtained from this clay with permeabilities of 1.9×10^{-10} m/s and 3.1×10^{-11} m/s (1.6×10^{-5} m/d and 2.7×10^{-6} m/d).

Regionally the Kellaways Formation (Ancholme Group strata) typically comprise a lower hydraulic conductivity mudstone known as the Kellaways Clay, overlain by a more granular horizon known as the Kellaways Sand. The Kellaways Sand can yield small quantities of groundwater and is classified as a Secondary A Aquifer and is also mapped by the British Geological Survey as occurring beneath the far northeastern corner of the wellsite. The Kellaways Clay which is also mapped by the British Geological Survey as occurring beneath the wellsite is classified as an Unproductive Strata (formerly Non Aquifer).

2 Civil and Structural Design Statement, Wressle Well Site, 25/5/18

The Planning and Sustainability Statement document is 214 pages long with additional appendices and has not been comprehensively reviewed. However, specific comments are made in the following paragraphs.

2.1 Site Investigation Report – Opus (March 2018)

This details a retrospective baseline site investigation regarding the well site. No previous investigation accompanied the original wellsite design, which was noted by the Planning Inspector. The following points are noted. A low level of contamination was found in the granular fill overlying the existing bentonite membrane. This was attributed to contamination brought on site within the granular stone layer. We would recommend that checks are made to confirm that the stone layer is not more widely contaminated if it is to be incorporated into the future site infrastructure and that any additional stone brought on site is from an uncontaminated source.

2.2 Design of Tertiary Containment

A series of recognised geotechnical tests were undertaken in the near surface of the site to obtain information on the engineering properties of the soils and support the design of the containment system. These included Standard Penetration Tests (SPT) tests. Dynamic Cone Penetrometer (DCP) testing was also undertaken. The results of these DCP tests were converted into a Californian Bearing Ratio (CBR) value per strata encountered.

Table 2 CBR results on site – Made Ground

Test Location	Test Range (m begl)	Blow Count	CBR Value (%)
WS02	0.0 – 0.30	34	30.2
WS03	0.0 – 0.30	55	50.3
WS04	0.0 – 0.30	1	0.7
WS05	0.0-0.30	2	1.5
WS06	0.0-0.30	17	14.5

The use of average CBR values in Alan Woods (page 7) is potentially misleading as some of the actual CBR results (from cone tests) are much lower. Typical values of CBR for aggregate would be 25-30% on a reasonable sub-base. However, it is recommended that this should be demonstrated through additional plate testing of shallow soils on a grid basis before the new liner is installed.

Table 3 CBR results on site – Sutton Sand Formation

Test Location	Test Range (m begl)	Blow Count	CBR Value (%)
WS01	0.4-0.95	14	6.2
WS02	0.30 – 0.90	87	39.2
WS03	0.30 – 0.90	72	32.1
WS04	0.30 – 0.905	33	14.0
WS05	0.30 - 0.90	83	37.3
WS06	0.30 - 0.90	88	39.4

Additional in situ plate load CBR testing is recommended as the DCP testing was undertaken on disturbed soils as the underlying membrane had been removed prior to testing. The current testing with the use of average CBR values and only one cylinder test (with variable size and rounded aggregate) does not reliably confirm the bearing capacity of the site, or protection of the membrane. Therefore, it is recommended that plate bearing tests should be undertaken over all the area where additional protection (concrete) is not proposed at a 2m interval on an off-set grid. 900mm (minimum 600mm) plate CBR tests should be undertaken. Either the lowest values should be used in design, or these areas reinforced/replaced.

As only 300mm aggregate is proposed for the site, no vehicle trafficking should be undertaken over the liner outside the concrete reinforced roadways. Fencing should be used to demark the roadways so that vehicles cannot drive over the unprotected granular stone layer. For un-trafficked areas (foot passage only) 300mm aggregate is probably adequate. For point loading (e.g. crane pad locations) the loading locations should be checked following loading for impact on the underlying liner. It is recommended that load spreading plates are used anyway for the crane pads as these are easy and not expensive to use and would greatly protect the underlying containment layers.

Further details should be provided regarding the proposed Scope of Works on site and how and where these will be undertaken and the order of works. The proposed screening of the aggregate layer to remove >125mm should also include removal of fines to prevent possible blockage of surface water drainage pathways. Following screening of the stone on site, we recommend that the cylinder test is repeated using representative stone from site and repeated loading cycles.

More detail regarding the 'careful removal' of the sub-base should be provided. This should be undertaken with only light weight plant (e.g. mini diggers, light weight tracked vehicles) or on temporary reinforced haul routes/runway plates. As the HDPE will be installed prior to and underlying the reinforced roadways on site, it is possible that temporary roadways may be required. The type of plant, protection measures, and where the sub-base is to be stored and screened should be confirmed within the CQA plan.

The methodology should specify how the existing GCL liner will be treated. While the existing GCL is to remain if it is found to be damaged, or ripped, or is damaged during the stone removal it could be repaired relatively easily while it is exposed. Specification for the repair of the GCL should be provided. Condition assessment should be provided of the GCL liner with photographic record etc. regarding its condition and areas repaired as part of the CQA. As the GCL is already on site it provides additional protection for the underlying groundwaters and aquifers.

CQA should be provided to confirm the connection of the HDPE with regard to the concrete well head and its presence beneath the roadways.

2.3 Interceptor

A Kingspan NSFP006 Class 1 full retention interceptor will be fitted with an oil alarm including alarm beacon and audible alarm. Details of this are provided in the Planning Statement, including Appendix 4 (page 157) and Appendix 5. These include test results

[2018s1208-L-L001-4.doc](#)

12 October 2018

www.jbaconsulting.com

indicating a high level of retention by the interceptor. However, the relation between the interceptor performance and the proposed contaminants to be tested for in the sampling undertaken for the permit has not been detailed. In particular the performance of the interceptor with regard to the full range of hydrocarbons/chemicals found in crude oil, formation water and produced water should be confirmed. Additional information should be provided about the ability of the interceptor to prevent ingress of water from Ella Beck in times of flood, including provision of a non-return valve.

2.4 Monitoring

Monthly and weekly monitoring is proposed for groundwater monitoring boreholes and Ella Beck before and during activities on site. This could be provided to the council as part of a planning condition.

2.5 Site assess arrangements (Para 3.6 Alan Wood Report)

Additional concrete is proposed within the well site, including:

1. Reinforced concrete beneath the No. 5 on-site tanks.
2. Robust concrete road for use by articulated vehicles.
3. A reinforced concrete bund at the access to the site to retain storm water on site.
4. Extension to the well head concrete platform to provide a clean working area and to protect the surface stone from contamination.

Para 3.4 page 11: 'The finished platform has been designed to accommodate a worst-case loading of 160 KN on a 1.2m \varnothing contact area (based on data based on expected worst case crane loading supplied by the potential crane supplier), which equates to 141.5 KN/m² (KPa). Should higher loading capacity than this be required then load spreading plates will be used beneath the crane outriggers to ensure the design loading intensity is not exceeded.'

It is noted that the bearing capacity calculations are based on average CBR results (which we have commented on above). Prior to works commencing on site we would recommend additional plate bearing tests to confirm ground conditions. As added security during installation spreader plates should be used below the crane outrigger pads

2.6 Proposed CQA for the new site liner

CQA is proposed for the HDPE membrane installation. As a minimum the CQA document will contain the following (para 3.11, page 16 Alan Wood Report) :-

- Seam and weld testing of the liner (pull test using existing liner);
- Air testing of the liner welds, spark test over panel before covering (contractor & independent);
- Liner panel layout plan (showing joint locations, roll number, repairs and pipe penetrations etc.);
- Air testing of drainage (ditch to interceptor and discharge);
- Insitu plate bearing tests (on platform following installation);
- As-built topographical survey (upon completion).

This should be confirmed as part of a planning condition.

Similarly, CQA should be undertaken on the underlying GCL liner and if it is damaged it should be repaired and this documented. The presence of the GCL gives additional security for the site regarding preventing pollution migration.

2.7 Surface containment on site

It is stated (Planning Policy Statement page 14, Alan Wood page 11 para 3.3) that the granular cover on site will be regraded to remove aggregate larger than 125mm. No reference is made to the roundness of the aggregate. It is important that the aggregate is not too angular (not more angular than that used in the cylinder test) as this would invalidate the cylinder test results. It is noted that the photograph of the aggregate used in the cylinder test shows rounded aggregate with some considerable fines proportion. The aggregate layer on site is supposed to be freely draining (to the French drains) so it is important that there are not too many fines. However, the presence of the fines within the cylinder test sample may reduce the potential for puncturing the liner. It is important that the aggregate used in the cylinder test is representative of what is to be on site. It is also essential that the final cover is of appropriate size and roundness so as not to puncture the underlying protective membranes when loaded.

If the existing aggregate on site is to be re-used to form the drainage layer above the membrane then its suitability should be confirmed through reference to appropriate guidance and also the liner manufacturer's specification. The material should also be checked to confirm that it is free from contamination.

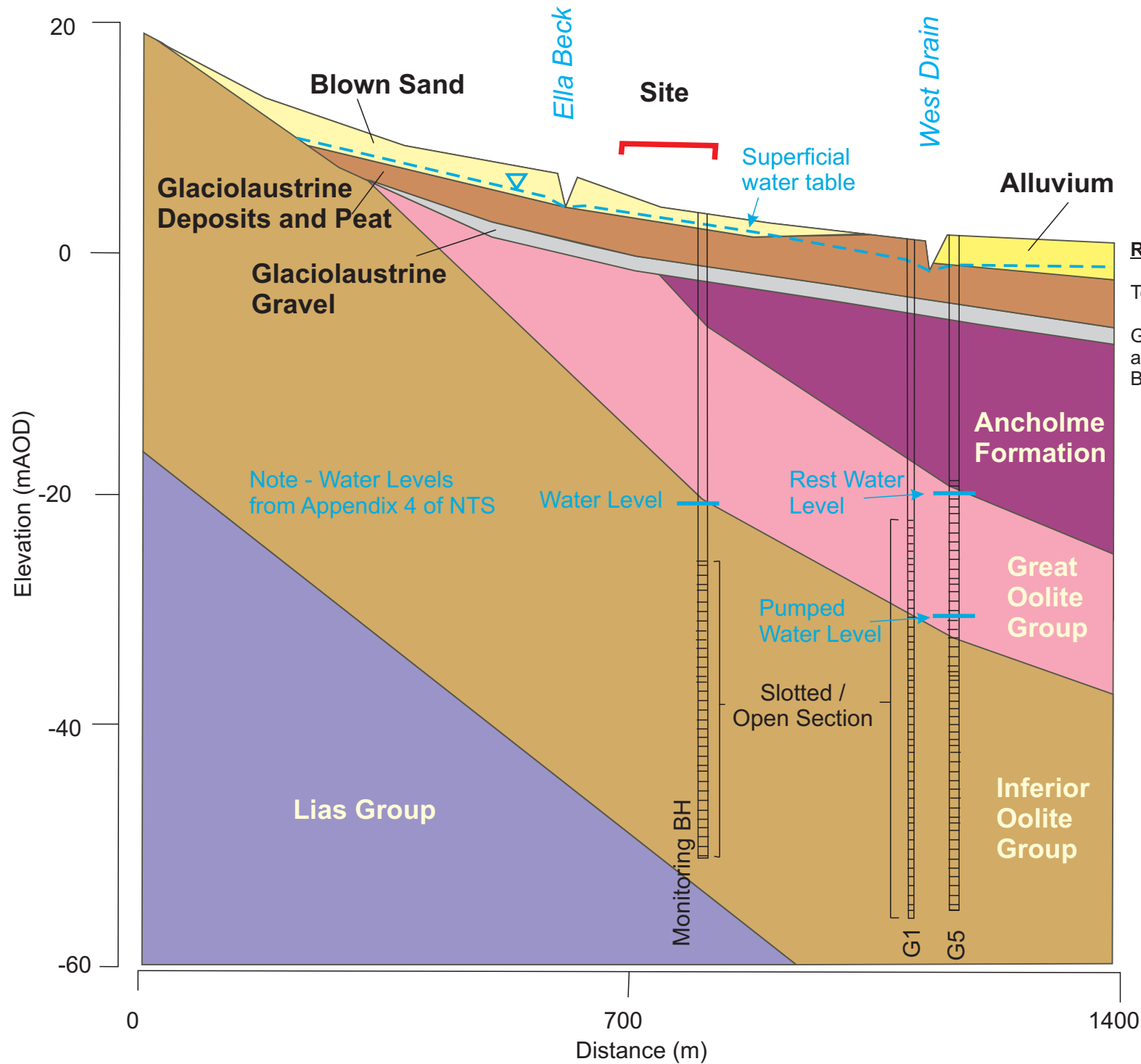
2.8 Decommissioning and Restoration

Details regarding decommissioning and restoration are provided in Appendix 5 of the Planning and Sustainability Statement with a summary in the main body of the text (para 6.131). It is possible that there is an accumulation of contamination within the granular layer on site during the site operation. The manner of decommissioning is important so that significant contamination from the site is not introduced into the ground during decommissioning and restoration to agricultural land.

2.9 Volume Calculations

Clarification could be provided that the storage volume calculations (for spillage and a 1in100 year flood retention on site) make allowance for the additional volumes of concrete (additional well apron and concrete road way areas).

Appendix C - Interpretative Geological Cross Section

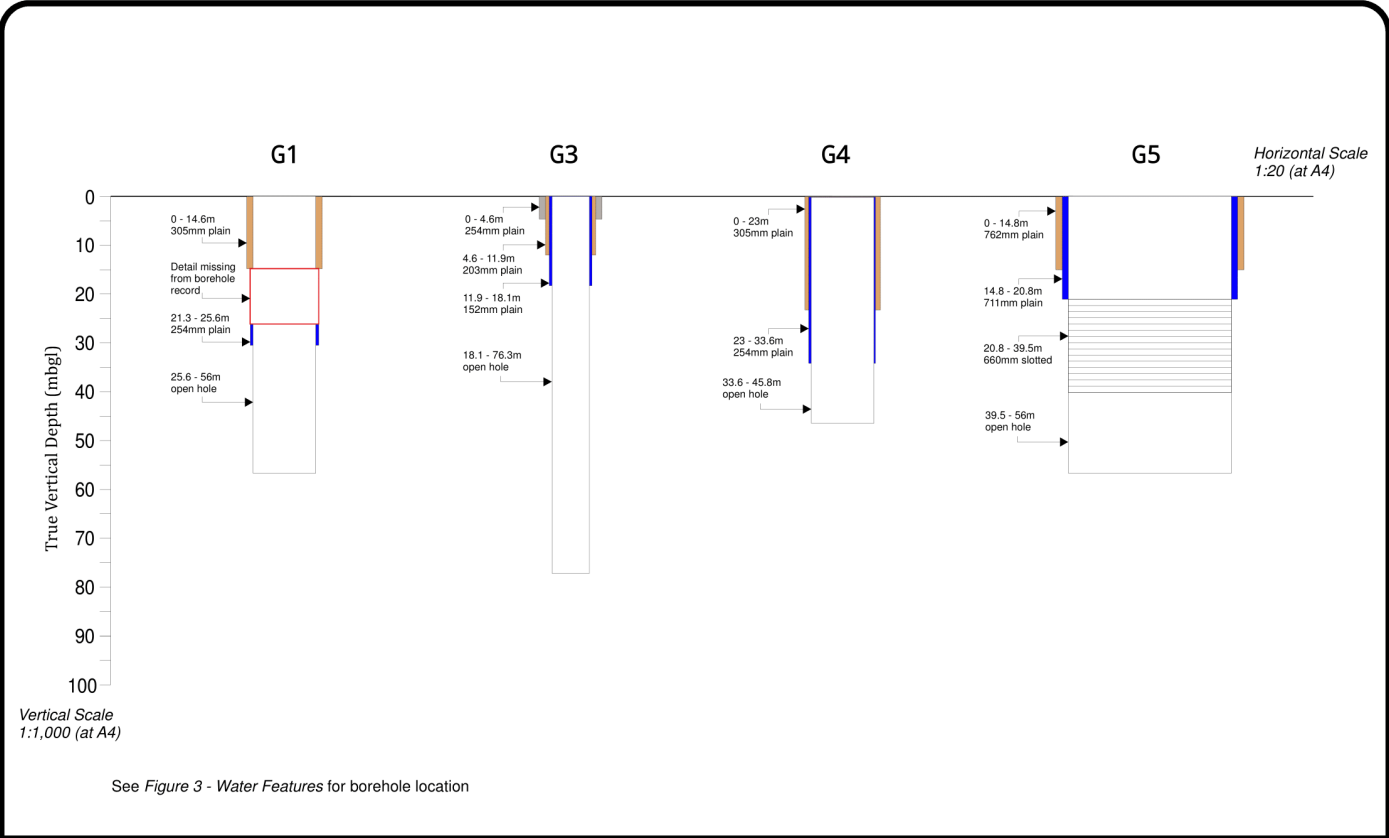


References

Topography: EA's 2m Lidar DTM

Geology: BGS 50k Superficial and Bedrock Geology, Historical Borehole Logs and Lexicon

BS Clapgate Boreholes





Appeal Decisions

Inquiry Held on 7-10 November and 14-15 November 2017

Site visit made on 15 November 2017

by Mr K L Williams BA, MA, MRTPI

an Inspector appointed by the Secretary of State for Communities and Local Government

Decision date: 04 January 2018

Appeal A: APP/Y2003/W/17/3173530

Lodge Farm, Clapp Gate, Appleby, Scunthorpe, DN15 0DB

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by Egdon Resources UK Limited against the decision of North Lincolnshire Council.
- The application, ref.MIN/2016/810, dated 31 May 2016, was refused by notice dated 11 January 2017.
- The development proposed is described in the application as the "retention of the existing wellsite and access road for the long-term production of hydrocarbons."

Summary of Decision: The appeal is dismissed.

Appeal B: APP/Y2003/W/17/3180606

Lodge Farm, Clapp Gate, Appleby, Scunthorpe, DN15 0DB

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by Egdon Resources UK Limited against the decision of North Lincolnshire Council.
- The application, ref.PA/2017/696, dated 28 April 2017, was refused by notice dated 3 July 2017.
- The development proposed is described in the application as the "retention of the existing wellsite and access road for the long-term production of hydrocarbons."

Summary of Decision: The appeal is dismissed.

Appeal C: APP/Y2003/W/17/3182879

Lodge Farm, Clapp Gate, Appleby, Scunthorpe, DN15 0DB

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission under section 73A of the Town and Country Planning Act 1990 as amended by the Planning and Compensation Act 1991 for construction of a temporary wellsite for drilling of an exploratory borehole with associated structures and works for which a previous planning permission was granted for a limited period.
- The appeal is made by Egdon Resources UK Limited against the decision of North Lincolnshire Council.
- The application, ref.PA/2017/268, is dated 21 February 2017.
- The application sought planning permission for the construction of a temporary wellsite for drilling of an exploratory borehole with associated structures and works granted planning permission for a limited period Ref: MIN/2013/0281, dated 18 June 2013.
- The permission is subject to a condition requiring that "The buildings, structures and works hereby permitted shall be removed and the use hereby permitted shall be discontinued and the land restored to its former condition within 3 years of development"

- commencing unless otherwise agreed in writing by the Local Planning Authority.”
- The reason given for the condition is “To define the terms of the planning permission and ensure that the site is returned to its former condition.”

Summary of Decision: The appeal is allowed and planning permission is granted subject to planning conditions.

Preliminary Matters

1. The Combined Statement of Common Ground (CSoCG, CDC12) contains a list of Core Documents (CD). There is also a Technical Statement of Common Ground (TSoCG, CDC13).

The Appeal Site

2. The site is in the countryside to the north-east of the village of Broughton. It comprises a broadly rectangular site extending to about 1.85 hectares. It is accessed from the B1208 and the farmyard of Lodge Farm via an unmade farm track. Ella Beck runs close to the site’s northern boundary.

Appeals A and B – Production of Hydrocarbons

The Proposed Development

3. Appeals A and B concern the use of the established wellsite for the long term production of hydrocarbons. Drawing 3334(2) P 03 shows the existing site layout. Drawing 3334(2) P 07 provides an indicative site layout with sidetrack drilling. Drawing 3334(2) P 05 provides an indicative site layout with proppant squeeze. The main elements of the proposal are summarised in the CSoCG as follows:
 - i) Site construction and civil works to construct a purpose built bunded area to facilitate storage tanks, a tanker loading plinth and installation of a surface water interceptor. The site area would be increased by 0.12 hectares to facilitate management of site access;
 - ii) The installation of production facilities and equipment. A workover would facilitate the removal of some of the existing completion, including tubing and subsurface wellbore equipment, and their replacement with a new completion;
 - iii) One or more of the following operations would be carried out to enable the production of oil and gas: a sidetrack drilling operation with a drill rig of up to 40m in height (this overall operation is expected to last 3-4 weeks); radial drilling (expected to last 1 week and included in Appeal A only); proppant squeeze; acidisation; and
 - iv) The production of oil and associated gas.
4. There is only a marginal difference between the scheme in Appeal A and that in Appeal B. It is the omission radial drilling from Appeal B. Extraction of hydrocarbons would be expected to continue for up to 15 years and to yield up to about 500 barrels of oil a day, producing about 2 million barrels overall. Extraction of gas is expected but the volume of gas is uncertain. If there is sufficient gas it would be used to generate electricity on site, which would be exported to the local electricity network. If volumes are low, gas would be managed on-site by means of an enclosed flare. A relief flare would

be required in any case. The indicative layouts also show provision for staff and security facilities.

Relevant Planning History

5. In June 2013 planning permission was granted for the construction of a temporary wellsite for an exploratory borehole with associated structures and works (MIN/2013/0281). In January 2017 the planning application which led to Appeal A was refused (MIN/2016/0810). Also in January 2017 planning permission was granted for the installation of the 4 groundwater monitoring boreholes now installed on the site (PA/2016/0808). In July 2017 the planning application which led to Appeal B was refused (PA/2017/696). By then the Environment Agency (EA) had granted a Notice of Variation and Consolidation of an Environmental Permit for the project (EPR/AB3609XX, May 2017).

Relevant Planning and Energy Policies

6. The development plan comprises the saved policies of the North Lincolnshire Local Plan, 2003 (LP) and the North Lincolnshire Core Strategy, 2011 (CS). LP policy M1 provides criteria subject to which mineral applications will be permitted. They include a requirement that adequate proposals are made to minimise visual and other amenity impacts to an acceptable level. LP policy M23 deals specifically with oil and gas production. It says that production facilities will be permitted provided that the proposal incorporates environmental protection measures that are adequate to mitigate the impacts arising from a long term or permanent site. LP policy DS15 does not permit development which would adversely affect the quality and quantity of water resources by, amongst other things, pollution from the development. Policy CS18 contains criteria concerning sustainable resource use and climate change. Criterion 10 is "*Ensuring development and land use helps to protect people and the environment from unsafe, unhealthy and polluted environments, by protecting and improving the quality of the air, land and water.*"
7. The Council also cites LP policy DS13. It is headed "Groundwater Protection and Land Drainage" and the preceding text refers to the importance of the water environment in North Lincolnshire. Nevertheless, the wording of the policy explicitly limits its purpose to that of controlling the level of water in the land drainage system.
8. The policies of the National Planning Policy Framework (The Framework) are a material consideration. Sections 11 and 13 are particularly pertinent in these appeals but other sections are also relevant. Section 11 deals with conserving and enhancing the natural environment. It is consistent with paragraphs 109, 121 and 122 that unacceptable risk of soil, air, water or noise pollution should be avoided. Planning decisions should ensure that a site is suitable for its new use taking account, amongst other things, of ground conditions. Local planning authorities should focus on whether the development itself is an acceptable use of land and on the impact of those uses, rather than the control of processes or emissions themselves where they are subject to approval under pollution control regimes. They should assume that those regimes will operate effectively. It is consistent with relevant caselaw (*Frack Free Balcombe Residents Association v West Sussex*

County Council [2014] EWHC 4108 Admin) that a Local Planning Authority may consider that matters of regulatory control could be left to a statutory regulatory authority to consider.

9. Framework section 13 deals with facilitating the sustainable use of minerals. Paragraph 142 explains that minerals are essential to support sustainable economic growth and our quality of life. Paragraph 144 says that in determining planning applications great weight should be given to the benefits of mineral extraction, including to the economy. It also refers to ensuring that there are no unacceptable adverse impacts on, amongst other things, the natural environment and human health.
10. Planning Practice Guidance (PPG) is a further material consideration. Paragraph 012 (ID: 27-012-20140306) reiterates that other regulating regimes should be assumed to work effectively. Paragraph 013 (ID: 27-012-20140306) lists environmental issues which should be addressed by Minerals Planning Authorities (MPA). They include the risk of contamination to land, surface water and, in some cases, groundwater issues. With regard to hydrocarbons issues, paragraph 112 (ID: 27-112-20140306) explains that some issues may be covered by other regulatory regimes but may be relevant to MPA in specific circumstances. Whilst a range of issues may be put to MPA they should not need to carry out their own assessment as they can rely on the assessment of other regulatory bodies. However, before granting permission they will need to be satisfied that those issues can or will be adequately addressed by taking the advice of the relevant regulatory body.
11. National Energy Policy is set out in the Overarching National Policy Statement for Energy, 2011 (EN-1). EN-1 deals primarily with major infrastructure projects but can also be a material consideration in planning applications and appeals. EN-1 refers to the challenges of climate change and to meeting legally binding targets for cutting greenhouse gas emissions. It also alludes to the importance of energy to economic prosperity and social well-being and of ensuring that the UK has secure and affordable energy as it transitions to a low carbon economy. While reliance on fossil fuels must be reduced over time some fossil fuels will still be needed during that transition. Other elements of national policy, including the Annual Energy Statement, 2014, are consistent with this approach.

Main Issues

12. The main issues arising from both Appeal A and Appeal B are:
 - i) The effect of the development on groundwater and on water courses; and,
 - ii) The effect of the development on local residents, the community and the local economy.

The effect on ground and groundwater and on water courses

Geology and Hydrogeology

13. The local geology is set out in Table 3 of appendix 6 of the Environmental Management and Mitigation document (CDC25). The wellsite is underlain by

superficial blown sand deposits and by the Kellaways Formation. That formation is underlain by various formations of clay, sandstone and limestone making up the Great Oolite Group. The Great Oolite is underlain by the Inferior Oolite group which includes the Lincolnshire Limestone Formation. Hydrocarbons would be extracted from the Millstone Grit Formation at a depth of about 1580m. The Lincolnshire Limestone Formation is a Principal Aquifer. The Kellaways Sands is a Secondary A aquifer. Formations in the Great Oolite group are Secondary A or Secondary B aquifers.

Near Wellbore Treatments and Related Risks Arising at Depth

14. A range of near wellbore treatments could be undertaken to enhance hydrocarbon flows and mitigate the "skin" effect which arises when a well is drilled at depth. They also assist in hydrocarbon extraction from "tight" formations. A short side-track borehole of 20-30m could be drilled over a 3-4 week period. Radial drilling would involve up to 4 small diameter boreholes of up to 100m in length, allowing the use of high velocity water/fluid jets. Proppant squeeze would involve pumping a mix of gelled fluids and small ceramic beads at pressure through holes in the wellbore casing. This would create small fractures in the rock extending about 40m laterally from the wellbore and about 20m vertically. The injected particles would prop open fine fractures in the rock, allowing hydrocarbons to flow. Acidisation involves the injection of a diluted acid combination through the wellbore. Hydrochloric acid and hydrofluoric acid would be used. The latter would result from a combination of ammonium bifluoride and ammonium chloride applied through the wellbore perforations. If either or both of the proppant squeeze and acidisation treatments failed to be effective it is not intended to use them again.
15. The near wellbore treatments will be at depths of more than 1500m whereas the principal and secondary aquifers are much nearer the surface. In its decision document on the Environmental Permit (CDG2), the EA refers to this considerable separation distance and the intervening formations. It also alludes to the limited lateral and vertical extent of the proppant squeeze, which it says has historically taken place in conventional oilfields in Lincolnshire where sandstone formations are tight or oil flows are impeded. Subject to conditions, the EA finds the proppant squeeze and the related retention within the formation of 50-70% of the proppant fluid to be acceptable. The acid would react with minerals in the formation, resulting in a mildly acidic flow-back to the surface. The Millstone Grit aquifer is highly saline and mineralised. Having regard to the quantity and concentration to be used and the deep and saline character of the formation, the EA treats the proposed acidisation as "de-minimis". The appellant's evidence is that both hydrochloric acid and hydrofluoric acid were used at the nearby Crosby Warren site. It is argued by some objectors that this proposal is for "unconventional" hydrocarbon extraction. However, the EA confirms in CDG2 that, notwithstanding the proposed limited use of near wellbore stimulation, the hydrocarbons to be targeted are found in reservoirs within source rocks. On that basis the proposed extraction can be regarded as "conventional".
16. The Council's case is not based on harm to groundwater at these depths. I appreciate the concerns of third parties about the use of proppant squeeze

and acidisation. At the Inquiry particular concern was expressed about the use of acids, including hydrofluoric acid. Reference was also made to ongoing research by UKGEOS into geological processes and the effects of fluid injection into formations. Nevertheless, the balance of evidence in these appeals leads me to conclude that the near wellbore treatments would not result in material harm.

Risks to Nearer Surface Aquifers and to Watercourses

17. A source-pathway-receptor model is adopted in assessing potential effects. It is common ground in the TSoCG that potential contaminant sources are liquids used and stored on the site, including product oil and related by-products. Possible pathways for contaminants are from the surface vertically into the blown sands, horizontally with drainage flows, vertically through the blown sands and underlying soils and into the bedrock and combinations of horizontal flows through the bedrock. A further potential pathway is through an engineered barrier. The Lincolnshire Limestone is a high sensitivity receptor and the Secondary aquifers are moderately sensitive. It is common ground that the superficial blown sands are likely to be in hydraulic continuity with Ella Beck. The beck is a potential receptor via run-off or by a groundwater route.
18. The appellant submitted an extended range of supporting information in support of planning application PA/2017/696 (Appeal B). It included an Assessment of Flood Risk, Hydrology and Pollution Control, May 2017 (CDA19) and an Environmental Management and Mitigation document, May 2017 (CDA25). Paragraph 9.4 of Appendix 6 of CDA25 says that the likelihood of infiltration from the surface of the wellsite into the Lincolnshire Limestone aquifer and the secondary aquifers is low due to a "*hydraulic break provided by the low permeability formations that overly the Lincolnshire Limestone and the presence of an upward hydraulic gradient that prevents downward movement of water.*" However, in cross-examination Mr Dodds conceded that evidence provided in drillers' logs from monitoring boreholes on the site showed that there is no longer an upwards gradient and that there is now a downwards hydraulic gradient. It is also said in CDA19 that there are artesian conditions in the Lincolnshire Limestone formation. However, this appears to be based on initial drilling which found artesian water at a depth of 80m, whereas at that depth the Marlstone Rock formation is encountered rather than the Lincolnshire Limestone.
19. The appellant's case that there would be no harm to groundwater in the Lincolnshire Limestone also rests in part on the existence of a capping layer above that formation. Paragraph 4.22 of CDA19 refers to the Kellaways Formation comprising rocks that confine underlying aquifers, effectively capping the Lincolnshire Limestones that are below. However, Figure 3 of CDA19 shows that the Kellaways Formation underlies only about half of the appeal site. Mr Dodd's evidence is that earlier local boreholes show that artesian conditions existed in the past, for example in 1918. He says that for that to have been the case there must have been an effective capping layer and it must remain in place. Nevertheless, there is conflicting evidence on how effective any capping layer might be. Whereas Mr Dodds refers to it as an essentially impermeable layer, a British Geological Survey (BGS) glossary

defines a confined aquifer as one "*whose upper and lower boundaries are low permeability layers.*" Drillers' records are available from the 4 monitoring boreholes installed at the site. The borehole 4 record does identify a grey clay layer beginning at about 12m below the site at that location. However, the rotary drilling of that borehole produced a "mush" and the clay layer has not been subject to permeability testing. Nor is a drillers log as detailed as would be a geologist's or engineer's log.

20. The Great Oolite group of formations, which lie between the Kellaways Formation and the Lincolnshire Limestone, comprises thin layers of clay, limestone, mudstone and sandstone. The Great Oolite includes formations that are classified as Secondary aquifers and there is no capping layer above them. If contaminants entered, there would be a high permeability pathway for them to travel horizontally, including towards the nearby Clapp Gate borehole from which British Steel extracts water for industrial purposes.

Pollution Prevention Measures

21. The above matters serve to emphasise the importance of ensuring that highly effective pollution prevention measures will be in place if this development is to proceed. Added weight is given to that need by the high level of dependence in North Lincolnshire on groundwater for drinking water and its importance for industrial purposes with regard to extraction of water by British Steel from the nearby Clapp Gate borehole. Moreover, if any contaminants found their way into the underlying aquifers it is unlikely to be easy to remove them.
22. The appellant's evidence, including that in CDA25, sets out the extensive range of environmental mitigation and management measures that would be put in place. The well design includes 3 sets of steel casings which are cemented in place to a depth well below formations considered to contain ground water with a resource value. Control of well design and integrity falls within the ambit of the Health and Safety Executive (HSE). There would be up to 5 storage tanks on site, each with an overflow protection device linked to a site safety and shutdown system. The storage tanks would be contained within a purpose built bund with at least 110% of the capacity of the largest storage tank. The tanks and related surface piping would be subject to regular inspection and testing. Waste products returned to the surface would include dilute spent acids, spent proppant and related fluids, rock cuttings, other fluids and naturally occurring radioactive material (NORM). Wastes would be stored on site until their transport to an authorised waste disposal site in accordance with a Waste Management Plan submitted to the EA. Chemicals would also be stored on site.
23. The site is already underlain by a Bentofix geosynthetic clay liner (GCL) which is intended to provide an impermeable layer, creating a sealed site. It is overlain with a surface dressing of stone. GCL has been used in a range of landfill and hydrocarbon drilling sites elsewhere. Soil moisture is said to maintain the integrity of the GCL and if pierced the inner core would expand to seal the rupture. The existing perimeter containment ditch would be re-lined with new GCL and would contain a perforated drainage pipe linked to the proposed surface water interceptor. The interceptor would be designed to filter out any contaminants, allowing a regulated discharge of clean, uncontaminated water to Ella Beck. The site is designed with sufficient

capacity to accommodate fluids and rainwater equivalent to that from a 1 in 100 year storm event, allowing for climate change. An Environmental Management System would be in place and site management would seek to ensure early detection of any spillages. The 4 boreholes allow the monitoring of groundwater. Three are shallow boreholes, to a depth of 6m. The fourth is to a depth of 50m, penetrating the Lincolnshire Limestone formation. Water quality in Ella Beck would also be regularly monitored.

24. There was a focus at the Inquiry on a number of matters concerning pollution mitigation and monitoring measures. The CIRIA document *"Containment Systems for the Prevention of Pollution"* provides guidance for a wide range of sites where containment systems are to be installed. It refers to the compulsory provision of a ground investigation report as part of the geotechnical design process. It should be prepared by a suitably qualified person, normally a chartered geotechnical engineer, and should be informed by both desk study and on-site investigations including those relating to permeability and stability. The appellant conceded at the Inquiry that no such report had been prepared, although the ground conditions are said to have been assessed and considered acceptable by a very experienced engineer prior to installation of the GCL. I consider this to be a serious omission, particularly as the site would operate over a very long period. In addition, Ms Wagstaff referred to the different qualities of the sub-surface material depending on the amount of water it contained. Nor is it clear from the Environmental Permit (CDG2) decision document that the absence of the necessary ground condition report was addressed through the Environmental Permitting process.
25. The provision of the necessary ground condition report may demonstrate that ground conditions are acceptable, such that there would be no risk of settlement beneath the GCL. I have considered whether this could be addressed by a condition. Mr Dodds conceded in cross-examination that a ground investigation report would have been helpful and suggested that it might be addressed retrospectively. However, there are no details of how that would be done and its results are uncertain. Nor would it be fully addressed by a condition requiring ongoing monitoring and management of the soundness and integrity of the GCL.
26. A German GCL product was used and installed in accordance with the manufacturer's specification. The appellant's evidence on the precise structure of the layers overlying the GCL was somewhat confused. Mr Abbot explained that 2 layers of geotextile were placed above the GCL. At the Inquiry Mr Dodds corrected the reference in this evidence to a sand layer above the GCL to refer to geotextile layers. In document CDG2 the EA refers both to geotextiles and a cover of stone and sand. The stone layer as installed is 300mm in depth and that depth is referred to in the *"Bentofix Installation and Acceptance Procedure (Type NSP and BFG) for Landfill Applications"* document. However, that document also advises that if frequent traffic is expected over a GCL lined area the depth of cover should be increased to at least 600mm. A further document *"Bentofix NSP Types GCL Installation Guidelines"* refers to a minimum of 300mm and says that *"Frequent traffic can be run over a soil coverage of at least 800mm. Different thicknesses or soil material might be possible due to site conditions and soils."* The EA's document *"Using Geosynthetic Clay Liners in Landfill*

Engineering" is also relevant. It says that "*Where you expect repeated traffic over the covered GCL, you should place an additional thickness of protective soils; 600mm is an appropriate amount of protection.*" Parts of the appeal site are likely to be subject to regular traffic movements, for example by oil tankers and other vehicles serving the site.

27. The appellant's evidence is not sufficient to show why a thicker layer of stone is not required over at least part of the site. It has not, for example, been demonstrated that the effect of the geotextile layer in distributing pressure would be sufficient to reduce the depth needed to that now in place. This is a serious deficiency in the appellant's case given the long period over which hydrocarbon production would continue and the important role of the material overlying the GCL in ensuring its continued integrity. This is not a matter which would be fully addressed by the draft GCL monitoring and management condition discussed at the Inquiry.
28. While conceding that the GCL was not completely impermeable, Mr Dodds asserted that it was of such a low permeability that it would take many months for any contaminant to pass through it. He agreed that no calculations had been made of the likely rate of leakage through the GCL but considered that on-site management would be able to detect and deal with any spillage onto the site surface within a short period. Nevertheless, this matter adds weight to the need to ensure an appropriate depth of cover over the GCL, particularly in the more trafficked parts of the site.
29. The avoidance of contaminants reaching Ella Beck through run-off relies on the proposed interceptor being able to remove any traces of contaminants so that only clean water would be discharged. It is not disputed that an interceptor could be designed to achieve that. Figure 4 of CDA25 gives a conceptual depiction of an interceptor. The EA does not regulate the discharge of clean surface waters but the Environmental Permit requires a monitoring standard or method to be agreed in writing. Details of the interceptor and its location could also be controlled by planning condition.
30. There is conflicting evidence on the likely effectiveness of the monitoring boreholes. Appendix H of Ms Wagstaff's evidence shows the location of the 3 shallow boreholes and the direction of shallow groundwater flow. Figures 1-4 of Mr Dodds' Technical Note shows the boreholes in relation to the local geology. The Council is concerned that the absence of shallow monitoring boreholes along most of the site boundary near Ella Beck could result in some contaminants avoiding detection. A further concern is that the shallow boreholes do not penetrate the full depth of the superficial deposits so that heavier pollutants would need to be picked up through traces of them at a higher level. It is also argued that the design of the shallow boreholes could prevent lighter contaminants from being detected. In response, Mr Dodds asserted that traces of any contaminants would find their way into the water columns within the monitoring boreholes and would then be detected. Nevertheless, he conceded that full penetration of the relevant horizons would be preferable. The need for a fully effective monitoring system is not disputed and there is likely to be scope for agreement on these points between the main parties. I am satisfied that this matter which could be addressed by condition.

Conclusions on the effect on ground and groundwater and on water courses

31. I take into account the extensive range of mitigation and management measures proposed by the appellant. However, having regard to my conclusions in respect of a ground investigations report and on the GCL cover layer, it has not been shown that a material risk of harm to groundwater resources and to water quality in Ella Beck would not remain.

The effect on local residents, the community and the local economy

32. A number of matters concerning potential adverse effects were raised by local residents and others. The appellant assesses the risk of the proposed proppant squeeze inducing a seismic event leading to discernible vibration at the surface to be extremely remote. Approval of a Fracturing Plan by the Oil and Gas Authority would be required and there would be monitoring of ground vibration. Evidence is submitted of alleged seismic events at a site in Lancashire, said to result from oil extraction. That scheme concerned hydraulic fracturing for shale gas or oil, which is not proposed here. In this case hydraulic fracturing would be of a small scale and carried out at very considerable depth. Examples elsewhere in the world are cited and there have been seismic events elsewhere in Lincolnshire. Nevertheless, the balance of evidence does not suggest an unacceptable risk of harm through seismic activity in this case. There is also concern about very long term risks arising well after hydrocarbon extraction has finished. The EA decision document on the Environmental Permit (CDG2) sets out in detail the legal and evidential requirements which would be put in place to ensure that the decommissioned well would not cause any ongoing adverse impacts.
33. The appeal site is in the countryside and is not close to dwellings. It is limited in extent, close to agricultural buildings and has little visual impact. If planning permission was granted conditions could be imposed controlling daytime and night time noise to acceptable levels. The site is in a low flood risk area and is designed with a capacity to accommodate rainwater equivalent to that from a 1 in 100 year storm event. The proposal is acceptable with regard to flood risk.
34. Concerns are also expressed about the potential effect of emissions on local air quality and on human health, particularly in respect of the proposed flaring of gas. Reference is made to existing local air quality issues, the potential for local harm, research into harmful health effects related to oil and gas production and the need for a stronger national approach to air quality. Framework paragraph 124 refers to avoiding unacceptable impacts on health and paragraph 124 refers to cumulative effects on air quality. There is some uncertainty over the amount of gas that would be flared. The Environmental Permit imposes an upper limit of 10 tonnes per day. The appellant has provided an Air Quality Assessment (CDA25, Appendix 6). It assesses the effects of 3 different rates of flaring of gas and it takes into account prevailing local meteorological conditions. It examines the effects with regard to nitrogen dioxide, Volatile Organic Compounds (VOC) and carbon monoxide and finds that they would not result in any significant impact. While there would be some effect on local air quality I find that it would not be sufficient to be unacceptable.

35. Some local residents are concerned about the traffic movements from the development resulting in congestion and a risk of accidents. The appellant's traffic assessment shows that there would be significant HGV movements only for short periods, for example during site mobilisation and de-mobilisation. Related vehicle movements would otherwise be low and HGV movements would use a designated route to and from the A18. There was no objection from the Highway Authority subject to conditions and the effect would not be materially harmful to highway safety. The vehicle crossing of Ella Beck and the underlying culvert were assessed for the purposes of the exploration phase and strengthening was carried out.
36. It is not unusual for hazardous materials to be handled on industrial or other sites and their control is a matter for the HSE. The decision document on the Environmental Permit (CDG2) enumerates the wastes that would be produced and refers to the arrangements that would need to be put in place for their safe disposal and related requirements.
37. The above matters do not render the proposals unacceptable. However, as I set out above, there is a high level of dependency in the area on clean groundwater resources, both for drinking water and for use by British Steel, a major local industrial employer. It follows from my conclusion on the first main issue that it has not been shown that a risk of material harm to local residents, the wider community and local industry would not remain.

Other matters

38. The alleged inconsistency of the proposed extraction of hydrocarbons with the necessary approach to climate change is the subject of numerous objections to these proposals. It was addressed by third parties at the Inquiry. The thrust of these objections is that the development conflicts with the need for urgent action to respond effectively to the threats posed by climate change. The use of the fossil fuels produced would result in the discharge of additional greenhouse gases into the atmosphere. Reference is made to the Paris Agreement 2016, to which the UK is a signatory, and to its intention to keep global warming to well below 2°C above pre-industrial levels. Evidence from recent research is cited, suggesting a serious risk of significantly exceeding this level on current trajectories and of dangerous levels of CO₂ emissions. It is argued that this shows the need to avoid exploiting oil and gas reserves such as these. There is also reference to the availability of other fuel sources, including renewable energy. The appellant's argument that exploiting UK reserves will reduce reliance on imports is refuted and reference is made to fossil fuel exports from the UK and to a declining demand for gas. The Committee on Climate Change's 2016 report on Onshore Petroleum includes a recommendation that the UK's unabated fossil fuel energy consumption must be reduced over time, while gas consumption must remain in line with carbon budgets.
39. Framework paragraph 93 says that planning plays a key role in helping shape places to secure radical reductions in greenhouse gas emissions, minimising vulnerability, providing resilience to the impacts of climate change and supporting the delivery of renewable energy, low carbon energy and associated infrastructure. Much of the evidence submitted by objectors post-dates the statement of national energy policy in EN-1. Nevertheless it remains part of national energy policy that fossil fuels have a role to play in

providing for UK energy needs during the transition to a low carbon economy. In that context the proposed extraction of hydrocarbons is consistent with national policy for energy.

40. I place little weight on the risk of this development creating a precedent for the proliferation of similar schemes or processes elsewhere, or the risk that the proposed processes could be varied. Any further proposals would fall to be determined with regard to relevant policies, material considerations and relevant regulatory regimes. Nor do alleged failures to adhere to or enforce planning conditions elsewhere mean that similar problems would arise in this case. Reference is also made to matters concerning the Petroleum Exploration and Development Licences (PEDL). The PEDL licencing regime is regulated by the Oil and Gas Authority and this matter has no direct bearing on my decisions in these appeals.

Overall Conclusion on Appeals A and B

41. In reaching my overall conclusion I give great weight to the benefits which would arise from this development. It would contribute to the provision of secure energy supplies and would be consistent with providing for a mix of energy sources during the transition to a low carbon economy. An established site would be used and there would be a degree of national and local economic benefit to the rural economy. I also take into account the EA's primary role as regulator in the protection of water resources. The EA has considered the proposals acceptable subject to conditions, resulting in the issue of the Environmental Permit. Nevertheless, these matters do not outweigh other considerations. It is consistent with PPG that a decision maker should be satisfied with regard to issues concerning the effect of development on groundwater resources and water courses. Having regard to my conclusions on the absence of a ground conditions survey report and of sufficient evidence on the adequacy of the GCL covering, it has not been shown that unacceptable adverse impacts to groundwater resources and water courses would not arise during the life of the development. The development does not meet the requirement arising from LP policies M1 and M23 to show that the proposed environmental protection measures would be adequate to mitigate impacts. It would not be consistent with criterion 10 of policy CS18. Nor has it been shown that the requirements of Framework paragraphs 109, 121 and 122, to which I refer above, would be met. Having regard to the above and to all other matters raised I therefore conclude that Appeals A and B should not succeed.

Appeal C – The Planning Condition Appeal

Preliminary Matters

42. At the Inquiry the appellant suggested that if this appeal was to succeed the date by which site restoration was required should be extended by 12 months from the date of this decision. However, that would go beyond the date specified in planning application PA/2017/268 and therefore beyond the scope of this appeal. It might also prejudice those who were not party to the discussion of this matter at the Inquiry. I have therefore determined the appeal on the basis of extending the period to 28 April 2018. That would be 4 years from the commencement of the development.

Main Issue

43. The main issue in this appeal is the effect of extending the temporary period of the permission on the character and appearance of the area and on living conditions of local residents.

Reasons

44. Appeal C is against the Council's refusal to allow an extension of the period at the end of which restoration of the wellsite would be required, beyond that specified in condition no.24 of planning permission MIN/2013/0281. That period was expressed in condition no.24 as 3 years from the date on which the development commenced. Development was started on 28 April 2014 so that restoration was required by 28 April 2017. Planning application PA/2017/268 sought to extend the period for restoration by 12 months, to 28 April 2018.
45. The Council's position by the close of the Inquiry was that if Appeals A and B were allowed then Appeal C should also succeed. If, as I have now concluded, Appeals A and B should not succeed then the Council considers that hydrocarbon production would be ruled out and there would be no merit in allowing an extended period.
46. It is consistent with Framework paragraph 144 that provision should be made for site restoration and aftercare at the earliest opportunity. In respect of oil and gas appraisal boreholes, LP policy M22 also requires adequate proposals for restoration on completion. Extending the temporary period would not be consistent with these policies. On the other hand, as the appellant points out, a significant level of investment has already been made in this site. The proposed extended period would be of a modest duration and would help to avoid the risk of abortive work if, for example, the appellants were to pursue an alternative or revised scheme for the site.
47. The site is currently on a care and maintenance footing. In the context of nearby farm buildings it does not have a significant adverse visual impact on its surroundings. Nor is it harmful to the living conditions of local residents.
48. I conclude that these material considerations outweigh the policy conflicts. The balance of evidence is that Appeal C should succeed. I shall therefore grant a new planning permission subject to those conditions which remain necessary and relevant. Those conditions are needed to protect residential amenity and the environment. I have taken into account the draft conditions discussed at the Inquiry and set out in Inquiry document 33. For the reasons set out above, condition no.11 limits sets a date of 28 April 2018 by which the site must be restored. The conditions are set out in the Schedule attached to this decision.

FORMAL DECISIONS

Appeal A: APP/Y2003/W/17/3173530

49. The appeal is dismissed.

Appeal B: APP/Y2003/W/17/3180606

50. The appeal is dismissed.

Appeal C: APP/Y2003/W/17/3182879

51. The appeal is allowed and planning permission is granted for the construction of a temporary wellsite for the drilling of an exploratory borehole with associated structures and works at Lodge Farm, Clapp Gate, Appleby, Scunthorpe, DN15 0DB effective from 28 April 2017 in accordance with the application ref: PA/2017/268 21 dated 21 February 2017 without compliance with condition no.24 previously imposed on planning permission MIN/2013/0281 and subject to the conditions set out in the Schedule to this decision.



INSPECTOR

APPEARANCES

FOR THE LOCAL PLANNING AUTHORITY: Mr A Evans, of Counsel.
He called:

Ms S Wagstaff, BA, MSc, FGS, JBA Consulting.
CGeol, EurGeol.

Ms K Atkinson, BA (Hons), Dip TP, KVA Planning Consultancy.
MA, MRTPI.

FOR THE APPELLANT: Mr R Glover, Partner, Squire Patton Boggs LLP.

He called:

Mr M Abbot, BSc (Hons), FGS. Egdon Resources Plc.

Mr J Foster. Zetland Group Ltd.

Mr J Dodds, BSc (Hons), Envireau Ltd.
DUC, MSc, CGeol, FGS.

Mr P Foster, BSc (Hons), Barton Willmore.
DipTp, MRTPI, MRICS.

INTERESTED PERSONS:

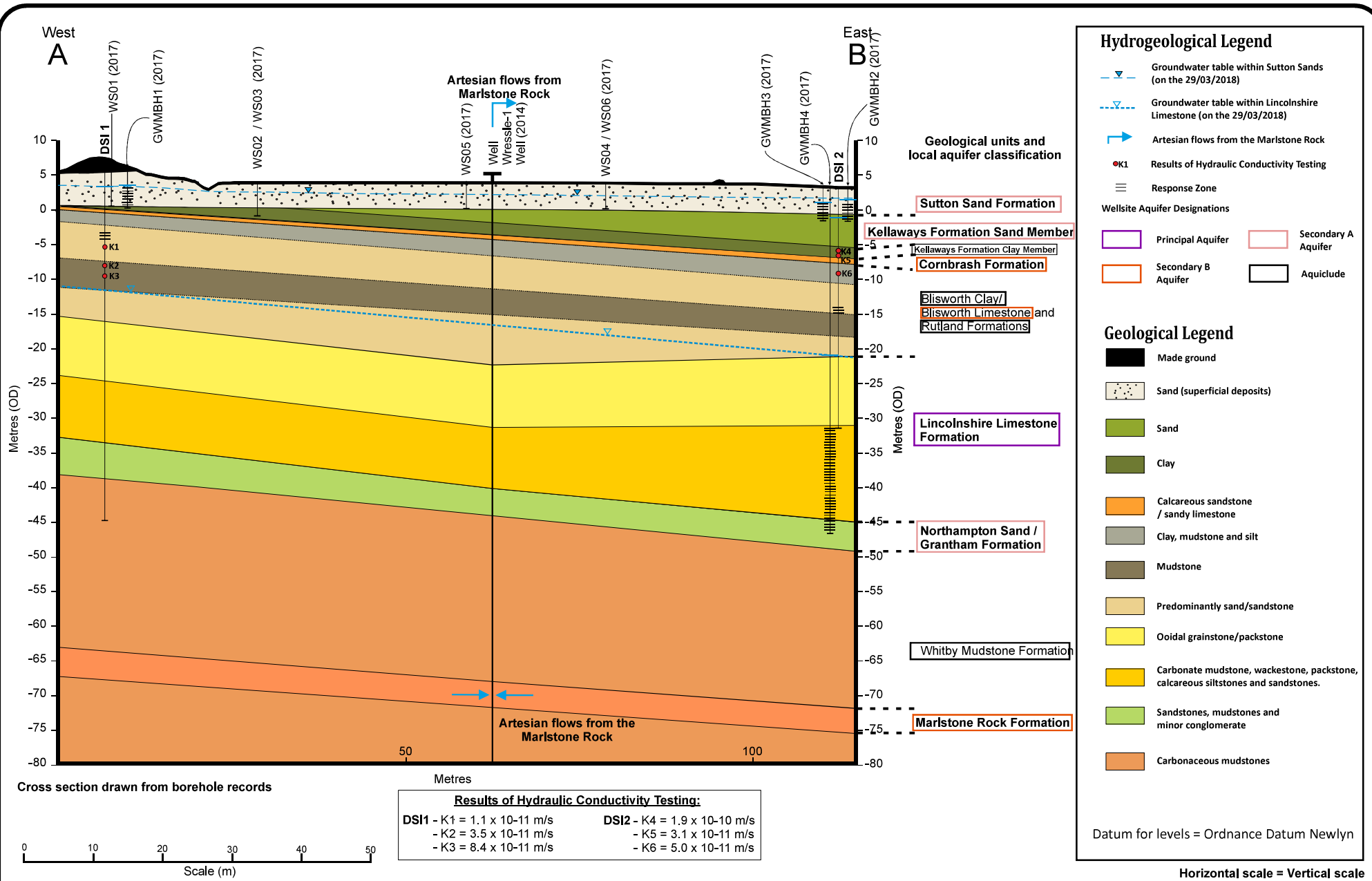
Ms Dunn	Local resident.
Mr Foster	Unite Union.
Ms McWhirter	Weald Action Group.
Mrs Betts	Local resident (statement read by Ms Williams).
Dr Simpson	Local resident.
Mrs Turner	Local resident.
Mr McLeod	Local resident.
Ms Dale	Local resident.
Mr Glover	Local resident.
Ms Clayton	Local resident.
Ms Williams	Local resident.
Mr Frackman	Campaigner against "fracking".
Mr Roberts	Local resident.

DOCUMENTS SUBMITTED AT THE INQUIRY

1. Council's list of appearances.
2. Appellant's list of appearances.
3. Council's opening statement.
4. Appellant's opening statement.
5. Council's composite document.
6. JBA Consulting map of bedrock geology and aquifer designation.
7. Glossary of groundwater and groundwater related terms.
8. Extract from Planning Practice Guidance Minerals.
9. Lithology lexicon document.
10. Example of engineer's borehole log.
11. Bentofix Installation and Acceptance Procedure (Type NSP and BFG) for Landfill Applications.
12. Council's set of photographs, 1 November 2017.
13. Environment Agency document: Using Geosynthetic Clay Liners in Landfill Engineering (version 3).
14. Construction Quality Assurance Plan document.
15. Photograph of sketch prepared by Mr Dodds.
16. Appellant's response to questions raised during cross examination of Mr Abbot.
17. How to Map Hydrocarbon Contamination of Groundwater Without Analysing for Organics (Abstract).
18. Community Union letter of 10 November 2017.
19. GMB Union email of 13 November 2017.
20. Use of Hydrofluoric Acid at Crosby Warren document.
21. Ms Dunn's statement.
22. Mrs Betts's statement.
23. Mr Foster's statement and related documents.
24. Ms McWhirter's statement and related documents.
25. Ms Williams's statement and related documents.
26. Dr Simpson's statement.
27. Mrs Clayton's statement.
28. Mr McLeod's statement and related documents.
29. Mrs Turner's statement and related documents.
30. Mr Robert's statement.
31. Mr Frackman's statement and related documents.
32. Schedule of suggested conditions.
33. Revised schedule of suggested conditions.
34. Mrs Clayton's summing up.
35. Mr McLeod's summing up.
36. Mrs Turner's summing up.
37. Ms Williams summing up.
38. Council's closing statement.
39. Appellant's closing statement.
40. Bentofix GCL Installation Guidelines.
41. Ms Wagstaff's Qualifications and Experience document.
42. Anglian Water Planning Application Report, January 2017.

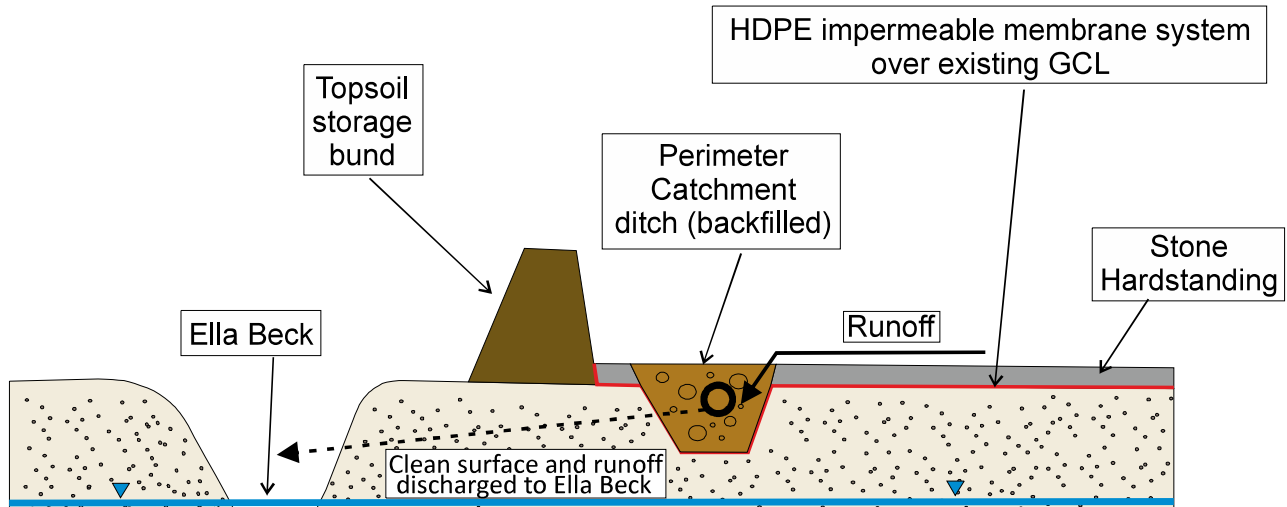
Schedule of Conditions for Appeal C: APP/Y2003/W/17/3182879,

1. The development hereby permitted shall be carried out in accordance with the following approved plans: 3334 P 01, 3334 P 02, 3334 P 03, 3334 P 04, 3334 P 05, 3334 P 06, 3334 P 07, 3334 P 08, 3334 P 09, 3334 P 10, 3334 P 11 and 3334 P 12.
2. Earthworks associated with site restoration and HGV deliveries shall only take place between the hours of 7:00 hours and 17:30 hours Monday to Friday and Saturday 7:00 hours to 13:00 hours with no deliveries on Sundays or Bank Holidays.
3. Noise from the approved exploration well site shall not exceed 42dB $L_{Aeq,5min}$ when measured at any noise sensitive dwelling between 7pm and 7am Monday to Sunday inclusive.
4. Noise from the approved exploration well site shall not exceed 60dB L_{Amax} when measured at any noise sensitive dwelling between 7pm and 7am Monday to Sunday inclusive.
5. Noise from the approved exploration well site shall not exceed 55dB $L_{Aeq, 1h}$ when measured at any noise sensitive dwelling between 7am and 7pm Monday to Sunday inclusive.
6. Noise from the approved exploration well site shall not exceed 70dB L_{Amax} when measured at any noise sensitive dwelling between 7am and 7pm Monday to Sunday inclusive.
7. The lighting layout for the scheme shall be as set out in drawing number 3334 P06, dated February 2013, and shall be implemented and retained during the life of the development.
8. The site shall be maintained as a bunded, sealed site with sufficient containment capacity to prevent pollutants from discharging to land.
9. The development shall only be carried out in accordance with the approved Flood Risk Assessment (FRA) dated January 2013. Specifically, the surface water runoff generated by the 100 year critical storm shall be limited to 5 litres per second so that the risk of flooding off site is not increased. Sufficient attenuation must be supplied in the ring ditch to prevent any negative impact on the site for the aforementioned storm event.
10. The Biodiversity Management Plan submitted with application MIN/2013/0281 shall be carried out in accordance with the approved details and timings, and the approved features shall be retained thereafter.
11. The buildings, structures and works hereby permitted shall be removed, the use hereby permitted shall be discontinued and the land restored to its condition before the implementation of planning permission MIN/2013/0281 no later than 28 April 2018.



North

South



	Classification	Lithology
	Aquifer	Sand *
	Aquiclude	Clay
	Aquifer	Sandstone
	Aquiclude	Clay
	Aquitard	Sandstone
	Aquiclude	Clay
	Aquitard	Sandstone
	Aquifer	Limestone
	Aquifer	Sandstone
	Aquiclude	Mudstone

* Sutton Sand Formation & Kellaways Sand Formation
(the Unconsolidated Sands Aquifer)

Not to scale



Ref: P:\Egdon Wressle 2018 (2355)\40 - Reporting\HRA\Figures\Final submission Date: June 2018

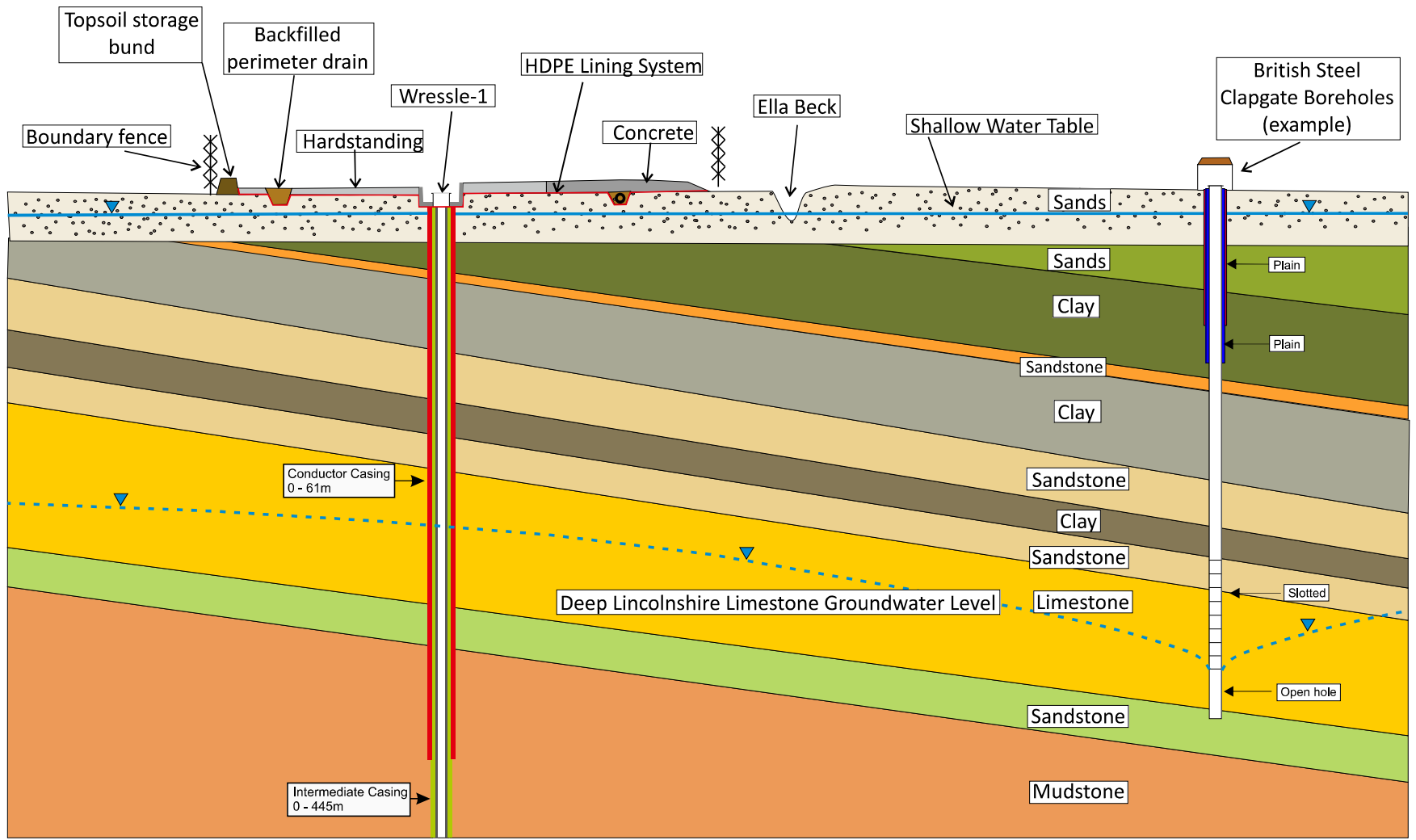
**Egdon Resources U.K. Limited -
Wressle HRA 2018**

Figure 19

Wressle Wellsite Hydrogeological Conceptual Model (HCM) Sketch

West

East



Not to scale



Ref: P:\Egdon Wressle 2018 (2355)\40 - Reporting\HRA\Figures\Final submission
Date: May 2018

Egdon Resources U.K. Ltd - Wressle 2018

Figure 20

Local Conceptual Model Sketch