Dear Sirs

PREESALL UNDERGROUND GAS STORAGE FACILITY

Further to your letter of 8th April 2014, the Protect Wyre Group asks the Secretary of State to further examine four specific matters arising from the re-determination of Halite Energy Group’s application to store gas underground in the Preesall salt field.

These are:-

    The unproven geology of the salt field,
    The national need for security of supply,
    The brine discharge into the Irish Sea and Morecambe Bay,
    The voices of 10,850 residents have not been fully heard.

We will be pleased to provide any additional information and to answer any questions that might arise from our comments and observations.

Yours sincerely

Ian Mulroy, Chair PWG
UNPROVEN GEOLOGY OF THE PREESALL SALT FIELD

The main focus of the Group’s attention is the unproven geology of the salt field and its ability to accommodate a development on the scale proposed and the lack of specific geological evidence, some of which has been unavailable and outstanding since the Public Inquiry into this matter in 2006.

At the Public Inquiry in 2006, Consultant Geologist, Ms Ruth Allington, MSc, MBA, FIMMM, CEng, FGS, CGeol, EurGeol, MAE, MEWI QDR, MChArb, acting in the role of advisor to the Planning Inspector, reported on what she considered was required, but missing, in terms of seismic and geological information to allow her to fully evaluate the application. In our opinion, few if any of the recommendations were fulfilled, other than by a re-interpretation of existing data and it was this new interpretation that formed the basis of the 4th application and Halite’s submission to the Examining Authority in 2012. Many of PWG’s long standing and repeated requests for factual information both to Halite and the Inspectorate are well documented but remain outstanding.

The Secretary of State is asked to note that the seismic tests, asked for as far back as 2006, were only undertaken after the refusal of planning permission in 2013 and whilst some seismic testing has now been undertaken, PWG contends that the results of this exercise have, to the best of our knowledge, not been made available to the public or interested parties and as such they should therefore not form part of the current evaluation.

Inclusion of the seismic test results could suggest the need for a fresh planning application, which we hope would not be accepted for determination unless all the missing geological evidence from the previous 4 applications has been gathered and made available, together with an updated environmental impact survey and a reassessment of the case for gas storage at this specific location.

Halite Energy Group, formerly known as Canatxx, has had a presence in this geographical location for over 20 years with the last 10 to 12 of them specifically focussed on obtaining planning permission for this proposed underground gas storage scheme. We strongly disagreed with the EA’s recommendation to allow the development to proceed, albeit subject to the provision of additional information and testing – this leaves too much uncertainty.

PWG had no interaction with the geological advisor to the EA on the last application but we wish to ensure that the independent geological advisor due to be appointed by the Secretary of State is fully aware of our ongoing concerns about the geology and aware of the correspondence between Halite and the Infrastructure Planning Commission so PWG has accordingly attached a number of appendices to this letter and report to assist this process.
The following paras numbered 1.1 to 11.3 and the list of appendices have been written by Howard Phillips, Vice-Chair and Geologist to the Protect Wyre Group

1.1 At the Open Hearing on 17th October 2012, I, Howard Phillips, gave evidence (Ref 10015247) which summarised The Protect Wyre Group’s (PWG’s) concerns that the geological information presented by Halite Energy Group (Halite/HEG) to the Examining Authority was insufficient to justify approval (see App A).

Note: The appendices have been attached in full to this document to ensure that any additional points that might need to be referenced are available and also to ensure that none of the statements made are taken out of context.

1.2 I would urge the Secretary of State to read that evidence, which was presented orally, and I would draw the attention of the Secretary of State to the following points raised by PWG at this hearing and refer to appendices where the concerns of PWG concerning the geology, the questions asked by the Examining Authority (EA) and the responses from Halite to both, over the course of the Inquiry, are set out.

2.1 Para 2.2 p2 (App A) of the Open Floor Hearing evidence refers to the accuracy of the geological model presented by Halite in 2012, compared with the 2005 BGS Model presented at the Public Inquiry where a similar application from Canatxx (the previous name of the Halite Energy Group) was refused because the geological information provided was “neither sufficient nor sufficiently detailed”.

2.2 The evidence for PWG’s claim that Halite has not carried out the detailed geological investigation that was required is set out in App B pp1-2.

2.3 The EA asked about the data used by Halite to construct the 2009 3D Model. Halite replied (App D p9) that no additional data has been obtained and the plots “are purely to aid visual assessment and no increase in accuracy is implied”.

2.4 PWG drew the attention of the seismic line GC 81-336 which was not used in the construction of the 3D Model, yet is referred to several times by Halite in demonstrating the accuracy of that model. (App E - Q 1/7 p4)

3.1 The evidence from PWG at the Open Hearing goes on to identify the 5 areas of contention between Halite and PWG regarding the 2009 3D Model. Halite has not given clear answers to the issues raised by PWG (nor to the EA in its questions).

4.1 **The N-S Fault which underlies the southern polygon.**

There is a major fault which runs north-south across the western end of the Heads Peninsula which PWG contends, extends northwards under Barnaby’s Sands and would prevent the construction of any caverns in the southern polygon. This is explained in the PWG evidence (App B pp2-3).
4.2 In its response to PWG (App C) Halite ignores this concern. It does, however, give a generalised answer to the EA Question 1/10 (App D pp13-14) regarding the predictable length of normal faults. PWG shows (App E Q1/10) that this in fact demonstrates that the Western Heads Fault does extend under Barnaby’s Sands (see also App G p3).

4.3 Any suggestion that the Fault does not extend northwards because no fault is shown in seismic line GC 81-336 is spurious because of the poor quality of that line. The use of GC81-336 by Halite in its justification for the accuracy of its 3D Model is highlighted by PWG’s response (App I par2) to Halite’s answer to Q5 of the EA’s second round of questions (App H 99 5-6).

5.1 The thickness of the halite bed underlying Barnaby’s Sands to the west of the Burrows Marsh Bore Hole.

Note: This bore was drilled at an angle under Barnaby’s Sands whereas Burrows Marsh lies to the south of the Heads Peninsula.

PWG (App B p3) drew attention to the discrepancies between the data revealed by this bore hole and the 2005 BGS Model in relation to the depth to the top and bottom of the halite bed and the thickness of this bed.

5.2 The 2009 3D Model produced by Mott MacDonald for Halite shows a major N-S fault under the eastern side of Barnaby’s Sands which could have impacted on the bore hole records. PWG (App 2 Figure 2) produced a possible scenario to show how faulting in this area reduces the apparent thickness of the halite bed from 320m as recorded in the bore, to the true thickness of 220m as shown in the BGS 2005 Model. Further evidence for the impact of the fault on the bore hole data is given on pp 4-6 (App 2).

5.3 Halite’s response (App C p3) was to produce Figure 2.1 “Trajectories of the Burrows Marsh Borehole and East Barnaby’s Sands Fault”. However, that diagram does not correspond with the evidence shown on its 2009 3D Model. This fact was drawn to Halite’s attention (App F p5 and also App G p7).

5.4 The EA asked Halite about the thickness of the halite in the Burrows Marsh Bore Hole (BMBH) (Q7 of further written questions). Halite admitted that its diagram was incorrect and as a response to the EA reproduced the section from the BGS Bore Hole Report (App H pp8-9), but this does not answer the fundamental question.

5.4 Thus Halite has failed to explain the discrepancies between the bore hole data and the BGS Model and has not produced an accurate section showing the effect of the East Barnaby’s Sands Fault on the halite bed. PWG assert that the thickness of the halite bed to the west of the BMBH, underlying Barnaby’s Sands is over estimated by c100m. This will severely reduce the size of caverns which can be constructed.
6.1 The East-West Fracture Zone

Halite agrees that a transposition of salt bottom and top faults occurs under Barnaby’s Sands, 300m south of Arm Hill. PWG interprets this transposition as an East-West zone of shearing which would prevent the construction of caverns in this area (App B p7 and also App F p7).

6.2 Halite states that these features are common in rift systems (App C pp3-4) and once again relies on seismic line GC81-336 to dispute PWG’s claim. The inadequacy of GC81-336 has already been referred to.

7.1 Northern Polygon caverns 8, 10 & 11

PWG has drawn attention to the differences between the Halite 3D Model of geology and the fissures used by Baker-Hughes in calculating the heights of the proposed caverns 8, 10 & 11 (App B p7).

7.2 Halite disputes this, stating that the true vertical depths on the Model and used in the calculations are the same (App C p11). This is not the case. This may be a minor point but it does illustrate a lack of accuracy and attention to detail on the part of Halite in its presentation of the geology.

8.1 Interpretation of Borehole E1 (Hackensall Hall)

No seismic evidence was presented by Halite to show that the geology in the area here it is proposed to construct caverns 1-6, is suitable. The justification is based on Halite’s interpretation of the data for Bore Hole E1. PWG presents the evidence to demonstrate how little is known about the geology of this area (App B pp7-9).

8.2 The log of Bore Hole E1 shows the thickness of halite to be 81m. However, Halite suggests that this does not show the true thickness of the halite bed because the bed is truncated by the Burn Naze Fault. In fact Halite claims that at the most westerly of the caverns proposed, the thickness is 260m.

8.3 PWG sets out clearly the evidence (App B 99 7-9) to show that the 81m in the borehole is the complete thickness of the halite bed and that it is not truncated by the Burn Naze Fault. Halite does not address this evidence in its response to PWG (App C p4).

8.4 The EA takes up the concern in its second round of questions to Halite. Question 4 asks about Borehole E1. Halite states (App H p5) that it had redefined the E1 data for geological interpretation this ignoring the evidence from the Borehole log.

8.5 Given that Halite had not given any satisfactory answers to the evidence presented by PWG, these points were reiterated (App I Q4) to demonstrate that Halite’s interpretation of the evidence from E1 is extremely questionable.
9.1 **Size of the Scheme**

Throughout the Inquiry PWG has consistently shown that Halite’s claim that this is a much smaller scheme than previously proposed is misleading. This scheme is of a very similar size – in the number of caverns it is proposed to build, the volume of gas it is proposed to store and the size of the area over which it will extend – to the Canatxx application refused after a Public Inquiry.

10.1 **Minimum Volume of Working Gas**

The concluding paragraphs (App A 5.1, 5.2) of PWG’s evidence to the Open Floor Hearing of 17th October 2012, give an estimate of the volume of gas which might be stored taking into account the problems referred to above.

That figure for the total volume of gas is 153 mcm., i.e. about 100 mcm of working gas. This quantity is far below the figure being proposed by Halite (600 mcm of working gas) and also far below the minimum figure proposed by the IPC Panel (300 mcm).

11.1 **Halite Seismic Surveys**

In the summer of 2013 (4 months after the Secretary of State published his decision to refuse) Halite undertook extensive seismic surveys of the area in question. None of the results of these surveys have been published, neither have any results been sent to PWG.

11.2 If Halite proposes to submit these surveys as evidence to the Secretary of State as part of the present review, then PWG would find this totally unacceptable. Residents of the area which includes Fleetwood, Thornton, Cleveleys, Poulton and the Over Wyre villages bordering the East bank of the River Wyre, have the right to examine any new documents presented by Halite. PWG has a mandate from more than 10,000 residents to represent them.

11.3 If there is new geological evidence, this, we contend, must form part of a new application where all aspects of the proposal, including the need for the scheme, the impact of fracking and environmental concerns can be updated and reconsidered.
List of Appendices

A  Evidence presented at the Open Floor Hearing on the 17th October 2012 by Howard Phillips on behalf of PWG (Ref 100015247)
B  PWG Evidence – Draft Document 7th April 2012
C  HEG Response to PWG April 2012 Evidence – Draft on 26th April 2012
D  HEG Response to EA’s First Written Questions on 1st June 2012
E  Comments from PWG on Halite’s Response to the EA’s First Written Questions 28th June 2012
F  PWG Reply to HEG Response to PWG Draft Document on the Geology 2nd July 2012
G  Comments from PWG on the questions asked in Annex A on 18th July 2012
H  HEG’s response to the EA’s Further Written Questions on 8th August 2012
I  PWG Response to Halite answers to the second round of questions and to PWG response to those questions on 25th September 2012
J  IPC Panel’s Report to the Secretary of State on 21st January 2013.
NATIONAL NEED FOR SECURITY OF SUPPLY

Halite’s earlier claim that this proposed scheme was vital to the national interest for the security of supply of gas has to have been reduced in importance over time with the availability of new natural gas supplies from Norway and the prospect of an imminent supply of natural gas from Fracking, much of which will take place in the North West of England.

Any claims that Halite’s proposed scheme is geographically important due to its proximity to the industrial and business conurbations of Greater Manchester and Merseyside are, we suggest, redundant because the gas from the fracking wells could offer a greater immediacy of supply to customers in these areas and indeed be located geographically nearer to them.

We therefore ask the Secretary of State to consider the current and proposed (i.e. planning permission approved) availability of underground gas storage, as stated in the Transco Ten Year Plan, and to consider the volumetric ability of the National Transmission System to transport an increased volume of gas around the network, over what appears to be a network working at near capacity in places, as and when these already approved storage schemes come on-line.

The Preesall scheme, if it were to go ahead, would represent a significantly smaller contribution to the security of supply than it might have done say 10 years ago and we suggest that this should be considered as and when a risk versus need equation is considered. This application represents a major industrial development, which will become a COMAH site, in an area where over 80,000 people live within a 3 mile radius of the proposed site.

NEED FOR FURTHER ENVIRONMENTAL INFORMATION

In para iv) of your letter, DECC invites further representations on the adequacy of the environmental information produced in support of the application and asks whether further or updated environmental information is now necessary.

PWG has always contended that the proposed brine discharge would be hugely detrimental to the quality of the sea water off the Fylde Coast at Rossall (the proposed discharge point) and indeed to the waters of Morecambe Bay and the tidal rivers that flow into it and that this in turn will have a detrimental effect on the marine life/food chain. Arguments to protect the marine environment in this area have already been put forward in earlier submissions with specific emphasis on the Wild Atlantic Salmon population which as well as being on the Endangered Species list uses the tidal rivers around Morecambe Bay to spawn.

Our calculations on the actual volume of salt that would be discharged into the sea over the 10 year development period differ from that offered by the applicant and we suggest it would be nearer to c60 to c65 million tonnes as opposed to the projected c45 million tonnes quoted in the application.

PWG also suggests that the dispersement models that have been used are outdated and point out that the studies used as the basis of the tidal flow projections were undertaken prior to the rock armouring of the
Rossall outfall pipe. Any effect that this armouring has subsequently had on the tidal flow might also be increased from the soon to be installed new rock groins, also at Rossall.

PWG suggests that a new survey is required, before any solution mining and brine discharge takes place and that this should include an assessment of the impact of the super-saturated brine discharge on the recently designated Liverpool Bay SPA. The massive volumes of brine that are involved here probably have the potential to encroach onto the SPA, if they don’t actually discharge directly into it. Whilst the discharge point might be on the northern reaches of the SPA, the twice daily ebb and flow of the tide has the potential to carry excess brine in a southerly direction into the SPA, building up excess salinity on a daily basis year upon year.

We would urge the Secretary of State to invoke the assistance of the NW Inshore Fisheries and Conservation Authority, the North West Fisheries Consultative Council and the Ribble Fisheries Consultative Association and to commission further studies into these matters before any planning consideration is given.

10,800 RESIDENTS HAVE NOT BEEN FULLY HEARD

In para v) of your letter, DECC invites further representations on matters arising which are felt to be material to the Secretary of State’s re-determination of the application.

In the Procedural Decisions section of the Panel’s Report to the Secretary of State on 21st January 2013, page 6 para 2.2, the Inspectorate states that they received just under 200 relevant and written representations concerning the proposal and it goes on to say that this is not a large number compared with other controversial development proposals.

There is some explanation from the EA of the ‘small’ number of representations being due to three previous planning applications for similar UGS proposals in the area and the coordination role played by the Protect Wyre Group.

The first point perhaps suggests an element of ‘campaign fatigue’ but it fails to point out that the ‘similar’ UGS proposals have all been for the same site and from the same applicant.

To contest any notion of ‘campaign fatigue’, records will show that on the first application from Canatxx (before it changed its company name to Halite), Lancashire County Council, who were determining the application received over 10,500 letters and proformas in the first few weeks of 2004.

The 2nd application attracted a further 11,500 written objections, the 3rd one less so at 8,500 and this 4th one attracted over 10,850, all of which suggests that the residents remain resolute in their determination to oppose this scheme. The volume of responses is anything but ‘small’ – it is indeed a very significant response from the local residents.
The proforma method of objection was introduced by PWG to lighten the considerable administrative load and cost that the first application placed on Lancashire County Council and it was worked to a pre-agreed format with LCC planners. One of the biggest cost savings was a waiver, on the proforma, of the need to have a personal response sent out to all those who objected – a huge saving to the council in postage and administrative costs and time.

The objections to the 2nd application followed a similar pattern as did the 3rd one with the Planning Inspectorate at the Public Inquiry. Indeed the Planning Inspector said at the Inquiry that residents’ letters of objection did not normally represent a material consideration but due to the volume of objections received they did indeed represent a material consideration and this was taken into account when the application was determined (and refused).

The 4th examination of this ‘similar’ application from the same applicant was subject to a rule change in that Mr Hudson, the lead examiner, announced that the examination would be conducted by written submissions from all parties and that opportunities for a ‘court room’ style cross examination of the evidence presented would not be possible. Those wishing to submit a written statement to the EA or those who wanted the opportunity to directly address the EA should pre-register as per the new IPC rules.

Over the last 12 year period, PWG has gained significant knowledge of the concerns, uncertainties and fears of the local residents and this knowledge was used to streamline the proforma objections that were to be presented to the Inspectors on the Examining Authority. It was clear that the new IPC rules about pre-registration and the strict timescales were going to be a problem for residents from the outset so the proforma route was once again adopted to ensure that those who wished to have a voice could do so. Each respondent was also invited to add their own comments to each proforma to make it a personalised objection and over 50% or respondents took advantage of this.

The EA would obviously have preferred all the 10,850+ residents to pre-register but clearly this was not going to happen and nor probably would it with any future application of this nature but it is somewhat unreasonable of the Inspectorate to say “these proforma responses are not themselves individual representations”. PWG considers them every bit as valid as those received by the EA from those residents and organisations that chose to pre-register. How can the planning system accept proformas at one examination (Public Inquiry 2006) and then downgrade them at another (ExA 2012) simply because a resident hasn’t ticked a particular box in the procedural flow?

PWG also has a concern with the EA statements in para 2.5 where the EA says “Perhaps not surprisingly, many representations repeated points made in opposition to earlier planning applications for UGS and indeed re-presented material submitted to the Public Inquiry held in 2007. Although it is important to recognise the history of the previous proposals for UGS in this locality, we were concerned from the outset to treat the application for development consent as a fresh proposal”.

Whilst we agree that this is in effect a fresh proposal it does not go any way to alleviating the concerns, uncertainties and fears of the local residents which is why residents continue to object to the development and will continue to do so as long as Halite prevaricates and fails to provide sufficient data and information to allay residents’ fears.
It is also worthy of note, considering the Inspector’s comments, that Halite didn’t present any significant new geological information – they simply re-presented material submitted to the Public Inquiry held in 2007 which had been re-worked and re-analyzed. The residents are therefore, in our opinion, quite right in referencing the earlier points as they are commenting on and objecting to the same data – or in some cases the lack of it.

In light of the above, we ask the Secretary of State to consider the volume of objections and the comments made therein as full and proper objections and to consider the whole as a material consideration in his re-determination of the proposed scheme.
OPEN FLOOR HEARING - 17TH OCTOBER 2012

FROM

HOWARD PHILLIPS

ON BEHALF OF

THE PROTECT WYRE GROUP

REFERENCE NUMBER: 10015247

APPLICATION FOR AN UNDERGROUND NATURAL GAS STORAGE FACILITY

UNDER THE WYRE ESTUARY BY HALITE ENERGY GROUP

PLANNING INSPECTORATE REFERENCE NUMBER: EN030001
Open Hearing Session 17th October 2012

PWG statement on Geology

1.1 My name is Howard Phillips. I am Vice-Chair of Protect Wyre Group (PWG) and I have been responsible for bringing together the PWG evidence and responses on the geology to this and the previous 3 applications from Canatxx/Halite for Underground Gas Storage in the Preesall Salt Field.

1.2 Whilst understanding that this is not a Public Inquiry as such, could I start by expressing a certain frustration at the process of examination. This frustration arises in two ways.

1.3 Firstly we have not had the opportunity to question directly those giving evidence on behalf of Halite. PWG has submitted a great deal of written evidence in response to Halite’s justification for its proposals and Halite has in due course replied but only to some of the questions asked. Indeed Halite stresses that it does not intend to provide an in depth assessment of the PWG evidence. This process has been of necessity protracted and now the time has run out.

1.4 Secondly regarding the PWG evidence. The questions from the Examining Authority have been directed largely at Halite and not at PWG. PWG has in due course, given its view in writing on the two rounds of questions. However, with no questions asked of us we have no way of knowing whether the Inspectors have grasped fully what we have been saying. There must be areas where perhaps we have not explained our concerns sufficiently clearly. We would have liked the opportunity to be questioned so we could be sure that the points we have been making are fully taken on board.

2.1 My concern with this and the previous proposals is that the geological information as represented by the 3-D model is insufficient to justify approval. There are other issues involving geology – the distance apart of the proposed caverns, the possibility of wet rockhead, crown hole subsidence, seismic activity and the juxta position of fracking for shale gas – which we have identified and are documented in our evidence.

2.2 But let me focus attention on the 3-D geological model. The first set of questions from the EA to Halite asked specifically about the accuracy of its 3-D model compared with the 2005 BGS model presented at the Public Inquiry. In reply Halite states “the latest plots are purely to aid visual assessment and no increase in accuracy is implied”.

2.3 The Inspector at the Public Inquiry concluded in his report when dealing with the geology that “overall, the information provided by the appellant is neither sufficient nor sufficiently detailed to support the proposals.” The Secretary of State agreed with this conclusion. With no increase in accuracy of the 2010 model presented in the application, we suggest that the conclusion must be the same.
Turning to the details of the 3-D geological model, I would like to summarize briefly the 5 areas of contention between Halite and PWG. These areas are set out in detail in the PWG documents submitted to the Examining Authority.

3.1 Firstly there exists a major fault which runs N-S across the western end of the Heads Peninsula. PWG contends that this fault must extend northwards under Barnaby’s Sands which would rule out the construction of any caverns in the southern polygon. The fault is not shown on the 3-D model and Halite has chosen not to comment on this issue.

3.2 The Burrows Marsh BH (i.e. at Barnaby’s Sands)

The data from the bore hole conflict with the BGS model (2005) and all the data from adjacent brinewells (as shown in the PWG evidence). An important N-S fault runs along the eastern edge of Barnaby’s Sands and could be instrumental in explaining the anomaly.

Halite was asked by PWG to produce a diagram of the fault and its affect on the halite bed. The diagram produced conflicted with the Halite 3-D model – it was incorrect - an issue taken up by the EA in its second round of questions. Halite’s response to the EA was to reproduce the section in the BGS Report on the Burrows Marsh Bore Hole. This does not show the fault.

Halite offers this explanation for its incorrect diagram. “It was intended to assist PWG with the interpretation of the plan position of the Burrows Marsh Bore Hole with respect to the East Barnaby’s Sands Fault and the deviated bore hole trajectory. The sketch was simplified and did not correctly show the inclination of the salt to the west of the Barnaby’s Sands Fault”.

Halite has failed to produce an accurate section across the fault showing its effect on the halite bed. Indeed in producing an inaccurate “sketch” we suggest that Halite has misled PWG and by default they have misled this examination.

3.3 The Possible East-West fracture Zone.

PWG claims that there could be a fracture zone running E-W under Barnaby’s Sands across the centre of the southern polygon. Halite dismisses this, explaining that “the primary evidence for the faulting shown on the model is seismic lines GC 81-336 to the south and IELP 99-25 to the north”. Both these lines run East-West, GC81 across the centre of the southern polygon, IELP to the north through Arm Hill.

In response to the EA’s second round of question, Halite admits that the line GC 81-336 is of poor quality and difficult to interpret and is not incorporated into the geological model.

So how is Halite able to justify the use of GC81-336 as primary evidence for faulting in this area? It is misleading to do so.

Furthermore, in response to the PWG question about the accuracy of the data for Cavern 17, which is located at the centre of the southern polygon, Halite states that the “overall geological structure is fairly well defined at the cavern” because “the location is intersected by seismic line GC81-336 which helps inform Section 2-2’ appended to the GSR”.

The poor quality of GC 81-336 reinforces the conclusion of the Geological Assessor at the Public Inquiry where she called for at least two more seismic lines across this area.
3.4 The Northern Polygon – Caverns 8, 10 & 11

The evidence from the 3-D model and the Coat Walls Bore Hole indicate that the salt bed lies at a shallower depth than the figure used by Halite in its calculations of gas pressures. These caverns are already the smallest of the 19 caverns proposed. With lower gas pressures less gas can be stored.

3.5 Northern Polygon – Caverns 1-6 and Bore Hole E1

This area was never considered in any of the previous applications as being suitable for gas storage. Yet without any seismic investigations or bore holes, Halite proposes to construct 6 caverns there.

These caverns will range from 120m to 220m in height. The nearest bore hole E1 shows the salt bed to be 81m thick, which calls into question the feasibility of creating caverns 1-6.

Halite was asked about E1 by the EA in its second round of questions. Its response is to dismiss the evidence from E1 and replace it with “an interpretation of salt thickness and the location of the Burn Naze Fault”.

So when evidence does not suit, Halite chooses to ignore it and to replace it with an interpretation that does.

Given the very limited thickness of the halite bed, the height of the caverns would need to be reduced to between 30 and 50m depending on the cavern radius.

Such caverns are not only unviable but potentially unsafe.

It would have been relatively simple to carry out a seismic survey from east to west through E1. Why was that not done?

We believe that it is absolutely essential at this stage to have a full understanding of the geology of the Preesall Graben. The most important unknown is the location of the Burn Naze Fault which forms the boundary of the salt field to the west.
4 The responses from Halite to these issues raised by PWG concerning the geology need to be carefully assessed.

4.1 Firstly Halite states that “The amount of data available to the project in the form of borehole data, data from existing caverns and seismic data is far in excess of most similar projects”.

Halite is proposing to store 900 mcm of gas (the largest terrestrially based UGS project in the UK), in an area of complex faulting, where the caverns would be the shallowest in Europe and potentially the most unsafe, adjacent to an old brine field where many of the brine wells and mine are in a state of collapse and where 80,000 people live within a 3 mile radius. It is little wonder that the geology of this area must be established with the greatest degree of accuracy so that nothing is left to chance.

4.2 The second response is that once consent for development is given, Halite will carry out more seismic surveys and possibly drill more bores in order to refine the geological model.

At the Issue Specific Hearing with the EA on the 19th September 2012 Halite stated that only in some areas is the geology sufficiently well understood to be able to go ahead with the design and approval of the caverns. Halite did not state which areas these were or how many caverns were involved. It did not reveal how many additional seismic lines would be needed or where they would be located.

Worryingly, Halite proposes to go ahead with the construction of the infrastructure before or at the same time as the additional seismic surveys not knowing whether the project can be successfully completed.

These additional seismic lines should have been carried out before the submission of this the fourth application for UGS in the Preesall Salt Bed.

4.3 Thirdly Halite asserts that the Technical Assessor’s comments at the 2005/6 Public Inquiry were in relation to a larger and less well defined scheme and presumably should be discounted.

PWG has shown that the Canatxx proposal considered at the Inquiry was for 20 caverns to store a total of 577 mcm of gas compared with the 19 caverns and 900 mcm of gas being proposed by Halite. It is also wrong to suggest that the present proposal is spread over a smaller area. What has happened is that Halite has moved the area where it proposes to construct caverns further to the north and under the Knott End Golf Course – an area where data are lacking.

5.1 An extension of the Western Heads Fault under Barnaby’s Sands would prohibit the construction of caverns in the southern polygon. The limited thickness of the salt adjacent to E1 would rule out caverns 1-6. That would leave just 5 caverns i.e. 7-11 confined to a very limited area with an estimated total of gas which could be stored of 153 mcm. This would have a very different impact even if it were considered to be an economically viable development in this much reduced form.

5.2 One of the conclusions reached by the Geology Assessor following the Public Inquiry was that “the current level of uncertainty inherent in the geological model is such that the range of possible outcomes in terms of cavern locations and capacities is so wide that the impact of the scheme in planning terms cannot be established”.

That level of uncertainty remains. Therefore we suggest that the conclusion reached must be the same.
PWG Evidence - Draft Document

Geology

Howard Phillips

For the purposes of this report, the company names of Canatxx and Halite Energy should be read and accepted as being the same organisation - the change from Canatxx to Halite was effected by a simple change of trading name at Companies House.

At the Public Inquiry (APP/Q2371/A/05/1183799), which began in September 2005, Canatxx presented 4 maps produced by the British Geological Survey (BGS) showing the geology of the Halite Bed.

1. Salt Top Contour
2. Salt Bottom Contour
3. Salt Thickness Isopachyte
4. Rock burden thickness Isopachyte

These maps did not claim to present the true geology but a model interpolated from 4 seismic lines and the bore hole data available at that time. The BGS diagram (PWG Fig. 1) presented at the Inquiry shows the confidence intervals of the top and bottom of the halite along the 4 seismic lines.

Where the seismic lines can be tied into a bore hole then the intervals are +/- 5m. Away from the borehole the uncertainty increases with intervals of +/- 25m. The western sections of the seismic lines Can G and Can F have intervals of +/- 40-50m for the base halite.

Given that this degree of uncertainty exists along the seismic lines, the geology of the interpolated area away from the lines must be treated with some caution. Caverns are being proposed by Halite up to 750m away from any seismic line.

In reply to questions from PWG (21st June 2011), Halite stated “typically interpolation over the western and northern areas beyond borehole or seismic data is of the order of 500-750m. The BGS modelling approach described above is accepted industry modelling practice. This, combined with conservative positioning of boundary faults is considered to adequately reduce uncertainty at the planning stage”.

At the Public Inquiry (2005-6) the Inspector, (Edward A Simpson) was assisted by Ruth Allington BSc, MSc, CEng, FIMMM, FGS, CGeol, FConsE, MBA in the role of an Assessor. We believe that this is the very uncertainty referred to by Ms Allington in her Report and which Halite has failed to address sufficiently.

The Assessor considered the geological information submitted before and during the Inquiry to be inadequate and suggested that a site investigation should be carried out “to confirm or amend assumptions of the geological model”.

PWG Draft Document on Geology 7th April 2012
She recommended

- At least two more seismic lines between existing lines IELP 99-25 and Can 97-G.
- Drilling and geophysical logging of boreholes on these lines to provide ground truth.

Professor Rokahr in his evidence at the Public Inquiry said he would have required “at least three” cored boreholes.

Since the area north of the Waste Treatment Plant was not under consideration for cavern construction, the Assessor made no recommendations for seismic investigations in this area.

The recommendations for more seismic lines between IELP 99-25 and Can 97-G have not been carried out (neither by the company when it was called Canatxx nor when it was renamed as Halite), nor has any investigation been made in the area north of the Waste Treatment Plant towards Hackensall Hall (an area which now forms part of the Halite proposals).

According to the Canatxx Environmental Scoping Report submitted to Lancashire County Council (LCC) on the 15th September 2008 for its third application, Canatxx intended to drill 4 additional boreholes which would establish with a little more certainty the accuracy of the 3-D model of the geology presented at the Inquiry.

In the event Canatxx drilled only 2 additional boreholes - at Hay Nook and inland from Barnaby’s Sands (incorrectly titled by the BGS as the Burrow’s Marsh BH). The data from these two bore holes offer the only new information which has been produced in response to the Assessor’s demands to confirm or amend the assumptions of the geological model.

Halite states (GSR pii S6) that the geological work done by Mott MacDonald has “enabled confirmation of the 3-D ground model as previously constructed by the British Geological Survey”. However, there are numerous differences between the BGS model and that presented by Mott MacDonald as part of this application.

**Hay Nook Borehole**

The Hay Nook borehole (HNBH) was drilled vertically in the same field as an ICI brine well (BW130) with its logged information.

It is a valuable exercise to compare the data from the bore hole with the BGS model, to test the accuracy of the model. The BGS model indicates the halite bed at Hay Nook at depths of 300-700m, i.e. a thickness of 400m. In fact the bore reveals that the halite bed lies between 304 and 557m, a thickness of 273m which highlights the uncertainties of the 3D model based on the seismic line Can 97-G.
In order to explain this anomaly Mott MacDonald introduces a N-S fault between HNBH and BW130 (shown on both the top and bottom of Halite maps (MMD 277663-6-DR-00-XX-0013 and 0016). This fault which is shown running N-S across the western Heads Peninsula (MMD 0017) affecting only the basal surface of the salt is not shown, according to the MMD model, to extend under Barnaby’s Sands even though there is a major difference (c 143m) in the depth of the basal surface between HNBH and BW130. If this fault does continue northwards it would compromise the safety of the caverns 12-19.

**Burrow’s Marsh (Barnaby’s Sands) Bore Hole**

The Barnaby’s Sands borehole (GR 335231 446286) was drilled vertically to a depth of 119m, then deviated south westwards beneath the salt marsh passing through the halite bed at an angle of 28 degrees. The top of the halite was encountered at c80m from the well head, the base at 280m (c 55m and 255m when the distance from the well head to the sea wall is deducted). The area where it is proposed to locate 9 of the caverns lies beyond the limits of the borehole, up to 400m from the sea wall.

Moreover because the bore was drilled at an angle, the dip of the halite could only be estimated at 14 degrees and the thickness of the halite at c 320m.

A comparison is made between the information provided by this borehole with the BGS model in the following table.

<table>
<thead>
<tr>
<th>BM Bore Hole</th>
<th>BGS model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Salt</td>
<td>371m</td>
</tr>
<tr>
<td>Bottom of Salt</td>
<td>754m</td>
</tr>
<tr>
<td>Thickness</td>
<td>320m</td>
</tr>
</tbody>
</table>

This indicates a considerable discrepancy which needs to be explained.

One possible explanation could be faulting. The Mott MacDonald map indicate a major N-S fault under Barnaby’s Sands on both the dip magnitude maps (MMD 0014 and 0017), with dip magnitudes of 70 degrees and throws to the west.

The location of the fault and the direction of the drilling would suggest that the borehole passed through the fault, yet the BGS Reports (CR 09/15 and CR 09/40) make no mention of this fact. According to the BGS Model there was no fault in this location, nor anywhere else under Barnaby’s Sands. This supposition was used by Canatxx as a justification for the location of its caverns.

During the consultation process Halite was asked about this (PWG meeting with Halite/MMD 24\textsuperscript{th} May 2011). MMD offered an explanation as to why the bore did not encounter any faults even though it went across a fault zone clearly identified on the 3-D model. This involves the angle at which the halite is dipping and the angle of the bore. No diagrams or details were given as to how this might occur.
The fault zone is clearly shown in the model as lying approximately 15-50m SW of the drilling site for the upper surface of the halite (MMD 0014) and between 80-125m for the basal surface (MMD 0017). The impact of this fault with a sizeable downthrow to the west, on the halite has not been shown in any detail by Halite.

The detailed section (MMD 0009) across cavern 16 indicates only a small increase in the depth of the of the halite bed from east to west across the fault at its upper surface but a large increase (100m +) at the basal surface. Analysis of the dip magnitude map of the Upper Surface (0014) shows that the fault is of some size, dipping to the west at angles of up to 70 degrees.

PWG Fig 2 plots the width of the faults as shown on the Upper Surface dip magnitude map (0014) and the basal surface map (0017). The lateral extent of the fault at the Upper Surface is 37m, which with a dip of 70 degrees gives a vertical difference of c 100m. Similarly the lateral extent of the fault at the basal surface is c 58m, giving a vertical difference of c 160m.

Given the Halite calculation that the halite bed is 366m thick, without correcting for dip, that leaves c 100m. This would occur if the halite bed on the east side of the fault was approximately 170m true thickness and 220m on the west. The 320m claimed by Halite seems exaggerated.

Table 1.3 (GRS p4) states that “the depth to significant mudstone bands was compared to the total salt thickness and for the significant mudstone interbeds, a correlation was established”. Comparing the % of the halite bed which occurs between mudstone interbeds 2 and 3, the following results are obtained: The Heads 33.6%, BW 116 28%, BW 123 29.5%, Arm Hill 29.7%. The figure for Barnaby’s Sands BH is 44.7%, approximately 50% greater.

There is a possibility that the sequence is repeated and the halite bed is much thinner than the 320m estimated by the BGS Report (CR/09/040). If this is the case then it calls into question the MMD Model for the area under Barnaby’s Sands and the height of the caverns planned in that area.

It is not possible to verify or to refute this by studying the cores taken from the Burrow’s Marsh Bore Hole. The bore was only cored for two areas, namely from 129m - 136m and from 336.5m to 399m (drilled depth). No mudstone interbeds occur between 530 and 710m in the bore according to the main geophysical logs. Samples as shown by the cuttings log data were taken at intervals of 1m, often 2m, which would not have picked out any repeated sequence.

In fact the data from the sampling does not identify the mudstone interbed 3 at 530m depth. The only measure which has managed to detail this layer is the temperature log.

It is useful to compare the data for the boreholes to the east (BW 123,121,119) and to the south on the eastern side of the Heads (see PWG Fig.3). All the brine wells to the east of the upper surface halite fault show a great deal of similarity. The
The top of the halite becomes shallower towards the south from 324m (BW123) to 227m (BW105) and then rising rapidly to 171m (BW106).

The base of the salt follows a similar pattern rising from 459 m (BW123) to 362m (BW 105) and 275m (BW 106). This means that the thickness of the halite is consistent (122-140m) with the exception of the shallower BW 106 (104m).

Under the Heads Peninsula, the fault downthrows the bed to the west as shown by the following borehole data.

<table>
<thead>
<tr>
<th></th>
<th>West</th>
<th>East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference E-W</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW 129</td>
<td>299</td>
<td>283</td>
</tr>
<tr>
<td>Top of Salt 30</td>
<td>568</td>
<td>478</td>
</tr>
<tr>
<td>Bottom of Salt 154</td>
<td>269</td>
<td>195</td>
</tr>
<tr>
<td>Thickness 124</td>
<td>277</td>
<td>263</td>
</tr>
<tr>
<td>BW 133</td>
<td>277</td>
<td>263</td>
</tr>
<tr>
<td>Top of Salt 27</td>
<td>528</td>
<td>456</td>
</tr>
<tr>
<td>Bottom of Salt 132</td>
<td>251</td>
<td>193</td>
</tr>
<tr>
<td>Thickness 105</td>
<td>261</td>
<td>242</td>
</tr>
<tr>
<td>BW 134</td>
<td>506</td>
<td>434</td>
</tr>
<tr>
<td>Top of Salt 90</td>
<td>245</td>
<td>192</td>
</tr>
<tr>
<td>Bottom of Salt 231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thickness 141</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The step effect of the faulting shows that the thickness of the halite bed increases westwards across the fault largely explained by the increasing depth of the halite.
base. This structure appears to continue northwards under Barnaby’s Sands. The
data from BW 114 to BW 123 show both the top and the base of the salt increasing
northwards but with little increase in its thickness.

All this data seems to be incongruous with the Burrows Marsh Bore Hole where the
thickness of the halite bed is estimated as 320m. In comparison the Arm Hill Bore
hole to the north shows a thickness of 241m.

To summarise, PWG believe that the discrepancy between the BGS model and the
MMD model in the area under Barnaby’s Sands is a result of including in the MMD
model the data from Burrows Marsh Bore. The Assessor at the Inquiry called for
two more seismic lines across the area which Canatxx/Halite has not done. These
would have picked out the fault and its effect.

Halite’s response to any uncertainty regarding the geology is that “ultimately the
geological model will be tested during drilling of cavern pilot holes and pre-
construction testing”. This same approach was criticised by the Inspector in his
Report from the Public Inquiry (IR p240 20.3.4).
Possible W-E fracture zone

Another issue raised at the meeting with Halite on the 24th May 2011, concerned the transposition of salt top and bottom faults in the fault zone north and south of Arm Hill. MMD considered this as perhaps unusual but they had been assured that this was not uncommon. Whoever gave this assurance and on what evidence was not revealed. We will seek further clarification on this point.

The transposition is clearly shown on the indicative cavern location plan and occurs 300m south of Arm Hill, along northing 464. PWG suggests that for this to happen there has to be an E-W zone of movement in the vicinity of northing 464. An indication of this possible fracture zone is shown in the thickness of the salt model (0019) but it is not identified in the fault maps (0014, 0017). Such a zone would, affect the safety of caverns 11, 14 and 13.

Northern Lozenge

With regard to the northern lozenge (caverns 1-11) PWG has serious issues with the suitability of the halite bed to store the amount of gas proposed.

Caverns 8, 10 and 11 are on the eastern slopes of the graben where the halite bed is shallower and thinner. The Coat Walls Farm Bore encountered the top of the salt at 281m and continued just 4m more into the bed. The base of the halite (as discerned from the seismic line IELP) has confidence limits of +/- 20 metres. The Baker Hughes Table (GSR p81 Table 6.3) uses figures for the top of salt as 322m (cavern 8), 306m (cavern 10) and 325m (cavern 11), all of which are larger than the 281 at Coat Walls Farm. From the MMD model (0013) the top of the salt can be estimated as 300m (cavern 8), 295m (cavern 10) and 300m (cavern 11), which are still in excess of the Coat Walls Farm data.

According to the Baker Hughes Table, the height of the caverns are 101m (cavern 8), 69m (cavern 10) and 73m (cavern 11). Given that these are the smallest caverns (in height) being proposed, it is of concern that the depth to the top of the caverns may have been overestimated.

Caverns 1-6 are proposed to be located between 350m and 700m north of the IELP seismic line and Arm Hill Bore. The Canatxx proposal was for caverns as far north as northing 470, hence this area between 470 and 474 was not investigated in detail by the BGS and an area which incidentally is not owned by Canatxx or Halite.

The information on which the MMD model is based is seismic line IELP with the associated Arm Hill Bore, E2 (top of salt only), and B6 boreholes to the south, E1 (HHF) to the north, P1 to the north east and BW 43 to the east (see PWG Fig 4).

According to the Baker Hughes table, the thickness of the salt bed at the proposed cavern sites 1-6, are as follows: cavern 1 - 222m, cavern 2 - 176m, cavern 3 - 260m, cavern 4 - 240m, cavern 5 - 209m, and cavern 6 - 193m. The nearest
borehole E1 shows the salt bed to be only 81m thick, which calls into question the feasibility of caverns 1-6.

The response from MMD (meeting with Wyre Community Group and Halite 9th May 2011) is that “it appears the Burn Naze Fault runs through borehole E1 and is why the salt is thin in that location versus nearby wells and proposed cavern locations”. (It should be noted that there are no wells which are nearby).

The MMD interpretation of E1 is that the bore passes through 323m of glacial deposits and Upper Mudstones, then the upper beds of the halite (c81m), then crosses the Burn Naze Fault at a depth of 398m, and penetrates the Lower Mudstones to a depth of 43m.

PWG asked whether the E1 borehole shows mudstone interbeds consistent with only the upper strata of the halite bed or whether the 5 mudstone interbeds present across much of the salt field can be discerned in the E1 bore, i.e. does the 81m in the bore show the full thickness of the halite? A letter from Halite (21 June 2011) states that “the mudstone interbeds within E 1 are consistent with thinned mudstones BGS5 and BGS4”. There has been no verification of this.

Indeed according to Wilson and Evans 1990 (BGS Geology of the Country around Blackpool) in E1 “the sequence of individual beds of salt becomes unrecognisable”(p21). The core details show possibly 6 beds of salt, separated by 5 layers of mudstone. This conflicts with the Halite statement claiming only two marl/mudstone interbeds.

At the meeting with Halite on the 24th May 2011, PWG asked on what basis had the thickness of the salt bed at proposed cavern sites 1-6, been estimated. MMD stated that at the P1 bore hole (Parrox Hall 359478), the halite bed was at a depth of 260-376m, a thickness of 116m, and that this did not show a thinning of the bed northwards. (In fact a small thinning is indicated from BW61 (139m), BW77 (121m), to P1 (116m). On this basis it was conjectured by Halite that the halite bed thickens and deepens to the west. Thus its estimated thickness at cavern locations 2, 5 and 6, is respectively 176, 209 and 193m, at 1 and 4, 222 and 240m and at cavern location 3 - the most westerly, 260m. However, the one borehole which could verify the westward thickening (BW 43) in fact shows the opposite, thinning westwards from BW 77 (121m) and BW61 (139m) to BW 43 (105m), which is consistent with the 81m of halite in E1 being the full thickness of the halite body at this point.

At the meeting it was claimed that the BGS has data from more boreholes to the north. Details of all the boreholes used to construct the MMD model were supplied by Halite and no bore holes north of E1 and P1 were used.

If the E1 bore were to intersect the Burn Naze Fault, then the rock below the fault in all probability would be Sherwood Sandstone and not the Lower Mudstones (see PWG Fig. 5). The depth from the surface to the base of the Lower Mudstone would need to be at least 440m in order not to encounter the Sherwood Sandstone. The
only boreholes on the Fleetwood/Thornton side of the estuary are well to the south and west at B1 (339448) where the Sherwood Sandstone appears at 471m beneath the surface and B8 (323453) at 369m.

Again, if the E1 bore were to intersect the Burn Naze Fault and penetrate the underlying mudstones, it is the lower beds of the Lower Mudstones (Hambleton Mudstones) that would be encountered immediately below the fault. Borehole records form the Hambleton Mudstones do not indicate any layers of rock salt, According to the E1 bore hole record, Thornton Mudstones occur under the halite bed. These mudstones include a marl and rock salt layer 27m below the top of the mudstone, indicating that these mudstones lie immediately below the Preesall Halite. Similar halite layers appear in the Thornton Mudstones in B6, E5, P1 and P101.

A major uncertainty in the BGS and MMD Models is the position of the Burn Naze Fault which according to the BGS and Halite is defined by boreholes E27 and B1 near Stanah in the south and borehole E1 in the north “which is interpreted to intersect the fault”. Only E27 and B1 together with seismic line GC-86-DU371 in the south define the fault. It can be assumed that generally the Burn Naze Fault parallels the N-S Preesall Fault, but two kilometres to the west. However there is no evidence as to the exact position of the Fault north of E27 - only somewhere under the Wyre Estuary.

In neither of the dip magnitude maps (upper surface of halite MMD 0014, basal surface 0017) does the model pick out the Burn Naze Fault. None of the other E-W seismic lines extend far enough westwards to identify its position. This is a major fault with a throw eastwards of c 800m which defines the graben and the halite beds within the graben on its western boundary and yet it has not been mapped by the 3-D modelling. It is vitally important that the location of the Burn Naze Fault be identified.

There are too many uncertainties concerning the geology which have not been resolved by the more detailed model produced by MMD as part of this application.

**Distance apart of proposed caverns**

According to the advice given by Professor Rokahr, the wall of salt left between caverns should be at least 3 x r (r = cavern radius). Halite has interpreted this to mean 1.5xr1 + 1.5xr2 for adjacent caverns 1 and 2 etc.. This in some cases significantly reduces the thickness of the wall. For example, between caverns 1 and 2 the wall is reduced from 120m thick to 108.75.

PWG Fig. 6 shows the minimum distances which must be left between the centres of adjacent caverns according to the Halite interpretation of the Rokahr rules. The actual spacing is measured from the grid co-ordinates of the cavern locations and the map spacing from MMD 0002. It must be noted that the scale of these maps in
Appendix B of the GSR is given as 1:5000. This is not the scale at which they are reproduced.

In the majority of cases the spacing criterion has been met, but so tightly that there is no margin for any error. However, there are three cases where the minimum spacing has not been adhered to – namely between caverns 12-13, 13-15, and 14-16. This is the case whichever method of measuring the actual spacing is used. These are all in the area under Barnaby’s Sands where the salt area is constrained by faults so that any adjustment of cavern location is not possible.

Professor Rokahr’s rule regarding the minimum distance of the wall of a cavern to a fault is that the fault should not be less than 3xmax radius of the cavern away from the cavern wall. One cavern (16) is located too near the fault line immediately to the east (see PWG Fig 6 and MMD 0002/P3). The distances of the other caverns to the faults in the area under Barnaby’s Sands are the minimum, hence the statement above which rules out any adjustment of cavern location.

The location of the caverns using the Rokahr rule regarding minimum distance from faults assumes that all faults in the area are correctly identified and located. Attention has already been drawn to the N-S fault across the western end of the Heads which is identified by the bore holes at BW130 and Hay Nook. A continuation of that fault northwards would have implications for the location of caverns in the southern part of the area under Barnaby’s Sands.

An E-W shatter zone would bring into question the location of caverns 11, 14 and 13.

The fault line running NNW-SSE immediately to the west of the Arm Hill Bore, is made to curve round at the north end towards the west. Yet the dip magnitude map (0017) gives no indication that this happens. Should that fault continue in the same NNW direction, then caverns 1, 3 and 4 would be too close to the fault.

**Volume of gas**

Halite has consistently claimed that its application for 19 caverns which would store 900mcm of gas is a slimmed down version of the previous Canatxx application. Halite claims (GSR pi S3) that this application represents “a reduction of the order of 50%”.

The second Canatxx application which was reused after a Public Inquiry was for 24 caverns to store up to 1700 mcm of gas. During the Inquiry the number of caverns was reduced to 20 and it was shown that the maximum amount of gas which could be stored based on the BGS 3-D Model was 577 mcm. Indeed the Assessor’s conclusion was that because of faulting, this total could be reduced to as little as 100 mcm.

The third Canatxx application was for up to 36 caverns to store 1700 mcm, but since Canatxx did not provide any maps of the geology and gave no indication as to where the caverns were to be located, these figures proved not to be verifiable.
Thus by stating that 19 caverns for 900 mcm is a slimmed down version of the previous proposal, Halite would appear to be misleading the public and the planning authorities. This is compounded by the statement from Halite that this is only Phase 1 of the development. This could be a very large scheme.

The volume of gas (both cushion and working totals) is calculated in the Baker Hughes Table (GSR p81).

It is assumed that the geological data used in calculating cavern volumes and pressures draw upon the MMD model. Given that this is a model, and not reality, uncertainties must exist with the data and therefore with the gas volumes.

Baker Hughes calculates cavern volumes by correcting for shape, insolubles, temperature and gas composition. In order to calculate gas volumes, the volume of the cavern is multiplied by the maximum pressure which is the depth to the top of the cavern multiplied by a factor of 0.22.

This would be the maximum pressure to which the gas could be raised and only used when the cavern is being tested. PWG suggests that this inflates the amount of gas which could be stored by 29%. Using a factor of 0.17 (which was the calculation used at the Public Inquiry) the total volume of gas stored is reduced to 650 mcm (273 cushion gas, 554 working gas). This is confirmed by Halite in the GSR (piii S9), which specifies an average working gas volume of 560 mcm.
**Wet Rockhead**

Given the past history of salt mining and brine extraction in the area, man made wet rockhead (i.e. the solution of the upper layer of the halite bed/collapse of the lower layer of the Upper Marl) has extended westwards from the natural wet rock head development which was shown in the 1990 BGS Report (Fig 11, p23).

This is of particular concern because the area chosen for cavern development is adjacent to many old brine wells and the salt mine which are in a state of collapse.

PWG raised concerns about this area at the Public Inquiry, particularly questioning why ICI had never extended westwards from the earliest brine wells and the mine at Preesall, but chosen to extend southwards and south westwards towards the Heads. Attention was drawn to the subsidence occurring immediately west of the old mine, the problems encountered in BW43, the uncertainty as to the occurrence of wet rock head in the Arm Hill Bore, and the void encountered during the drilling in BW 130.

The Assessor in her Report from the Public Inquiry drew attention to the hazards posed by the presence of wet rock head.

“it is essential that both the western limit of wet rockhead is established with more certainty and that information is available at the planning stage” (IR 241 20.3.6).

Halite recognises the potential hazard presented by the old mine workings. The mine was opened in 1884 and abandoned in 1930 and allowed to flood. In 1940 wells were sunk and wild brine pumping commenced which continued into the 1960’s. The geographical extent of the wild brine pumping, notably its extension westwards, is unknown.

Fugro Aperio Ltd undertook a seismic survey on behalf of Halite in 2010 but could not reliably define the area at the level of the lower mine from which brine had been pumped over 20+ years. No figures have been provided as to how much brine was extracted, how much halite was dissolved and over what area.

Given these uncertainties, Halite proposes a hazard buffer zone around the salt mine equivalent to a distance of 4 times the proposed cavern radius. The nearest caverns would be 10 and 11 with radii of 45 and 50m respectively. Thus the buffer zone would be between 180 and 200m in width. Given that the extent of wild brine pumping has not been established, this width of this buffer zone could well prove to be insufficient.
The problems which have been encountered with anthropogenic wet rock head is illustrated by BW50 (GSR p42) where dissolution has extended 40m towards the north-west at the salt rockhead boundary.

PWG has concerns that there might be problems at the salt rockhead boundary in the areas selected by Halite for cavern construction. To test this Canatxx drilled the two bore holes at Hay Nook and Barnaby’s Sands and found no evidence of any void, but this does not prove that problems do not exist elsewhere.

Questions had been raised about possible wet rock head shown by the localised thinning at the salt rockhead boundary in the Coat Walls Farm BH. The BGS have recently re-examined the core, bored in 1974, and suggest that this was caused by undersaturated saline drilling fluid.

There are worrying doubts concerning a number of other bores. The GSR refers to 3 of these.

1. The Borehole record for E1 (which the GSR calls E2) shows that at the top of the salt no core is recorded for a depth of 5.49m. The GSR seeks to explain this as core loss resulting from the fact that the bore was drilled in 1936 when techniques and equipment were poor compared to modern standards.

2. In the Arm Hill BH the core loss is explained by core slippage. No mention is made of the water encountered at the top of the salt.

3. For BW 130 the statement by the British Drilling and Freezing Company indicated that in the Daily Drilling Report No 14, no void above the salt was recorded. However, Daily Drilling Report No 13 seems to confirm Mr Robinson’s statement that a void was encountered at the top of the salt on the 9th January 1990 during the drilling of BW 130.

Other brine well incidents are not examined in the GSR. For example BW 43 close to the proposed caverns 5 and 6, had to be abandoned because the lining tubes had broken off at the salt rock head.

During the drilling of BW 117, water was encountered at depth which could have accumulated in a void on top of the salt.

All these incidents which have occurred in bores adjacent to the areas where it is proposed to create the caverns to store gas, show that despite the hazard buffer zones to which Halite intend to adhere, the whole of the salt field is a potential hazard zone.

**Faulting**
Canatxx had previously claimed that the existence of faults within the overburden and within the halite bed did not present any problems in the creation and operation of gas storage caverns.

Halite intends to avoid “known fault hazard” (GSR p52) and fault planes have been assigned a hazard buffer zone of 3 times the proposed maximum cavern radius.

This is on the assumption that faults are in fact known (i.e. identified in the Mott MacDonald maps). Areas where intra-grabinal faults may be present but not identified have previously been referred to.

Moreover, the position of the Burn Naze Fault which defines the western side of the graben relies on the fact that the salt in Bore Hole E1 is only 81m in thickness. In addition it is not known whether the Burn Naze Fault is a single fault or whether there are a series of parallel step faults to the east.

As previously stated neither of the dip magnitude maps produced by MMD identify the Burn Naze Fault or step faults. It is inconceivable that a fault which has a throw of c 800m would not be recognised. Thus both the position and the structure of the Burn Naze Fault are in some doubt.

It can be shown that the major N-S fault to the east, the Preesall Fault, which defines the eastern side of the graben, is not annealed, because water from the Sherwood Sandstone aquifer lying to the east, has penetrated into, and dissolved the salt bed to the west. It is quite likely that the Burn Naze Fault is equally permeable. Other N-S faults could also prove not to be annealed and therefore provide a route for gas migration.

It is absolutely essential that the position of the Burn Naze Fault and possible parallel step faults on the western edge of the graben, be accurately determined. The siting of any cavern which is subsequently filled with gas at pressures up to 80 bar, could result in the migration of gas via these faults towards the Fleetwood Peninsula.
The gas could rise up these faults and collect in the glacial sands and gravels which overlie the Lower Marl under Fleetwood. Another possibility is that the gas could permeate into the porous Sherwood Sandstone which underlies the Lower Marl and because of the fault, lies adjacent to the Halite Bed (see section).

Both these scenarios present a serious risk because:

A  Halite would not know the route of any gas escaping from the caverns or indeed in some instances whether any gas was escaping at all.

B  The gas could find an escape route to the surface and explode in a densely populated area.

C  The gas could collect in the United Utilities Fleetwood Treatment Works and get into the Fylde Coast Tunnel mixing with air to form an explosive mixture threatening the centres of Blackpool, Cleveleys and Fleetwood.

There is a possibility that the storage of large quantities of gas at very high pressures across or adjacent to a fault could reactivate the fault, even though annealed, and thus provide a route for gas migration. That route could be from the cavern itself or from a cracked pipe leading from the cavern to a well head, which is of particular concern if the pipeline is not vertical as in many of the proposed well heads.
There is another important reason why faults should be identified and caverns not built across a fault.

Suppose Halite did drill a vertical borehole at the site of a proposed cavern and that adjacent to the bore, there existed a fault with a downthrow of 20m.

![Diagram showing fault and cavern]

This would not be detected in the borehole data. But when the cavern was being created the top of the halite would be reached in one side of the cavern 20m below where it would have been expected. Thus the cavern would be unsafe for gas storage because there would be no roof of halite up to 50m thick to stop collapse of the roof, over one side of the cavern.

If faults are not identified or ignored then that

“could result in a cavern with unacceptably thin salt head or even a roof partially in mudstone” (IR 244 30.3.22).

Thus the uncertainties regarding the location and displacement of faults in the Preesall Salt Field makes it unsuitable for gas storage.
Subsidence and Crown Hole Collapse

There is the possibility in certain circumstances that underground caverns may collapse either during construction or whilst in operation, resulting in subsidence of the overlying ground. The degree of subsidence can vary from a general lowering of the ground level up to the development of a significant void over an area larger than the diameter of the underground cavern that causes it (i.e. crown hole collapse).

Such a collapse could remove overburden from adjacent caverns and thus place them in jeopardy and thus increase the risk of gas migration from these adjacent caverns.

Canatxx/Halite claims that subsidence and crown hole collapse will not occur with caverns that are designed to modern specification. PWG questions how Canatxx/Halite can be so certain that none of its caverns will ever collapse either during construction or decommissioning.

There is a possibility of crown hole collapse during construction if the overburden is not strong enough at that particular point. Halite proposes to test the strength of the overburden at many of the caverns by directional drilling. Yet this will not test whether the mudstones vertically above can support any cavern of the size proposed. Moreover, they are asking for planning permission before they have done this testing!

Regarding the decommissioning of the caverns, Canatxx/Halite intends to fill them with brine and abandon them.

“Sonar surveys of the most recent ICI caverns demonstrate the caverns left with a salt roof have remained stable for decades after they were abandoned”.

The decades referred to is a very short period of time. ICI only ceased brine pumping in 1992, just 20 years ago, hardly sufficient time to judge how stable these caverns might be.

David Evans of the BGS in his report for Canatxx on the Wet Rock Head (Additional Environmental Information) when referring to these particular caverns, concedes

“there is evidence for increasing internal pressure, indicating that salt creep and closure is taking place”.

This salt is identified as a high creep salt which seriously affects the long term stability issue.

When gas storage caverns are abandoned, they will have to last forever without collapsing which is something which any programme of maintenance would not be able to guarantee. In the
event that Halite doesn’t make appropriate provision for the continuing aftercare of disused caverns, it will be Lancashire County Council who will have to pick up the bill.

Natural England (NE) and the Environment Agency (EA) have been alerted to the possibilities of crown hole subsidence in the medium and long term future but to our knowledge neither has produced any definitive statements on it.

It is possible that the salt marsh (SSSI), the sea wall and Preesall Sewage Treatment works could be within the zone of influence of a crown hole collapse. If United Utilities’ Preesall Sewage Treatment works and its connecting pipelines were to be damaged by a crown hole collapse, the treatment works could be out of action for a period during which there may be a sustained discharge of untreated sewage into the River Wyre.

Canatxx claimed that

“once the pumping of brine ceases, the continued solution of the halite beds ceases and with it further development of the subsidence features”.

If this is the case then why is subsidence still occurring in the brine field – for example the ever increasing collapses north of Height o’ th’ Hill Farm (BW88 potentially linked to BW 87) and along Aggleby’s Road (BW 52- 53-57-84) into which the road has now disappeared.

According to the GSR the at risk caverns were “all developed relatively early”, i.e. between 1904 and 1917, with production ceasing between 1919 and 1936. Yet the time line (Appendix A GSR p89) shows that BW 87 and 88 were constructed between 1940 and 1955.

Halite asserts that Crown Hole Subsidence will never occur with modern caverns which possess a salt roof. This is at odds with the Assessor’s statement from the Public Inquiry.
Depths for top and base halite poorly constrained. Surfaces based upon regional dips established from the east and from north to south and interpretations of western ends of seismic lines.

Top halite tided to B6 and by synthetic seismogram from sonic log of Arm Hill. Depths +/- 5 m.

Top halite tied to Coat Walls Farm borehole and aided by synthetic seismogram from sonic log of Arm Hill. Top halite +/- 5 m, Base halite +/- 20 m.

Top halite +/- 20 m, Base halite +/- 40-50 m.

Top halite +/- 20 m, Base halite +/- 25-35 m.

Top halite and base halite constrained by ICI-130, -129 & -112. Depths +/- 5 m.

Top halite and base halite constrained by ICI-134. Depths +/- 5 m.

Top and base halite tied by synthetic seismogram from sonic log of The Heads. Depths +/- 5 m.

Between The Heads & E27 Top halite +/- 20 m. Base halite +/- 25 m.
Possible scenario for Ear Barneby's Sand Fault as derived from Dip Magnitude Maps (MUD 2014, 2017)
Borehole data associated with East Barnaby's Sand Fault
Possible Scenario of Buni Naze Fault.

- Lower Mudstones
- Sherwood Sandstone

- Upper Mudstones
- Halite

- Lower Mudstones
- Sherwood Sandstone
PWG Figure 6

Spacing between cavern centres

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Distance to faults

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Proposed Underground Gas Storage Facility at Preesall, Lancashire

Response to Protect Wyre Group Evidence

May 2012

Halite Energy Group Ltd
### Issue and revision record

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Proposed Underground Gas Storage Facility at Preesall, Lancashire
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2.2 Geological Block Diagram
3.1 Location of possible fracture zone relative to other features
3.2 BGS sketch showing generic graben faulting terminology
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Statement Scope

Protect Wyre Group (PWG) submitted to Halite Energy Group (Halite) a document titled “draft Evidence” in relation to Halite’s application to the Infrastructure Planning Commission (now the Secretary of State) for an underground gas storage facility at Preesall (Project). This document responds to PWG’s draft Evidence and the questions raised.

This document is not produced as part of the Examination process but is provided by Halite to try and address the issues raised in PWG’s draft evidence and to narrow down areas of disagreement.

A thumbnail summary of the proposed underground facility is provided for the benefit of any party not conversant with the situation. The overall context of this document is also stated. The history of previous proposals and exchanges is not repeated.

A summary of the concerns evident in the Protect Wyre Group’s latest “draft Evidence” is presented and their specific questions are re-iterated. The questions are then responded to individually.

Matters responded to may be categorised as:

- Position of salt boundaries and degree of confidence in model adopted.
- Persistence and inter-relationship of faulting, known and postulated.
- Calculation of working gas volume.
1. Introduction

1.1 Project Overview

Two adjacent areas of the Preesall Salt beds, on the eastern side of the Wyre Estuary, have been identified as being suitable for the creation of gas storage caverns. Much geological and related data has been acquired over the last decade together with other historical data and various expert advice taken. The fundamental issues for such developments are that the salt is gas tight, is of sufficient strength and has an adequate distribution.

The local geology comprises Mercia Mudstone Group strata affected by a graben structure, between the Burn Naze and Preesall Faults, with local faulting also known. The salt beds are over- and underlain by mudstones, with the Sherwood Sandstone at greater depth. The salt contains mudstone marker interbeds; the marker beds generally dip in a westerly direction and vary in total thickness.

In addition to faulting, where the salt beds are relatively shallow in depth they can be affected by "wet rockhead". Historical mining activity, the recovery of brine through solution mining, and other borings in the salt present artificial hazards to be considered. Such features constrain the design of caverns in the salt, generally expressed as a required separation from the proposed caverns in terms of a multiple of proposed cavern radius.

Allowing for these constraints, the studies to date indicate sufficient development potential to proceed through planning to detailed design, based on 19 caverns of varied height and diameter. Full details and background are provided within the Geological Summary Report.

The Protect Wyre Group (PWG) is an umbrella organisation which was formed to co-ordinate the efforts of some residents in their opposition to gas storage near Preesall. The PWG has tabled various evidence and specific questions in response to the Geological Summary Report, submitted by Halite Energy Group Ltd (Halite) to the Infrastructure Planning Commission (Document 9.2.2).

This document provides initial comments on the draft Evidence prepared by the PWG, but does not intend to provide an in depth assessment of that evidence. This document then provides answers to the seven specific questions posed by the PWG.
2. Protect Wyre Group Submissions

2.1 PWG Evidence – Draft Evidence

This evidence is a critical response to the Geological Summary Report (GSR). The PWG Draft Evidence is attached in full as Appendix A to this document. It is recognised that this PWG submission may yet evolve as it is a draft document—the attachment is dated 7th April 2012.

Following a review of the submission we have summarised what we have interpreted to be the main concerns identified by the PWG. We have also provided summary responses to these points. Our review indicates the following:

- Concern over the degree of certainty of the geological model where projected some distance from known data, related specifically to the limited new data acquired since 2005, and to the area now proposed for cavern formation,

The science of geology, as with all sciences, depends on collection of data, analytical work, and the construction of models to facilitate understanding. In the case of Preesall, the amount of data available to the project in the form of borehole data, data from existing caverns and seismic data is far in excess of most similar projects. We feel that the model is robust and provides a close approximation for the actual geological circumstances for the purposes of identifying zones in which caverns could be located. Should approval be granted for the Project, the model would be refined as additional geological data was obtained. We believe there are no significant differences between the BGS model and that presented within the Geological Summary Report presented (Document 9.2.2). There are refinements, but those refinements reflect the natural consequence of additional work, analyses and data being incorporated into the model.

- Concerns over the findings of the two most recent boreholes in relation to previous interpretations of geophysical work, with implications for salt thickness and faulting, and about how the Burrows Marsh (BM) borehole has been interpreted,

As noted above models are refined as new data becomes available, this is the usual process within projects. Some of the differences referred to are not actual differences as like for like comparisons are not being made. For example the differences quoted for the Burrows Marsh (BM) Borehole we believe are not a true comparison of the data. The plan location for the BM borehole is to the east of the north-south trending fault (referred to by PWG as the East Barnaby Sands Fault) and the salt depths for this plan location reflect the salt thickness to the east of the fault. The comparison depths quoted by PWG within the BM borehole are for salt depths to the west of the fault as the borehole is deviated. The BGS model values represent True Vertical Depth values at the surface location of the Burrow's Marsh Borehole. The depths noted by PWG for the BM borehole reflect the offset penetrations of top and base salt. The salient features are shown in the sketch shown in Fig 2.1
Trajectories of the Burrow Marsh Borehole and East Barnaby Sands Fault

Figure 2.1

- Concern that an E-W fracture zone not depicted on fault maps might affect caverns 11, 13 and 14.

This appears to be in reference to the transfer zone located between the opposing faults in the north-central part of the area. This geometry is typical in rift-extensional systems (see figure below). The transfer zone does not need an east-west shear zone to account for this arrangement. The so-called "shatter zone" is a transfer zone that accommodates motion between the tip lines of strike-aligned, but dip opposing normal faults. These features are extremely common in rift systems and occupy the zone of interaction between the involved faults. They do not extend beyond the domain of fault interaction.
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See also figure 3.2 for an example from a BGS report.

Figure 2.2


- Concern over the interpretation of faulting and salt thickness in the northern polygon, not least regarding borehole E1 and the Burn Naze Fault.

Sedimentary relationships in basins reflect depositional environments, including base level changes and water depths and thus dictate facies and/or thickness changes. It is expected and normal to observe such facies changes for different parts of a basin, particularly when comparing basin-centre locations with basin-margin locations. The dip magnitude maps were created from the top and base salt grids. These grids do not cross the Burn Naze Fault and thus do not calculate dips within that domain. All three wells referred to by PWG (BW43, 61 and 77) are in relative basin-margin positions and thus all three are associated with thinner salt sections than more basin-centred locations. The salt in BW61 and 77 boreholes are on the order of 15 metres thicker than that in BW43, with the total salt thickness at BW43 being ~105 metres as compared with 120 metres in BW 77 and 140 metres in BW61. In a graben system, such thickness deviations, even over relatively small areas, are not considered unusual.

It is considered that showing the Burn Naze Fault intersecting borehole E1 is a more cautious interpretation than assuming thinning of the salt beds at that location.

- Concern over how the Rokhar rules have been applied in relation to adjacent caverns of differing radii and in the proximity of faults, (NB. The rules do permit the application as adopted).

The application of the Rokahr rules was established directly with Professor Rokahr. However, the application of generic rules is a cautious approach and is used for planning purposes. Further numerical analysis would be undertaken as part of any detailed design.
• Concern over the actual gas storage which might be feasible, relative to that estimated, whether larger or smaller.

The total body of recent volumetric work accounts for a broad range of volumetric relationships for the cavern cluster. It takes into account reasonable variation in the geologic circumstances and the washing process. Further, the volumetric model accounts for the entire spectrum of volumes for individual caverns from maximum to minimum fill. Under operating conditions, the likelihood of all of the caverns being at either maximum or minimum fill is small. The assumptions made in calculating the volumes are set out in the notes accompanying the table and is based on accepted industry practice.

• Concern that caverns could be affected by migrating wet rockhead or unknown brine extractions,

There is no evidence that wet rockhead is migrating or that there is a hydrogeological reason to support wet rockhead migration. Migration of wet rockhead would require a driving head which is continually replenished, a flow path and an exit for brine so that fresh water could continually be introduced to salt. There is no evidence that there is an exit for brine, that a flow path exists or that there is a driving head.

The pond in collapsed Brinewell 88 has one of the highest water elevations in the area being at an elevation of 8m OD. BW 88 was said by ICI to be connected to BW 87 therefore some development of anthropogenic wet rockhead could be considered to have occurred. The water level in the pond remains virtually static; the interpretation must be that the precipitation to the pond must be balanced by the evaporation plus seepage into the ground. The water in the pond is still saline even though collapse occurred in 1994.

The precipitation amounts to some 900mm per annum whereas the evaporation can be expected to be up to about 700 - 900mm. The locally high hydraulic head, the very low rate of seepage into the ground and the high salinity within the pond strongly indicate that there is only a very low flow into the soil, mudstone or salt strata, or into any anthropogenic wet rockhead.

Collapsed ponds provide the most likely opportunity for the development of wet rockhead because of the direct link from surface water to salt rockhead and the high potential head which exists. The evidence points to extremely low flows from the collapsed brinewells into the soils, mudstone or salt strata and on this basis it is concluded that the migration of wet rockhead is not occurring.

• Concern about gas migration through imprecisely located faults and/or through the Sherwood Sandstone towards and beyond Fleetwood.

The HSE conducted a risk assessment for UGS (Underground Gas Storage) facilities within the UK with specific consideration of gas migration via faulting. The HSE report RR606 concluded:

1. Cavern pressure is unlikely to be high enough to displace water within a fractured zone. Hence gas will not be able to enter the fracture zone.
2. In the unlikely event point 1. pressures are exceeded flux rates through a fracture zone are such that time to empty a cavern would be around 5000 years. This assumes a constant pressure. Actual pressures would decrease halting or severely slowing gas migration.
3. A MM calculation to define the BS8485 gas hazard potential at the surface for the HSE flux rates equates to a very low gas hazard potential.

A review of gas migration scenarios from caverns or wells connecting the caverns to the wellhead have also been conducted for the Risk Assessment Report, Document 9.3.1. The report assessed the risk of migration through fault zones. This report assessed the length of the pathway to a receptor and the two
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dimensional nature of the pathway. The effect of these physical pathway properties means that, in the unlikely event gas exceeded the capillary pressure entry value and that pressure was maintained at source, the gas would dissipate radially from source. As the gas front expands pressure at that front will drop considerably as the gas expands into the fault zone. The flow rate will therefore be severely impeded and most likely stopped, due to falling below the capillary entry pressure of the surrounding saturated material, before the end of the pathway.

The risk of escape of gas from surface pipelines is well understood and is regulated by the HSE as many hundreds of miles of high pressure gas pipelines criss-cross the country.

The scenarios for gas migration presented by PWG are not considered to be credible given that salt is effectively impermeable, mudstone has a low permeability particularly immediately above the salt where it is impregnated with halite, faults involving mudstone are smeared and there is a layer of superficial clay which is also of low permeability. Further the quantities of gas which would be required to escape to saturate a flow path leading to Fleetwood, assuming that such a flow path was possible, would be enormous, these together with other technical reasons such as those described above would further add to the reasons why the postulated escape mechanism is not credible.

- Concern about surface subsidence and cavern collapse in the longer term.

The caverns will be designed to international standards using numerical analysis which is accepted international industry practice. Rates of cavern closure have been assessed and predicted subsidence values are reported in the GSR.

Cavern collapse of the legacy brine wells is possible within the proposed design life of the caverns. The reasons for such collapse are well understood and are known to be because of poor practice when constructed which totally removed the salt up to the marl/mudstone strata. The caverns which have the potential to collapse have been taken into account in delineating the zones in which it is proposed that new caverns could be safely constructed.

The risk management strategy has been presented to the HSE which is satisfied with the approach adopted.

2.2 PWG Questions

PWG have raised the following specific questions to which a response is requested:

1. Do the confidence intervals shown in Fig 1 (PWG response) refer to a confidence level of 66 or 95%?
2. Using the figures shown in the Baker Hughes Table, what are the confidence intervals and degrees of confidence for the top and bottom of the halite bed at the location of the proposed caverns 17 and 2?
3. Can you produce a diagram of the East Barnaby’s Sands Fault and explain the effect that it has on the halite bed?
4. Regarding the possible East-West fracture zone, who assured MMD that the transposition of faults north and south of Arm Hill was not uncommon and on what evidence? In what percentage of cases does transposition occur?
5. Why does the Baker Hughes Table use depths to the top of the salt for caverns 8, 10 and 11 which are greater than that shown in the MMD Model and the adjacent Coat Walls Farm Bore?
6 On p6 of the GSR a map shows the location of caverns for the third Canatxx scheme. Was this map included as part of the third application and why are the locations shown for 32 caverns and not 36?

7 How is average working gas volume referred to in GSR iii S9 calculated?
3. Responses to PWG Questions

3.1 Question 1

Do the confidence intervals shown in Fig 1 (PWG response) refer to a confidence level of 66 or 95%?

Where supported by other evidence, top and/or base of halite interpreted from geophysical traverses is considered on this figure to be accurate to +/-5m. Where not directly supported, the deemed accuracy is reduced to between +/-20 to 50m.

When expressing +/- ranges in this context, the magnitude of range would normally be selected to cover all conceivable variables. For these purposes therefore, a confidence level of 95% would be appropriate to the quoted ranges, based on the information considered at the time.

3.2 Question 2

Using the figures shown in the Baker Hughes Table, what are the confidence intervals and degrees of confidence for the top and bottom of the halite bed at the location of the proposed caverns 17 and 2?

The levels of top and base salt in Table 6.3 in the GSR have been taken from the model. The explanation for the derivation of the volumes is given in Section 6.2 of the GSR and the notes to Table 6.3.

Cavern 2 – salt is anticipated from -320 to -496m (176m thickness); the location is approximately 350m east of nearest borehole E1; the nearest seismic line IELP-99-25 is 700m+ to the south. The geological structure in this area is interpreted as depicted on Section 6-6’ appended to the GSR. It is likely that future work will allow some refinement to Section 6-6’, which may increase or decrease the available cavern volume. At present the top of halite is probably accurate within +/-20m, and the bottom within +/-40m, bearing in mind that borehole E1 is considered not to prove the base of salt.

Cavern 17 - salt is anticipated from -363 to -753m (390m thickness); the location is intersected by seismic line GC81-336, which helps inform Section 2-2’ appended to the GSR, so the overall geological structure is fairly well defined at this cavern.

3.3 Question 3

Can you produce a diagram of the East Barnaby’s Sands Fault and explain the effect that it has on the halite bed?

We understand that the fault referred to by the PWG as the East Barnaby Sands Fault is the north-south trending fault located 15-20m to the west of the BM borehole. Section 2 on page 100 of the GSR indicates the strata configuration close to the fault and the BM borehole. The sketch shown in Figure 2.1 above provides a more detailed explanation.
This is suggestive of subsidiary syn-depositional faulting as generally depicted on the model. The question here is the northwards extent of the East Barnaby’s Sands Fault as a distinct structural feature, before it becomes a healed asymmetric fold in the bedding. There is no direct evidence at seismic line GC81-336, so the model is considered to be a realistic interpretation.

3.4 Question 4

*Regarding the possible East-West fracture zone, who assured MMD that the transposition of faults north and south of Arm Hill was not uncommon and on what evidence?*

The interpretation of the faults referred to by the PWG is understood to be those shown in Figure 3.1. The interpretation has been made by the BGS and Dr E Rutherford, both internationally recognised specialists in the interpretation of basin geology including gas storage in salt.

It is not agreed that an east-west fault zone is implied by the presence of the “transposition of faults”. The primary evidence for the faulting shown on the model, assisted by data from boreholes and brine wells, is seismic lines GC81-336 to the south and IELP 99-25 to the north.

As shown in Section 2 of this report and in the block diagram prepared by the BGS shown in Figure 3.2 below, the transposition of faults is typical of rift systems. An east-west rupture zone is not necessary to explain the geological model and it would not be expected.
To the south, the edge of the heart of the graben is marked by a normal fault of substantial downthrow to the west. That the downthrow is rather greater at the base of the salt compared to the top indicates that the fault was syn-depositional and continued to develop for some time during the deposition of overlying muds.

The fault detected by the northerly seismic line is of a different nature and is not considered to be an extension of the fault to the south, rather an entirely separate structural feature, as shown on the model. The BGS uses the terms “synthetic” and “antithetic” for these faults, the more southerly being synthetic because it is of the same sense as the underlying Preesall Fault, and vice versa.

Thus an east-west fault or fracture zone is not likely to be present nor is it needed to explain the observed features.
3.5 Question 5

*Why does the Baker Hughes Table use depths to the top of the salt for caverns 8, 10 and 11 which are greater than that shown in the MMD Model and the adjacent Coat Walls Farm Bore?*

The true vertical depths for top of salt at the cavern location given by Baker Hughes are the same as those used in the assessment of volumes presented in the Table 6.3 of the GSR which were taken from the model.
3.6 Question 6

On p6 of the GSR a map shows the location of caverns for the third Canatxx scheme. Was this map included as part of the third application and why are the locations shown for 32 caverns and not 36?

It is understood that the 2009/10 application was for up to 36 caverns. The outline scheme developed by Canatxx was for 32 caverns. The application did not include the plan showing these proposed positions.

3.7 Question 7

How is average gas working volume referred to in GSR piii S9 calculated?

A full explanation for the method of calculating the indicative gas volume is given in the GSR Section 6.2 and Table 6.3 together with the notes to that table. The volume quoted is an approximation, which depends upon various probabilistic assumptions, as discussed in Section 6.2 of the GSR. The table provides calculated figures for each cavern based on an average value for the parameter range. The main variables are the shape factor, insoluble residue, insoluble content not removed during washing and a bulking factor for the remaining residue. A full Monte Carlo analysis was undertaken for ranges of all these variables but for simplification only the average value from each variable has been reported in the GSR. It is anticipated that in the course of time as, and if, the scheme design and implementation progresses, the calculated volumes for some caverns will increase and some will decrease.

The figure calculated for any given cavern comprises a simple “gross volume”, which is substantially reduced to a net volume to allow for anticipated shape losses and insoluble rock content not recovered, these being judged from industry experience. A further reduction is calculated to allow for temperature and pressure factors and correction for gas composition.

“Working gas” storage is then calculated after allowing for so-called “cushion gas”, essentially the difference between stored volume at maximum and minimum operational pressures.
4. Concluding Summary

The foregoing sections may be summarised as follows:

- The Protect Wyre Group has submitted to Halite a document, described by PWG as “draft Evidence” expressing various geology related concerns, as background to seven specific questions.

- Mott MacDonald has provided initial comments on the draft evidence and is not intended to be an in depth analysis of that evidence. Specific answers to the questions have been provided.
Appendices

Appendix A. PWG Evidence – Draft Document dated 7th April 2012

PWG Evidence - Draft Document

Geology
Howard Phillips

For the purposes of this report, the company names of Canatxx and Halite Energy should be read and accepted as being the same organisation - the change from Canatxx to Halite was effected by a simple change of trading name at Companies House.

At the Public Inquiry (APP/Q371/A/05/113799), which began in September 2005, Canatxx presented 4 maps produced by the British Geological Survey (BGS) showing the geology of the Halite Bed.

1. Salt Top Contour
2. Salt Bottom Contour
3. Salt Thickness Isopachyte
4. Rock burden thickness Isopachyte

These maps did not claim to present the true geology but a model interpolated from 4 seismic lines and the bore hole data available at that time. The BGS diagram (PWG Fig. 1) presented at the Inquiry shows the confidence intervals of the top and bottom of the halite along the 4 seismic lines.

Where the seismic lines can be tied into a bore hole then the intervals are +/- 5m. Away from the borehole the uncertainty increases with intervals of +/- 25m. The western sections of the seismic lines Can G and Can F have intervals of +/- 40-50m for the base halite.

Given that this degree of uncertainty exists along the seismic lines, the geology of the interpolated area away from the lines must be treated with some caution. Caverns are being proposed by Halite up to 750m away from any seismic line.

In reply to questions from PWG (21st June 2011), Halite stated “typically interpolation over the western and northern areas beyond borehole or seismic data is of the order of 500-750m. The BGS modelling approach described above is accepted industry modelling practice. This, combined with conservative positioning of boundary faults is considered to adequately reduce uncertainty at the planning stage”.

At the Public Inquiry (2005-6) the Inspector, (Edward A Simpson) was assisted by Ruth Allington BSc, MSc, CEng, FIMMM, FGS, CGeol, FConsE, MBA in the role of an Assessor. We believe that this is the very uncertainty referred to by Ms Allington in her Report and which Halite has failed to address sufficiently.

The Assessor considered the geological information submitted before and during the Inquiry to be inadequate and suggested that a site investigation should be carried out “to confirm or amend assumptions of the geological model”.

PWS Draft Document on Geology 7th April 2012
She recommended

- At least two more seismic lines between existing lines IELP 99-25 and Can 97-G.
- Drilling and geophysical logging of boreholes on these lines to provide ground truth.

Professor Rokahr in his evidence at the Public Inquiry said he would have required “at least three” cored boreholes.

Since the area north of the Waste Treatment Plant was not under consideration for cavern construction, the Assessor made no recommendations for seismic investigations in this area.

The recommendations for more seismic lines between IELP 99-25 and Can 97-G have not been carried out (neither by the company when it was called Canatxx nor when it was renamed as Halite), nor has any investigation been made in the area north of the Waste Treatment Plant towards Hackensall Hall (an area which now forms part of the Halite proposals).

According to the Canatxx Environmental Scoping Report submitted to Lancashire County Council (LCC) on the 15th September 2008 for its third application, Canatxx intended to drill 4 additional boreholes which would establish with a little more certainty the accuracy of the 3-D model of the geology presented at the Inquiry.

In the event Canatxx drilled only 2 additional boreholes - at Hay Nook and inland from Barnaby’s Sands (incorrectly titled by the BGS as the Burrow’s Marsh BH). The data from these two bore holes offer the only new information which has been produced in response to the Assessor’s demands to confirm or amend the assumptions of the geological model.

Halite states (GSR pii 56) that the geological work done by Mott MacDonald has “enabled confirmation of the 3-D ground model as previously constructed by the British Geological Survey”. However, there are numerous differences between the BGS model and that presented by Mott MacDonald as part of this application.

Hay Nook Borehole

The Hay Nook borehole (HNBH) was drilled vertically in the same field as an ICI brine well (BW130) with its logged information.

It is a valuable exercise to compare the data from the bore hole with the BGS model, to test the accuracy of the model. The BGS model indicates the halite bed at Hay Nook at depths of 300-700m, i.e. a thickness of 400m. In fact the bore reveals that the halite bed lies between 304 and 557m, a thickness of 273m which highlights the uncertainties of the 3D model based on the seismic line Can 97-G.
In order to explain this anomaly Mott MacDonald introduces a N-S fault between HNBH and BW130 (shown on both the top and bottom of Halite maps (MMD 277663-6-DR-00-XX-0013 and 0016). This fault which is shown running N-S across the western Heads Peninsula (MMD 0017) affecting only the basal surface of the salt is not shown, according to the MMD model, to extend under Barnaby’s Sands even though there is a major difference (c 143m) in the depth of the basal surface between HNBH and BW130. If this fault does continue northwards it would compromise the safety of the caverns 12-19.

Burrow’s Marsh (Barnaby’s Sands) Bore Hole

The Barnaby’s Sands borehole (GR 335231 446286) was drilled vertically to a depth of 119m, then deviated south westwards beneath the salt marsh passing through the halite bed at an angle of 28 degrees. The top of the halite was encountered at c80m from the well head, the base at 280m (c 55m and 255m when the distance from the well head to the sea wall is deducted). The area where it is proposed to locate 9 of the caverns lies beyond the limits of the borehole, up to 400m from the sea wall.

Moreover because the bore was drilled at an angle, the dip of the halite could only be estimated at 14 degrees and the thickness of the halite at c 320m.

A comparison is made between the information provided by this borehole with the BGS model in the following table.

<table>
<thead>
<tr>
<th>BM Bore Hole</th>
<th>BGS model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Salt</td>
<td>371m</td>
</tr>
<tr>
<td>Bottom of Salt</td>
<td>754m</td>
</tr>
<tr>
<td>Thickness</td>
<td>320m</td>
</tr>
</tbody>
</table>

This indicates a considerable discrepancy which needs to be explained.

One possible explanation could be faulting. The Mott MacDonald map indicate a major N-S fault under Barnaby’s Sands on both the dip magnitude maps (MMD 0014 and 0017), with dip magnitudes of 70 degrees and throws to the west.

The location of the fault and the direction of the drilling would suggest that the borehole passed through the fault, yet the BGS Reports (CR 09/15 and CR 09/40) make no mention of this fact. According to the BGS Model there was no fault in this location, nor anywhere else under Barnaby’s Sands. This supposition was used by Canatxx as a justification for the location of its caverns.

During the consultation process Halite was asked about this (PWG meeting with Halite/MMD 24th May 2011). MMD offered an explanation as to why the bore did not encounter any faults even though it went across a fault zone clearly identified on the 3-D model. This involves the angle at which the halite is dipping and the angle of the bore. No diagrams or details were given as to how this might occur.
The fault zone is clearly shown in the model as lying approximately 15-50m SW of the drilling site for the upper surface of the halite (MMD 0014) and between 80-125m for the basal surface (MMD 0017). The impact of this fault with a sizeable downthrow to the west, on the halite has not been shown in any detail by Halite.

The detailed section (MMD 0009) across cavern 16 indicates only a small increase in the depth of the of the halite bed from east to west across the fault at its upper surface but a large increase (100m +) at the basal surface. Analysis of the dip magnitude map of the Upper Surface (0014) shows that the fault is of some size, dipping to the west at angles of up to 70 degrees.

PWG Fig 2 plots the width of the faults as shown on the Upper Surface dip magnitude map (0014) and the basal surface map (0017). The lateral extent of the fault at the Upper Surface is 37m, which with a dip of 70 degrees gives a vertical difference of c 100m. Similarly the lateral extent of the fault at the basal surface is c 58m, giving a vertical difference of c 160m.

Given the Halite calculation that the halite bed is 366m thick, without correcting for dip, that leaves c 100m. This would occur if the halite bed on the east side of the fault was approximately 170m true thickness and 220m on the west. The 320m claimed by Halite seems exaggerated.

Table 1.3 (GRS p4) states that “the depth to significant mudstone bands was compared to the total salt thickness and for the significant mudstone interbeds, a correlation was established”. Comparing the % of the halite bed which occurs between mudstone interbeds 2 and 3, the following results are obtained - The Heads 33.6%, BW 116 28%, BW 123 29.5%, Arm Hill 29.7%. The figure for Barnaby’s Sands BH is 44.7%, approximately 50% greater.

There is a possibility that the sequence is repeated and the halite bed is much thinner than the 320m estimated by the BGS Report (CR/09/040). If this is the case then it calls into question the MMD Model for the area under Barnaby’s Sands and the height of the caverns planned in that area.

It is not possible to verify or to refute this by studying the cores taken from the Burrow’s Marsh Bore Hole. The bore was only cored for two areas, namely from 129m - 136m and from 336.5m to 399m (drilled depth). No mudstone interbeds occur between 530 and 710m in the bore according to the main geophysical logs. Samples as shown by the cuttings log data were taken at intervals of 1m, often 2m, which would not have picked out any repeated sequence.

In fact the data from the sampling does not identify the mudstone interbed 3 at 530m depth. The only measure which has managed to detail this layer is the temperature log.

It is useful to compare the data for the boreholes to the east (BW 123, 121, 119) and to the south on the eastern side of the Heads (see PWG Fig.3). All the brine wells to the east of the upper surface halite fault show a great deal of similarity. The
top of the halite becomes shallower towards the south from 324m (BW123) to 227m (BW 105) and then rising rapidly to 171m (BW106).

The base of the salt follows a similar pattern rising from 459 m (BW123) to 362m (BW 105) and 275m (BW 106). This means that the thickness of the halite is consistent (122-140m) with the exception of the shallower BW 106 (104m).

Under the Heads Peninsula, the fault downthrows the bed to the west as shown by the following borehole data.

<table>
<thead>
<tr>
<th>Difference E-W</th>
<th>West</th>
<th>East</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top of Salt 30</td>
<td>299</td>
<td>283</td>
</tr>
<tr>
<td>Bottom of Salt 154</td>
<td>568</td>
<td>478</td>
</tr>
<tr>
<td>Thickness 124</td>
<td>269</td>
<td>195</td>
</tr>
<tr>
<td>BW 129</td>
<td>BW112</td>
<td>BW111</td>
</tr>
<tr>
<td>BW 133</td>
<td>BW 127</td>
<td>BW 125</td>
</tr>
<tr>
<td>Top of Salt 27</td>
<td>277</td>
<td>263</td>
</tr>
<tr>
<td>Bottom of Salt 132</td>
<td>528</td>
<td>456</td>
</tr>
<tr>
<td>Thickness 105</td>
<td>251</td>
<td>193</td>
</tr>
<tr>
<td>BW 134</td>
<td>BW 128</td>
<td>BW 106</td>
</tr>
<tr>
<td>Top of Salt 90</td>
<td>261</td>
<td>242</td>
</tr>
<tr>
<td>Bottom of Salt 231</td>
<td>506</td>
<td>434</td>
</tr>
<tr>
<td>Thickness 141</td>
<td>245</td>
<td>192</td>
</tr>
</tbody>
</table>

The step effect of the faulting shows that the thickness of the halite bed increases westwards across the fault largely explained by the increasing depth of the halite.
base. This structure appears to continue northwards under Barnaby’s Sands. The data from BW 114 to BW 123 show both the top and the base of the salt increasing northwards but with little increase in its thickness.

All this data seems to be incongruous with the Burrows Marsh Bore Hole where the thickness of the halite bed is estimated as 320m. In comparison the Arm Hill Bore hole to the north shows a thickness of 241m.

To summarise, PWG believe that the discrepancy between the BGS model and the MMD model in the area under Barnaby’s Sands is a result of including in the MMD model the data from Burrows Marsh Bore. The Assessor at the Inquiry called for two more seismic lines across the area which Canatxx/Halite has not done. These would have picked out the fault and its effect.

Halite’s response to any uncertainty regarding the geology is that “ultimately the geological model will be tested during drilling of cavern pilot holes and pre-construction testing”. This same approach was criticised by the Inspector in his Report from the Public Inquiry (IR p240 20.3.4).
Possible W-E fracture zone

Another issue raised at the meeting with Halite on the 24th May 2011, concerned the transposition of salt top and bottom faults in the fault zone north and south of Arm Hill. MMD considered this as perhaps unusual but they had been assured that this was not uncommon. Whoever gave this assurance and on what evidence was not revealed. We will seek further clarification on this point.

The transposition is clearly shown on the indicative cavern location plan and occurs 300m south of Arm Hill, along northing 464. PWG suggests that for this to happen there has to be an E-W zone of movement in the vicinity of northing 464. An indication of this possible fracture zone is shown in the thickness of the salt model (0019) but it is not identified in the fault maps (0014, 0017). Such a zone would affect the safety of caverns 11, 14 and 13.

Northern Lozenge

With regard to the northern lozenge (caverns 1-11) PWG has serious issues with the suitability of the halite bed to store the amount of gas proposed.

Caverns 8, 10 and 11 are on the eastern slopes of the graben where the halite bed is shallower and thinner. The Coat Walls Farm bore encountered the top of the salt at 281m and continued just 4m more into the bed. The base of the halite (as discerned from the seismic line IELP) has confidence limits of +/- 20 metres. The Baker Hughes Table (GSR p81 Table 6.3) uses figures for the top of salt at 322m (cavern 8), 306m (cavern 10) and 325m (cavern 11), all of which are larger than the 281 at Coat Walls Farm. From the MMD model (0013) the top of the salt can be estimated as 300m (cavern 8), 295m (cavern 10) and 300m (cavern 11), which are still in excess of the Coat Walls Farm data.

According to the Baker Hughes Table, the height of the caverns are 101m (cavern 8), 69m (cavern 10) and 73m (cavern 11). Given that these are the smallest caverns (in height) being proposed, it is of concern that the depth to the top of the caverns may have been overestimated.

Caverns 1-6 are proposed to be located between 350m and 700m north of the IELP seismic line and Arm Hill Bore. The Canatxx proposal was for caverns as far north as northing 470, hence this area between 470 and 474 was not investigated in detail by the BGS and an area which incidentally is not owned by Canatxx or Halite.

The information on which the MMD model is based is seismic line IELP with the associated Arm Hill Bore, E2 (top of salt only), and B6 boreholes to the south, E1 (HHF) to the north, P1 to the north east and BW 43 to the east (see PWG Fig 4).

According to the Baker Hughes table, the thickness of the salt bed at the proposed cavern sites 1-6, are as follows cavern 1 - 222m, cavern 2 - 176m, cavern 3 - 260m, cavern 4 - 240m, cavern 5 - 209m, and cavern 6 - 193m. The nearest
borehole E1 shows the salt bed to be only 81m thick, which calls into question the feasibility of caverns 1-6.

The response from MMD (meeting with Wyre Community Group and Halite 9th May 2011) is that “it appears the Burn Naze Fault runs through borehole E1 and is why the salt is thin in that location versus nearby wells and proposed cavern locations”. (It should be noted that there are no wells which are nearby).

The MMD interpretation of E1 is that the bore passes through 323m of glacial deposits and Upper Mudstones, then the upper beds of the halite (c81m), then crosses the Burn Naze Fault at a depth of 396m, and penetrates the Lower Mudstones to a depth of 43m.

PWG asked whether the E1 borehole shows mudstone interbeds consistent with only the upper strata of the halite bed or whether the 5 mudstone interbeds present across much of the salt field can be discerned in the E1 bore, i.e. does the 81m in the bore show the full thickness of the halite? A letter from Halite (21 June 2011) states that “the mudstone interbeds within E 1 are consistent with thinned mudstones BG55 and BG54”. There has been no verification of this.

Indeed according to Wilson and Evans 1990 (BGS Geology of the Country around Blackpool) in E1 “the sequence of individual beds of salt becomes unrecognisable “(p21). The core details show possibly 6 beds of salt, separated by 5 layers of mudstone. This conflicts with the Halite statement claiming only two marl/mudstone interbeds.

At the meeting with Halite on the 24th May 2011, PWG asked on what basis had the thickness of the salt bed at proposed cavern sites 1-6, been estimated. MMD stated that at the P1 bore hole (Parrox Hall 359478), the halite bed was at a depth of 260-376m, a thickness of 116m, and that this did not show a thinning of the bed northwards. (In fact a small thinning is indicated from BW61 (139m), BW77 (121m), to P1 (116m). On this basis it was conjectured by Halite that the halite bed thickens and deepens to the west. Thus its estimated thickness at cavern locations 2, 5 and 6, is respectively 176, 209 and 193m, at 1 and 4, 222 and 240m and at cavern location 3 - the most westerly, 260m. However, the one borehole which could verify the westward thickening (BW 43) in fact shows the opposite, thinning westwards from BW 77 (121m) and BW61 (139m) to BW 43 (105m), which is consistent with the 81m of halite in E1 being the full thickness of the halite body at this point.

At the meeting it was claimed that the BGS has data from more boreholes to the north. Details of all the boreholes used to construct the MMD model were supplied by Halite and no bore holes north of E1 and P1 were used.

If the E1 bore were to intersect the Burn Naze Fault, then the rock below the fault in all probability would be Sherwood Sandstone and not the Lower Mudstones (see PWG Fig. 5). The depth from the surface to the base of the Lower Mudstones would need to be at least 440m in order not to encounter the Sherwood Sandstone. The
only boreholes on the Fleetwood/Thornton side of the estuary are well to the south and west at B1 (339448) where the Sherwood Sandstone appears at 471m beneath the surface and B8 (323453) at 369m.

Again, if the E1 bore were to intersect the Burn Naze Fault and penetrate the underlying mudstones, it is the lower beds of the Lower Mudstones (Hamleton Mudstones) that would be encountered immediately below the fault. Borehole records form the Hamleton Mudstones do not indicate any layers of rock salt.

According to the E1 bore hole record, Thornton Mudstones occur under the halite bed. These mudstones include a marl and rock salt layer 27m below the top of the mudstone, indicating that these mudstones lie immediately below the Preesall Halite. Similar halite layers appear in the Thornton Mudstones in B6, E5, P1 and P101.

A major uncertainty in the BGS and MMD Models is the position of the Burn Naze Fault which according to the BGS and Halite is defined by boreholes E27 and B1 near Stanah in the south and borehole E1 in the north “which is interpreted to intersect the fault”. Only E27 and B1 together with seismic line GC-86-DU371 in the south define the fault. It can be assumed that generally the Burn Naze Fault parallels the N-S Preesall Fault, but two kilometres to the west. However there is no evidence as to the exact position of the Fault north of E27 - only somewhere under the Wyre Estuary.

In neither of the dip magnitude maps (upper surface of halite MMD 0014, basal surface 0017) does the model pick out the Burn Naze Fault. None of the other E-W seismic lines extend far enough westwards to identify its position. This is a major fault with a throw eastwards of c 800m which defines the graben and the halite beds within the graben on its western boundary and yet it has not been mapped by the 3-D modelling. It is vitally important that the location of the Burn Naze Fault be identified.

There are too many uncertainties concerning the geology which have not been resolved by the more detailed model produced by MMD as part of this application.

Distance apart of proposed caverns

According to the advice given by Professor Rokahr, the wall of salt left between caverns should be at least 3x r (=cavern radius). Halite has interpreted this to mean 1.5xr1 + 1.5xr2 for adjacent caverns 1 and 2 etc. This in some cases significantly reduces the thickness of the wall. For example, between caverns 1 and 2 the wall is reduced from 120m thick to 108.75.

PWG Fig. 6 shows the minimum distances which must be left between the centres of adjacent caverns according to the Halite interpretation of the Rokahr rules. The actual spacing is measured from the grid co-ordinates of the cavern locations and the map spacing from MMD 0002. It must be noted that the scale of these maps in
Appendix B of the GSR is given as 1:5000. This is not the scale at which they are reproduced.

In the majority of cases the spacing criterion has been met, but so tightly that there is no margin for any error. However, there are three cases where the minimum spacing has not been adhered to - namely between caverns 12-13, 13-15, and 14-16. This is the case whichever method of measuring the actual spacing is used. These are all in the area under Barnaby’s Sands where the salt area is constrained by faults so that any adjustment of cavern location is not possible.

Professor Rokahr’s rule regarding the minimum distance of the wall of a cavern to a fault is that the fault should not be less than 3xmax radius of the cavern away from the cavern wall. One cavern (16) is located too near the fault line immediately to the east (see PWG Fig 6 and MMD 0002/P3). The distances of the other caverns to the faults in the area under Barnaby’s Sands are the minimum, hence the statement above which rules out any adjustment of cavern location.

The location of the caverns using the Rokahr rule regarding minimum distance from faults assumes that all faults in the area are correctly identified and located. Attention has already been drawn to the N-S fault across the western end of the Heads which is identified by the bore holes at BW130 and Hay Nook. A continuation of that fault northwards would have implications for the location of caverns in the southern part of the area under Barnaby’s Sands.

An E-W shatter zone would bring into question the location of caverns 11, 14 and 13.

The fault line running NNW-SSE immediately to the west of the Arm Hill Bore, is made to curve round at the north end towards the west. Yet the dip magnitude map (0017) gives no indication that this happens. Should that fault continue in the same NNW direction, then caverns 1, 3 and 4 would be too close to the fault.

Volume of gas

Halite has consistently claimed that its application for 19 caverns which would store 900mcm of gas is a slimmed down version of the previous Canatxx application. Halite claims (GSR p13) that this application represents “a reduction of the order of 50%”.

The second Canatxx application which was reused after a Public Inquiry was for 24 caverns to store up to 1700 mcm of gas. During the Inquiry the number of caverns was reduced to 20 and it was shown that the maximum amount of gas which could be stored based on the BGS 3-D Model was 577 mcm. Indeed the Assessor’s conclusion was that because of faulting, this total could be reduced to as little as 100 mcm.

The third Canatxx application was for up to 36 caverns to store 1700 mcm, but since Canatxx did not provide any maps of the geology and gave no indication as to where the caverns were to be located, these figures proved not to be verifiable.
Thus by stating that 19 caverns for 900 mcm is a slimmed down version of the previous proposal, Halite would appear to be misleading the public and the planning authorities. This is compounded by the statement from Halite that this is only Phase 1 of the development. This could be a very large scheme.

The volume of gas (both cushion and working totals) is calculated in the Baker Hughes Table (GSR p81).

It is assumed that the geological data used in calculating cavern volumes and pressures draw upon the MMD model. Given that this is a model, and not reality, uncertainties must exist with the data and therefore with the gas volumes.

Baker Hughes calculates cavern volumes by correcting for shape, insolubles, temperature and gas composition. In order to calculate gas volumes, the volume of the cavern is multiplied by the maximum pressure which is the depth to the top of the cavern multiplied by a factor of 0.22.

This would be the maximum pressure to which the gas could be raised and only used when the cavern is being tested. PWG suggests that this inflates the amount of gas which could be stored by 29%. Using a factor of 0.17 (which was the calculation used at the Public Inquiry) the total volume of gas stored is reduced to 650 mcm (273 cushion gas, 554 working gas). This is confirmed by Halite in the GSR (piii 59), which specifies an average working gas volume of 560 mcm.
Wet Rockhead

Given the past history of salt mining and brine extraction in the area, man made wet rockhead (i.e. the solution of the upper layer of the halite bed/ collapse of the lower layer of the Upper Marl) has extended westwards from the natural wet rock head development which was shown in the 1990 BGS Report (Fig 11, p23).

This is of particular concern because the area chosen for cavern development is adjacent to many old brine wells and the salt mine which are in a state of collapse.

PWG raised concerns about this area at the Public Inquiry, particularly questioning why ICI had never extended westwards from the earliest brine wells and the mine at Preesall, but chosen to extend southwards and south westwards towards the Heads. Attention was drawn to the subsidence occurring immediately west of the old mine, the problems encountered in BW43, the uncertainty as to the occurrence of wet rock head in the Arm Hill Bore, and the void encountered during the drilling in BW 130.

The Assessor in her Report from the Public Inquiry drew attention to the hazards posed by the presence of wet rock head.

"it is essential that both the western limit of wet rockhead is established with more certainty and that information is available at the planning stage" (IR 241 20.3.6).

Halite recognises the potential hazard presented by the old mine workings. The mine was opened in 1884 and abandoned in 1930 and allowed to flood. In 1940 wells were sunk and wild brine pumping commenced which continued into the 1960's. The geographical extent of the wild brine pumping, notably its extension westwards, is unknown.

Fugro Aperio Ltd undertook a seismic survey on behalf of Halite in 2010 but could not reliably define the area at the level of the lower mine from which brine had been pumped over 20+ years. No figures have been provided as to how much brine was extracted, how much halite was dissolved and over what area.

Given these uncertainties, Halite proposes a hazard buffer zone around the salt mine equivalent to a distance of 4 times the proposed cavern radius. The nearest caverns would be 10 and 11 with radii of 45 and 50m respectively. Thus the buffer zone would be between 180 and 200m in width. Given that the extent of wild brine pumping has not been established, this width of this buffer zone could well prove to be insufficient.
The problems which have been encountered with anthropogenic wet rock head is illustrated by BWS0 (GSR p42) where dissolution has extended 40m towards the north-west at the salt rockhead boundary.

PWG has concerns that there might be problems at the salt rockhead boundary in the areas selected by Halite for cavern construction. To test this Canatxx drilled the two bore holes at Hay Nook and Barnaby’s Sands and found no evidence of any void, but this does not prove that problems do not exist elsewhere.

Questions had been raised about possible wet rock head shown by the localised thinning at the salt rockhead boundary in the Coat Walls Farm BH. The BGS have recently re-examined the core, bored in 1974, and suggest that this was caused by undersaturated saline drilling fluid.

There are worrying doubts concerning a number of other bores. The GSR refers to 3 of these.

1. The Borehole record for E1 (which the GSR calls E2) shows that at the top of the salt no core is recorded for a depth of 5.49m. The GSR seeks to explain this as core loss resulting from the fact that the bore was drilled in 1936 when techniques and equipment were poor compared to modern standards.

2. In the Arm Hill BH the core loss is explained by core slippage. No mention is made of the water encountered at the top of the salt.

3. For BW 130 the statement by the British Drilling and Freezing Company indicated that in the Daily Drilling Report No 14, no void above the salt was recorded. However, Daily Drilling Report No 13 seems to confirm Mr Robinson’s statement that a void was encountered at the top of the salt on the 9th January 1990 during the drilling of BW 130.

Other brine well incidents are not examined in the GSR. For example BW 43 close to the proposed caverns 5 and 6, had to be abandoned because the lining tubes had broken off at the salt rockhead.

During the drilling of BW 117, water was encountered at depth which could have accumulated in a void on top of the salt.

All these incidents which have occurred in bores adjacent to the areas where it is proposed to create the caverns to store gas, show that despite the hazard buffer zones to which Halite intend to adhere, the whole of the salt field is a potential hazard zone.

Faulting
Canatxx had previously claimed that the existence of faults within the overburden and within the halite bed did not present any problems in the creation and operation of gas storage caverns.

Halite intends to avoid “known fault hazard” (GSR p52) and fault planes have been assigned a hazard buffer zone of 3 times the proposed maximum cavern radius.

This is on the assumption that faults are in fact known (i.e. identified in the Mott MacDonald maps). Areas where intra-grabinal faults may be present but not identified have previously been referred to.

Moreover, the position of the Burn Naze Fault which defines the western side of the graben relies on the fact that the salt in Bore Hole E1 is only 81m in thickness. In addition it is not known whether the Burn Naze Fault is a single fault or whether there are a series of parallel step faults to the east.

As previously stated neither of the dip magnitude maps produced by MMD identify the Burn Naze Fault or step faults. It is inconceivable that a fault which has a throw of c 800m would not be recognised. Thus both the position and the structure of the Burn Naze Fault are in some doubt.

It can be shown that the major N-S fault to the east, the Preesall Fault, which defines the eastern side of the graben, is not annealed, because water from the Sherwood Sandstone aquifer lying to the east, has penetrated into, and dissolved the salt bed to the west. It is quite likely that the Burn Naze Fault is equally permeable. Other N-S faults could also prove not to be annealed and therefore provide a route for gas migration.

It is absolutely essential that the position of the Burn Naze Fault and possible parallel step faults on the western edge of the graben, be accurately determined. The siting of any cavern which is subsequently filled with gas at pressures up to 80 bar, could result in the migration of gas via these faults towards the Fleetwood Peninsula.
The gas could rise up these faults and collect in the glacial sands and gravels which overlie the Lower Marl under Fleetwood. Another possibility is that the gas could permeate into the porous Sherwood Sandstone which underlies the Lower Marl and because of the fault, lies adjacent to the Halite Bed (see section).

Both these scenarios present a serious risk because:

A Halite would not know the route of any gas escaping from the caverns or indeed in some instances whether any gas was escaping at all.

B The gas could find an escape route to the surface and explode in a densely populated area.

C The gas could collect in the United Utilities Fleetwood Treatment Works and get into the Fylde Coast Tunnel mixing with air to form an explosive mixture threatening the centres of Blackpool, Cleveleys and Fleetwood.

There is a possibility that the storage of large quantities of gas at very high pressures across or adjacent to a fault could reactivate the fault, even though annealed, and thus provide a route for gas migration. That route could be from the cavern itself or from a cracked pipe leading from the cavern to a well head, which is of particular concern if the pipeline is not vertical as in many of the proposed well heads.
There is another important reason why faults should be identified and caverns not built across a fault.

Suppose Halite did drill a vertical borehole at the site of a proposed cavern and that adjacent to the bore, there existed a fault with a downthrow of 20m.

This would not be detected in the borehole data. But when the cavern was being created the top of the halite would be reached in one side of the cavern 20m below where it would have been expected. Thus the cavern would be unsafe for gas storage because there would be no roof of halite up to 50m thick to stop collapse of the roof, over one side of the cavern.

If faults are not identified or ignored then that

“could result in a cavern with unacceptably thin salt head or even a roof partially in mudstone” (IR 244 30.3.22).

Thus the uncertainties regarding the location and displacement of faults in the Preesall Salt Field makes it unsuitable for gas storage.
Subsidence and Crown Hole Collapse

There is the possibility in certain circumstances that underground caverns may collapse either during construction or whilst in operation, resulting in subsidence of the overlying ground. The degree of subsidence can vary from a general lowering of the ground level up to the development of a significant void over an area larger than the diameter of the underground cavern that causes it (i.e. crown hole collapse).

Such a collapse could remove overburden from adjacent caverns and thus place them in jeopardy and thus increase the risk of gas migration from these adjacent caverns.

Canaxo/Halite claims that subsidence and crown hole collapse will not occur with caverns that are designed to modern specification. PWG questions how Canaxo/Halite can be so certain that none of its caverns will ever collapse either during construction or decommissioning.

There is a possibility of crown hole collapse during construction if the overburden is not strong enough at that particular point. Halite proposes to test the strength of the overburden at many of the caverns by directional drilling. Yet this will not test whether the mudstones vertically above can support any cavern of the size proposed. Moreover, they are asking for planning permission before they have done this testing!

Regarding the decommissioning of the caverns, Canaxo/Halite intends to fill them with brine and abandon them.

“Sonar surveys of the most recent ICI caverns demonstrate the caverns left with a salt roof have remained stable for decades after they were abandoned”.

The decades referred to is a very short period of time. ICI only ceased brine pumping in 1992, just 20 years ago, hardly sufficient time to judge how stable these caverns might be.

David Evans of the BGS in his report for Canaxo on the Wet Rock Head (Additional Environmental Information) when referring to these particular caverns, concedes

“there is evidence for increasing internal pressure, indicating that salt creep and closure is taking place”.

This salt is identified as a high creep salt which seriously affects the long term stability issue.

When gas storage caverns are abandoned, they will have to last forever without collapsing which is something which any programme of maintenance would not be able to guarantee.
event that Halite doesn’t make appropriate provision for the continuing aftercare of disused caverns, it will be Lancashire County Council who will have to pick up the bill.

Natural England (NE) and the Environment Agency (EA) have been alerted to the possibilities of crown hole subsidence in the medium and long term future but to our knowledge neither has produced any definitive statements on it.

It is possible that the salt marsh (SSSI), the sea wall and Preesall Sewage Treatment works could be within the zone of influence of a crown hole collapse. If United Utilities' Preesall Sewage Treatment works and its connecting pipelines were to be damaged by a crown hole collapse, the treatment works could be out of action for a period during which there may be a sustained discharge of untreated sewage into the River Wyre.

Canatxx claimed that

“once the pumping of brine ceases, the continued solution of the halite beds ceases and with it further development of the subsidence features”.

If this is the case then why is subsidence still occurring in the brine field – for example the ever increasing collapses north of Height o’ th’ Hill Farm (BW88 potentially linked to BW 87) and along Aggleby’s Road (BW 52- 53-57-84) into which the road has now disappeared.

According to the GSR the at risk caverns were “all developed relatively early”, i.e. between 1904 and 1917, with production ceasing between 1919 and 1936. Yet the time line (Appendix A GSR p89) shows that BW 87 and 88 were constructed between 1940 and 1955.

Halite asserts that Crown Hole Subsidence will never occur with modern caverns which possess a salt roof. This is at odds with the Assessor’s statement from the Public Inquiry.
Proposed Underground Gas Storage Facility at Preesall, Lancashire
Response to PWG April 2012 Evidence - DRAFT

Depths for top and base halite poorly constrained. Surfaces based upon regional dips established from the east and from north to south and interpretations of western ends of seismic lines.

Top and base halite tied to B6 and by synthetic seismogram from sonic log of Arm Hill. Depths +/- 5 m.

Top halite tied to Coat Walls Farm borehole and aided by synthetic seismogram from sonic log of Arm Hill. Top halite +/- 5 m, Base halite +/- 20 m.

Top halite +/- 20 m, Base halite +/- 40-50 m.

Top halite +/- 20 m, Base halite +/- 25-35 m.

Top halite and base halite constrained by ICI-130, -129 & -112. Depths +/- 5 m.

Top halite and base halite constrained by ICI-134. Depths +/- 5 m.

Top and base halite tied by synthetic seismogram from sonic log of The Heads. Depths +/- 5 m.

Between The Heads & E27 Top halite +/- 20 m, Base halite +/- 25 m.
Possible scenario for Earl Barony’s Sands Fault as derived from Dip Magnitude Maps (MM 2014, 2017)
Proposed Underground Gas Storage Facility at Preesall, Lancashire
Response to PWG April 2012 Evidence - DRAFT

Borehole data associated with East Barnby Lower Sand Fault

RWG Figure 3

0 500 metres
Proposed Underground Gas Storage Facility at Preesall, Lancashire
Response to PWG April 2012 Evidence - DRAFT
Proposed Underground Gas Storage Facility at Preesall, Lancashire
Response to PWG April 2012 Evidence - DRAFT
**PWG Figure 6**

Spacing between cavern centres

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Distance to faults

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Questions for Mott MacDonald
Meeting on 17th April 2012

8 Do the confidence intervals shown in Fig 1 (PWG response) refer to a confidence level of 66 or 95%?

9 Using the figures shown in the Baker Hughes Table, what are the confidence intervals and degrees of confidence for the top and bottom of the halite bed at the location of the proposed caverns 17 and 2?

10 Can you produce a diagram of the East Barnaby’s Sands Fault and explain the effect that it has on the halite bed?

11 Regarding the possible East-West fracture zone, who assured MMD that the transposition of faults north and south of Arm Hill was not uncommon and on what evidence? In what percentage of cases does transposition occur?

12 Why does the Baker Hughes Table use depths to the top of the salt for caverns 8, 10 and 11 which are greater than that shown in the MMD Model and the adjacent Coat Walls Farm Bore?

13 On p6 of the GSR a map shows the location of caverns for the third Canatxx scheme. Was this map included as part of the third application and why are the locations shown for 32 caverns and not 36?

14 How is average working gas volume referred to in GSR piiii S9 calculated?
THE INFRASTRUCTURE PLANNING (EXAMINATIONS PROCEDURE) RULES 2010

Preesall Underground Gas Storage Facility, Lancashire

HALITE RESPONSE TO EXAMINING AUTHORITY’S FIRST WRITTEN QUESTIONS

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INTRODUCTION

1.1 The Examining Inspectors ("PINS") set out a list of first written questions ("Questions") to Halite Energy Group Limited ("Halite") pursuant to Rule 8 of The Infrastructure Planning (Examinations Procedure) Rules 2010 at Annex D of their letter dated 2 May 2012 relating to Halite’s application for a development consent order to authorise the construction and operation of an underground gas storage facility and associated development, including a brine pipeline and gas interconnector pipeline, in Preesall, Lancashire.

1.2 This document sets out Halite’s response to PINS’s first written Questions.

1.3 PINS stipulated 6 June 2012 as the due date for Halite’s responses. This document was submitted to PINS within that deadline.

DEFINED TERMS AND CROSS-REFERENCES

2.1 For ease, this document uses the following defined terms:

"BGS" British Geological Survey
"CGSL" Canatxx Gas Storage Limited
"COMAH" Control of Major Accidents and Hazards
"DCO" Development Consent Order
"DCO Application" Halite’s application for a DCO (PINS reference EN030001)
"EA" Environment Agency
"ES" Environmental Statement
"GCC" Gas Compressor Compound
"GSR" Geology Summary Report (Document 9.2.2)
"Halite" Halite Energy Group Limited
"HSE" Health & Safety Executive
"LCC" Lancashire County Council
"LEMSP" Landscape and Ecological Management Strategy Plan
"NE" Natural England
"PESL" Preesall Energy Services Limited
"Project" underground gas storage scheme subject of the DCO Application
"SoCG" Statement of Common Ground
2.2 Documents submitted with the DCO Application are referred to by their name and document reference, for example "Gas Interconnector Pipeline report (Document 9.2.6)".

2.3 Appendices referred to in the Responses below are supplied with this document. A full list is provided at paragraph 4 below.

2.4 Statements of common ground are referred to by their topic and reference number in the file of statements of common ground submitted to PINS on the same date as this document, for example "a statement of common ground on geology (SoCG 1) and safety (SoCG 15)".

3 FIRST WRITTEN QUESTIONS AND RESPONSES

3.1 Section 1: Geology

The application

Question 1/1:

Figure 1.1 of the Geological Summary Report (GSR, Document 9.2.2) outlines a process model for reviewing the geology. Does this application represent a particular stage in the model, assuming the top stage is the detailed design for COMAH approvals?

Response to Question 1/1:

Figure 1.1 of the GSR is a process diagram used to assess the suitability of a saltfield for gas storage. It is based on a sequential assessment of data gathering and risk assessment. It does not formally sit within any guidance or legislation but rather is based on the experience of gas exploration and infrastructure geologists. Nonetheless the process logically suits the planning and Control of Major Accident Hazard Regulations (1999) ("COMAH") process as the initial 6 stages are concerned with the salt geology and the interaction of existing features that may impact on gas storage and would need to be considered to assess whether it was possible for gas caverns to be developed. These stages lead to a realistic assessment of the locations and sizes of the probable caverns and associated infrastructure so that realistic assessments can be made to support planning applications. Further design work would be required to develop the proposals for COMAH applications. The current status of the Project within the context of Figure 1.1 is that work has progressed into the final stage (scoping front-end design).

Question 1/2:

Please supply (preferably electronically) the following documents listed as references in chapter 8 of the GSR: 9 to 12 inclusive, 14, 17 to 20 inclusive and 35.

Response to Question 1/2:

The reports requested are provided on CD and contained at Appendices 1 - 10.
**Question 1/3:**

Please supply (preferably electronically) the British Geological Society ("BGS") report CR/10/007 which is referred to at paragraph 11.4 in the Gas Interconnector Pipeline report (Document 9.2.6).

**Response to Question 1/3:**

A number of British Geological Survey reports are referenced in the Responses which have been included, together with the specific reports requested by the Examining Authority, on the CD provided and in the Appendices to this document. BGS report CR/10/007 can be found at Appendix 11.

**Question 1/4:**

Please supply prints of the following plots in the GSR at 1:5000 scale: Figure 3.7a (drawing number ending 0013) and Figure 3.9 (drawing number ending 0019).

**Response to Question 1/4:**

Prints of drawings 0013 and 0019 are included on the CD provided and at Appendices 12 and 13.

*Additional work carried out*

**Question 1/5:**

What new seismic-reflection data, as distinct from the reassessment of data referred to in earlier applications, has been acquired for the present application?

**Response to Question 1/5:**

(a) New seismic reflection data was obtained in 2010 with respect to salt rockhead and the "dry" mine to investigate the south-western boundary of the mine. In addition the data already in existence was re-assessed with the borehole data obtained from the Hay Nook and Burrows Marsh boreholes as reported in the BGS reports CR/09/015, CR/09/049 and CR/10/128 (Appendices 3, 8 and 9).

(b) BGS report CR/09/035 (Appendix 14) provides an assessment of the quantity of data available for the Preesall saltfield and some other planned and operational gas storage projects within the northwest and other English regions. This report highlights that the data obtained at Preesall and the definition of the geology is similar or better than other gas storage schemes in the UK at a similar stage in the process.

(c) LCC and its technical advisors, Atkins, who have both considered the technical merits of previous applications, have agreed an SoCG on geology (SoCG 1) and safety (SoCG 15) which acknowledges that the geology is adequately defined for the definition of zones in which caverns can be located.
Question 1/6:

The GSR includes data from four boreholes: Arm Hill, The Heads (2003) and Hay Nook, Burrows Marsh (2008/9) which appears to precede the preparation of the current application. Please confirm that no new boreholes have been sunk for the purposes of this application and whether the data from these four boreholes is reinterpretation of previous data or from re-drilling of the boreholes.

Response to Question 1/6:

(a) Further to the 2005/6 Public Inquiry the Hay Nook and Burrows Marsh borehole reports CR/09/015, CR/09/049 and CR/10/128 (Appendices 3, 8 and 9) were completed by the BGS which provided downhole geophysics data, core fracture analysis and core photographs. In addition in 2011 calliper logging and in situ gas permeability testing was undertaken in the Hay Nook borehole at specific horizons to represent the overburden mudstone, the halite and mudstone interbeds within the halite. Three boreholes were drilled along Monks Lane to investigate the depth to rock head.

(b) No new deep boreholes have been drilled in addition to the available data. Use of borehole logs in the GSR represents refinement and continued use of the high quality data presented in the geophysical logs. The Response to Question 1/7 below is also relevant to this Question 1/6.

The geological model

Question 1/7:

The proposed caverns are in areas where there is limited borehole and seismic data. Please provide the evidence to demonstrate that there is sufficient data covering the areas proposed for the underground gas caverns.

Response to Question 1/7:

(a) The data sets available to assess the geology and risk from cavern construction and gas storage are considered to be sufficient to provide a reliable model on which to delineate areas in which caverns can be constructed and the likely risks associated with underground gas storage. The reliability of the geological model is discussed further in the Response to Question 1/8 below. The zones in which caverns are currently proposed have taken into account the hazards such as faults, old brine wells, exploratory holes, mine-wells and wet-rockhead, and are much reduced from previous applications. Previous applications have proposed a greater number of caverns spread over a much wider area and at the 2005/6 CGSL public inquiry questions were raised about the sufficiency of this data over that wider area. Figure 1.2 of the GSR (Document 9.2.2) provides a plan comparison of the current application against the previous application. The present DCO Application limits cavern creation to an area in respect of which there is sufficient data to demonstrate that the integrity of new caverns will not be undermined by old workings, faults, wet rockhead and so on.

(b) Further geological and other data will also be required by the HSE and EA, as competent authorities, under the Control of Major Accident Hazard safety regime. The developer of an underground gas storage facility requires both pre-construction and pre-operational approvals under the
COMAH regime. That regime is not duplicated by the Planning Act 2008 regime. DECC’s Overarching National Policy Statement for Energy (EN-1 paras 4.10.3 and 4.11.3) emphasises this point. Paragraph 4.11.3 of EN-1 states:

"Some energy infrastructure will be subject to the Control of Major Accident Hazards (COMAH) Regulations 1999. These Regulations aim to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any that do occur. COMAH regulations apply throughout the life cycle of the facility, i.e. from the design and build stage through to decommissioning. They are enforced by the Competent Authority comprising HSE and the EA acting jointly in England and Wales (and by the HSE and Scottish Environment Protection Agency acting jointly in Scotland). The same principles apply here as for those set out in the previous section on pollution control and other environmental permitting regimes. “[emphasis added]

(c) The preceding principles referred to are contained in paragraph 4.3.10:

"In considering an application for development consent, the IPC should focus on whether the development itself is an acceptable use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves. The IPC should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator. It should act to complement but not seek to duplicate them. “[emphasis added]

(d) The BGS report CR/09/035 (Appendix 14) provides a comparison of the data available at Preesall with other sites within the UK. This demonstrates that the Preesall data is comparable, if not better than, similar UK schemes at planning stage. BGS report CR/08/149 (Appendix 2), in Section 7.2, contains a summary of the data for the Preesall project as follows:

- 5 reprofiled seismic lines totalling 15.7km , reprocessed in October 2005
- 745 borehole logs, 120 of which defined the depth and thickness of the halite
- 2 fully cored BGS boreholes
- 2 Canatxx boreholes one fully cored (Arm Hill #1) being in the northern regions of the proposed storage area. Geophysical logs from these and 15 other boreholes within the brinefield.
- Borehole pressure and hydrofracture tests in the Arm Hill#1 borehole
- Geophysical and engineering properties from boreholes drilled in the region and offshore E Irish Sea

(e) Since that report there has been further:

- in situ gas permeability testing in the Hay Nook borehole
• 4 shallow borehole, three to prove rockhead
• Seismic survey over the dry mine and adjacent areas

(f) The BGS report CR/08/149 (Appendix 2) at Section 7.2 also states that the geological data at Preesall are significant, with much relevant detail known about the halite beds, their depth range, thickness, lateral continuity, engineering properties and insoluble content. The BGS reports CR/08/149 (Appendix 2) and CR/09/035 (Appendix 14) note that other sites in England which have been granted planning permission have relied at the planning stage on substantially less data than is available at Preesall.

(g) The following documents set out guidance on the sufficiency of geological data in the context of underground gas storage projects:
• BS EN 1918-3 Gas Supply Systems – Underground Gas Storage, Part 3 Functional recommendations for storage in solution-mined salt cavities;
• HSE/BGS report RR605 An appraisal of underground gas storage technologies for the development of risk assessment methodology 2008; and
• A report by Quintessa for HSE/BGS report RR606 Scoping calculations for release from potential UK underground gas storage facilities Watson et al 2008.

(h) The BS EN1918-3 standard, section 4.3 states that:

“A geological exploration shall be undertaken to obtain sufficient knowledge about the geological site and determine the geological feasibility of the underground storage project by means of geological and geophysical surveys and drilling operations.”

“The available geological and geophysical data should be gathered in a pre-feasibility study before deciding on the exploration of a saline site. The study should include information of a general nature as given by gravimetric or magnetic maps (especially in largely unexplored zones) and regional geological elements, existing seismic profiles and/or data from previous drilling in the saline series.”

“Additional geological or geophysical surveys may have to be carried out if the existing data are not sufficient. The geometry of the saline mass should be investigated by seismic survey, if seismic data are not available.”

“Exploration drilling shall be carried out to determine the quality of the salt and the distribution of the impurities.”

“A sufficient part of the saline strata shall be cored to provide knowledge of the salt structure and its detailed composition and to enable laboratory tests to be carried out to determine salt composition, mechanical strength and its solution characteristics.”

“Well logging shall be carried out to determine the salt composition of uncored parts of the relevant saline strata and to evaluate the quality of the overlying rocks. The data may also serve for future well-to-well correlations.”
"The exploration data shall be sufficient to decide about the technical feasibility of the site for the construction of salt cavities. A summary of the data should be included in a feasibility report about the exploration. This summary should also be used to define the most favourable zones for locating cavities, taking into account the depth and thickness of the saline layer, the distribution of insolubles and the proximity of possible tectonic zones."

(i) The HSE document RR605 "An appraisal of underground gas storage technologies and incidents, for the development of risk assessment methodology" was developed for risk assessment and land use planning, it includes non-specific guidance which are considered to be minimum levels of detail that an HSE Inspector would be looking for when viewing applications in terms of Land Use Planning. The following quotes from Section 12 of the report:

"Salt caverns require similar geological characterisation and adequate knowledge of the proposed site area.

- The thickness, depth and extent of the salt beds
- The thickness, depth and extent of the caprock sequence and its suitability
  - Lithological heterogeneity
  - Presence or absence of fractures
    - Open or infilled
    - What mineral – studies of fractures may show several stages of development and differing types of infilling material
  - Rock mechanical properties
- Superficial deposits are mapped
  - Nature of the deposits – presence of any potential 'collector zones' (higher porosity layers)
  - Their distribution across the proposed area
  - Their relationship to any development of wet rockhead
  - Their thickness or the depth to rockhead
- The sedimentary environment that will permit understanding of
  - The presence and nature/distribution/thickness of non salt interbeds
  - The presence and nature of more soluble evaporite beds
  - Lateral changes in sedimentary facies
- The geological structure, including the likely presence of faulting in overlying sequences and whether, for example, large faults define the margins of the saltfield."

(j) These excerpts show that there are no ‘base rules’ dictating the precise amount of information that can be regarded as sufficient at the planning stage. The competent authorities will need to be satisfied, however, that sufficient data has been obtained at the appropriate stage in the COMAH process. At Preesall, a wide range of data on the geology has been obtained by drilling, cores have been obtained, surface seismic geophysical exploration was available and additional specific surveys were undertaken, down hole geophysical logging has been undertaken, laboratory analysis of cores carried out, in situ gas permeability testing undertaken and a wealth of historical data on geology from brinewell bores, operational data and sonar surveys. The geological model prepared from this data has enabled the feasibility of the geology to be assessed and the identification of the
most favourable zones for locating caverns. As stated above, from BGS report CR/09/035 (Appendix 14) it may be concluded that the data available for Preesall compares favourably with that which has been presented for current permitted projects.

(k) The BGS prepared the initial model, which is presented in report CR/05/183N (Appendix 15). This model was refined by Dr E Rutherford, an internationally experienced gas and petroleum geologist. The refinement was based on more detailed analyses of the top and base salt surfaces. From the refined model plots of top and base salt, salt thickness, dip magnitude and dip direction of top and base salt surfaces have been prepared. The density of data available for this scheme is considered to be adequate for assessing the feasibility of cavern locations at this planning stage.

(l) The risks from the legacy of the historic brinewells have been comprehensively assessed and a programme for monitoring and maintenance prepared (see Document 9.2.1). This risk assessment and monitoring and maintenance programme has been presented to the Health & Safety Executive (HSE), which has stated that they are satisfied with the work undertaken.

(m) In conclusion it is considered that a substantial data set on geology has been prepared which is suitable at this planning stage in the overall consenting process. The data sets are substantial and are as good as, or better than, other permitted projects within the UK. Further refinement of the geological model will be undertaken during the COMAH consenting process, which is described briefly below.

Overview of the COMAH Process

(n) The Control of Major Accident Hazard (COMAH) Regulations 1999 (Statutory Instrument 1999/743) is the UK legislation implementing European Community Council Directive 96/82/EC, which is often referred to as the Seveso II directive. This legislation deals with the Control of Major Accident Hazards relating to the use of defined ‘Dangerous Substances’. Natural gas, when stored in large quantities, is considered as a dangerous substance under the regulations and therefore the proposed gas storage facility will come under the COMAH Regulations. The HSE produce a guide to the COMAH Regulations (Reference L111).

(o) A gas storage facility, such as that proposed at Preesall, would be classified as a top tier site under the COMAH Regulations and a Safety Report would need to be produced and assessed by the HSE prior to the construction of the facility (Pre-Construction Safety Report) and, furthermore, the report would need to be revised and extended with additional information prior to the introduction of natural gas into the facility (Pre-Operational Safety Report).

(p) The information required to be in the Safety Report is described in ‘Preparing Safety Reports: Control of Major Accident Hazards Regulations 1999’ HSG 190, available on the HSE website. How the Safety Report is assessed by the HSE is described in Safety Report Assessors Manual (SRAM), also on their website http://www.hse.gov.uk/comah/sram/index.htm. In general the HSE is not prescriptive on what information they require, putting the onus on the developer to demonstrate that they have designed and built a safe facility.
In the case of the Preesall Project it is expected that the Safety Report will be created in the following stages:

**Pre-Construction Safety Report**
- Framework Report including site information and surface infrastructure
- Specific section for the design of each proposed cavern including test borehole information for the specific location. These sections will be submitted individually for each cavern and assessed by the HSE prior to the commencement of solution mining.

**Pre-Operational Safety Report**
- Framework report including ‘as built’ information for the surface infrastructure
- Sections for each cavern, which will include riser and wellhead, giving complete details of cavern formation and ‘as built’ dimensions and the surrounding salt and overburden. Information on pressure testing of the caverns to demonstrate that they are leak-tight will also be provided.

As stated at paragraphs (b) and (c) above, the combination of paragraphs 4.3.10 and 4.11.3 of NPS EN-1 make clear that an Examining Authority should assume that the COMAH regime will be properly applied.

**Question 1/8:**
What data was used to enable the accuracy of the BGS (2005 and 2009) models to be increased from 1:10,000 scale with 100 m contours to 1:5,000 scale with 20 m contours in the Rutherford (2010) model?

**Response to Question 1/8:**
(a) No additional data has been obtained. The refinements in the geological model were based on additional analyses of the top and base salt surfaces and the latest plots are purely to aid visual assessment and no increase in accuracy is implied. A detailed explanation follows, which is relevant to both this Question and also to Questions 1/10, 1/11, 1/12 and 1/15.
(b) To more fully understand the relationship between contours and related grids, it is instructive to examine the derivation of permissible grid node spacing for the raw data.
(c) The 20 metre contour interval used to depict top and base salt structure and salt thicknesses was chosen to match the resolution of the grids from which the contours were derived. Figure 1 below illustrates the distribution of distances for each borehole in the Halite database to the nearest neighbour. A histogram of the nearest neighbour distribution (Figure 2 below) indicates the highest density of nearest neighbour distances to be on the order of 90 to 100 metres, with significant skew towards lower values. When creating grids from point data, grid cell size should reflect spacing relationships in the source data. A typically used grid node spacing relationship is that spacing should be on the order of 20% to 25% of minimum inter-point distances from the point data. On the basis of highest occurrence of minimum spacing, the resulting range of suggested grid node spacing for the borehole database at Preesall is in the
18 to 25 metre range (Figures 3a and 3b below). The final grid node spacing of 20 metres used in the Preesall geological model both falls within the recommended nearest neighbour range, reflects the tendency for values lower than the 90 to 100 metre spacing range to be more common in the data than values larger than the 90 to 100 metre class and makes maximum use of the data volume. Use of significantly larger node spacing would induce smoothing and would yield a grid that would not sufficiently match data point values. Use of significantly smaller spacing forces increased matching to data point values, but generally yields no further model improvement and simply results in improved aesthetics in presentation. It should be additionally noted that data points derived from available seismic lines in the project area were not included in this analysis. Inclusion of these data serves to further reinforce the 20 metre node spacing; however, it was decided to focus on the “hard” data points presented by the boreholes.

(d) The contour interval of 20 metres thus reflects the full and appropriate resolution of the underlying grid. Contours in a digital mapping sense are simply vector graphic element that connects points of equal numerical value and separates areas of higher values from areas of lower values. In the context of map presentation, contours by themselves are scale independent, so long as the underlying grid geometry is understood and is well represented in the presentation scale. For the Preesall geological model, the 20 metre grid node spacing plots at 4 mm per grid node at a scale of 1:5,000 and all nodes of the model are reasonably represented in plotter runs for the maps.
Figure 1

![Borehole to Nearest Neighbor Minimum Distance](image)

Figure 2

![Diagram](image)
Figure 3a

Figure 3b
Question 1/9:

Are the revised positions of the faults shown of the Rutherford (2010) model based on new data or on a reinterpretation of the six seismic-reflection profiles referred to in earlier reports?

Response to Question 1/9:

The Rutherford model is based on all of the historic data, the seismic reflection surveys and the exploratory boreholes and their associated core analysis and downhole geophysical logging. It represents both a refinement of the BGS model (as some data was available from the Hay Nook and Burrows Marsh boreholes), and also a more detailed assessment of dip magnitude and dip direction of both the top and base salt surfaces. The refined fault positions are considered to be a cautious refinement of the BGS model to reflect the additional analysis.

Question 1/10:

What is the data source for the identification of the faults shown in the drawing number ending 0001 in appendix B of the GSR, and what confidence is there that no fault penetrates the Preesall Halite in the proposed areas for cavern development?

Response to Question 1/10:

(a) Confidence that faults do not penetrate the Preesall halite within the zones delineated for cavern construction is considered robust because of the cautious interpretation of fault lengths as discussed below, and the agreement with other technical experts acting for LCC (see SoCG 1 on geology).

(b) The identification of faults is based on the refined geological model. The data source for the model is as described in the BGS reports CR/05/183N Section 6 (Appendix 15) and CR/08/149 Section 7.2 (Appendix 2). The BGS model was refined to give a more cautious interpretation of faults on the basis of common fault length: displacement ratios and from the further analyses undertaken of the top and base salt surfaces. The proposed areas for cavern construction were then decided by standoff-hazard zones from this more cautious interpretation. This is discussed further below.

(c) A conservative approach was taken in examining structure. In addition to faults observed directly from seismic and well data, dip magnitude and dip direction maps were used to attempt to note possible additional faults. In the dip magnitude map, elongate areas of significantly higher than background dip were noted as potential faults. Normal faults tend to have relatively predictable length – displacement relationships, where displacement tends to be approximately .01 to .02 times the tip-to-tip length of the fault. On that basis, a fault with 10 metres of displacement would have a strike length of 0.5 to 1 kilometres. Given the distribution of data, even in the most basinal part of the area, it would be difficult to fit a large displacement fault, of proper strike orientation, into the space available without encroaching on the domain of either well or seismic data. Thus, using the available data and analyses, Halite has concluded that any large, previously unmapped fault would perturb the top and/or base salt structural grids to the point where increased dip magnitude gradients would be noticeable.
To the south of the Preesall area, the Canabxx and Gas Council seismic lines image considerable faulting of the Triassic section, including the Preesall Halite. However, the most northerly seismic line (IELP-99-25) images far less in the nature of seismically resolvable faulting, indicating that the faulting recognised to the south does not affect the area to the north, as depicted in the geological model.

LCC and its technical advisors, Atkins, who have both considered the geological model for previous applications, have agreed a SoCG on geology (SoCG 1) and safety (SoCG 15) which acknowledges that the geology, including faulting, is adequately defined for this planning stage.

**Question 1/11:**

How have the top and bottom boundaries of the Preesall Halite shown in Figure 3.5 of the GSR been defined?

**Response to Question 1/11:**

(a) Figure 3.5 is taken directly from the BGS report CR/08/149 (Figure 3) (Appendix 2) and is also included in BGS report CR/09/036 (Figure 2) (Appendix 5). The latter report describes the use of geophysics, particularly gamma ray and density logs to differentiate between mudstone and halite. The top and bottom boundaries of the Preesall Halite were established using the gamma ray and density logs which are sufficiently sensitive to differentiate between the two lithologies as the density of halite is sufficiently different to that of mudstone. The geophysical log interpretations were confirmed by correlation of the logs with the core from the Arm Hill borehole (which cored the entire Preesall halite) and subsequent cores taken in the Burrows Marsh and Hay Nook boreholes. This is described more fully in a series of BGS reports including CR/09/048 (Appendix 7).

(b) The top of the Preesall halite is taken when the lithology becomes predominantly halite and the base is picked from the log above a series of mudstone layers that marks the point where halite dominance finishes.

**Question 1/12:**

What is the horizontal resolution with which faults can be recognised at the level of the top and the bottom of the Preesall Halite in each of the six seismic sections shown in drawing number ending 0001 in appendix B of the GSR?

**Response to Question 1/12:**

(a) The horizontal resolution of the seismic sections with respect to the faults depends largely upon the quality of the data acquired (including acquisition parameters), the stacking and migration of the data during processing and the magnitude of throw on any given fault. Seismic reflection data are of good quality, having been reprocessed during the generation for the 3D geological model in 2005. A significant improvement in quality of the data was obtained compared to the original 1997 processing (Evans et al., 2005), with the data containing high frequencies. As a consequence, the imaging of relatively thin beds is possible, with reflector offsets down to near tuning thicknesses of $\frac{1}{4}\lambda$ ($\lambda =$ wavelength) readily identified in the vertical sense (refer to responses to the Assessor at 2005 Public Inquiry). The seismic lines had station (geophone receiver group) intervals of 25 m
for the older Gas Council hydrocarbon exploration lines and in the more recent Canatxx and IELP data, 10 m intervals. All spacings are sufficient to permit accurate horizontal resolution in the seismic reflection data.

(b) All of these factors mean that the lateral determination of reflector terminations is well constrained and thus provides confidence in indentifying the location of the footwall and hanging wall cut-offs for various reflectors, down to at worst, 50 m laterally and generally within a few 10's of metres. In general, vertical and horizontal resolution decreases with depth, increasing velocity and lower frequency, but given the relatively shallow depths of the top and base Preesall halite, the differences in confidence for top and base halite is negligible.

**Question 1/13:**

With what vertical accuracy can the boundaries of the Preesall halite be resolved in each of the six seismic sections in the drawing referred to above?

**Response to Question 1/13:**

(a) The following range of accuracies was given in evidence by the BGS at the previous 2005/2006 Public Inquiry, and it remains relevant:

<table>
<thead>
<tr>
<th>Line</th>
<th>West end of line</th>
<th>East end of line</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1.1 IELP99-25</td>
<td>Possible error @ top halite (m)</td>
<td>Possible error @ base halite (m)</td>
</tr>
<tr>
<td>Can - G</td>
<td>10 - 15</td>
<td></td>
</tr>
<tr>
<td>Can - F</td>
<td>10 - 15</td>
<td></td>
</tr>
<tr>
<td>Gas DV371</td>
<td>10 15, tied to E27 BH</td>
<td>25 -35</td>
</tr>
</tbody>
</table>

(b) The accuracies can be seen in context to the typical salt thickness at proposed cavern locations, where the salt thickness ranges from a minimum of 123m up to a maximum of 390m, with an average thickness of 238m.

(c) This is an adequate accuracy for this stage in the process and will be refined, should approval for the Project be obtained, from the pilot bores at individual cavern locations. The refined data will be used to support the COMAH stage submissions.
Question 1/14:

The geological cross sections (drawing numbers ending 0003,0004 and 0005 in appendix B of the GSR) show variations in the thickness of the Preesall Halite beneath the Fylde Estuary: e.g. from c. 250 to c. 420 m in section 1-1. What is the evidence for these variations?

Response to Question 1/14:

The thickness variations shown in the sections were taken from the refined top and base salt contour plots. The variations of the depths of the mudstone interbeds has been taken from the relationship of salt thickness to interbed spacing described in the GSR Section 4.2 (Document 9.2.2).

Question 1/15:

Drawing number ending in 0014 in appendix B of the GSR shows dips of over 50º in the top of the Preesall Halite. Where and how were these dips identified?

Response to Question 1/15:

The dip magnitude and dip direction maps were derived directly from the top and base salt structure grids. For any single grid node within a volume of grid nodes representing a structural surface, the change in elevation to neighbouring nodes can be used to derive dip and dip direction.

Influence of earlier salt workings

Question 1/16:

In the drawing number ending 0001 in appendix B of the GSR there are the four "zones of recorded subsidence" in the northern area for cavern development. Are these modern collapse structures related to former salt workings such as caverns or wild-brine runs?

Response to Question 1/16:

This was an error in the labelling of features. The four areas with blue colouring within the northern area for cavern development are in fact small ponds, related to agricultural use, which have been shown as they form part of the background survey data and should be differentiated from the known subsidence areas. The symbol for these has been amended so that these ponds are differentiated from the subsidence zones and the revised drawing is included on the CD provided and at Appendix 16.
**Question 1/17:**

In the same drawing please provide:

i) an explanation of the red borehole/shaft prefixes HHF, HNB, BHR, RCP, CWFP, FBH, TP, E, B, BMB and MWS.

ii) an explanation for the blue areas of subsidence shown in the areas of proposed cavern development if they are not related to former salt workings.

iii) an additional version of this drawing also showing the polygonal areas, proposed cavern areas, well heads, Gas Compressor Compound (GCC), booster station and proposed road alignment, in order to illustrate existing and proposed works on a single drawing.

iv) an explanation about the current state of the brine wells with a marl roof; do they overlie partially collapsed caverns that are overlain by artificially induced wet rockhead?

**Response to Question 1/17:**

i) HHF = Hackensall Hall Farm
   
   HNB = Hay Nook Borehole
   
   BHR = Rotary percussive hole to prove rockhead
   
   RCP = Cable percussion borehole in drift
   
   CWFP = Cote Walls Farm
   
   FBH = Fugro Borehole
   
   TP = Trial Pit
   
   E = BGS prefix
   
   B = BGS prefix
   
   BMB = Burrows Marsh Borehole
   
   MWS = Mine well/shaft

ii) As noted in the Response to Q16 the blue areas are small ponds, locally referred to as marl pits, which are said to have been formed when the land was being prepared for agricultural use.

iii) This drawing has been prepared and is included on the CD provided and at Appendix 16.

iv) The impact of the legacy brinewells has been addressed specifically within the report “Legacy Brinewell Risk Assessment” (Document 9.2.1). The table below provides a list of the known caverns with marl roofs and the rate of migration based on sonar, hooking and dipping data. The caverns with marl roofs are understood to have been deliberately formed in this way by ICI before the
impact of such a strategy was apparent. The caverns were washed until all the salt had been removed. It is understood to have been an operational strategy rather than due to the presence of Wet Rockhead (WRH), natural or induced.

Brinewells with marl Roofs

<table>
<thead>
<tr>
<th>Brinewell No</th>
<th>Rate of migration (m/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>-0.1</td>
</tr>
<tr>
<td>32</td>
<td>-0.1</td>
</tr>
<tr>
<td>43</td>
<td>0.92</td>
</tr>
<tr>
<td>44</td>
<td>0.91</td>
</tr>
<tr>
<td>46</td>
<td>0.65</td>
</tr>
<tr>
<td>48</td>
<td>Collapsed</td>
</tr>
<tr>
<td>50</td>
<td>2.89</td>
</tr>
<tr>
<td>53</td>
<td>No rate available</td>
</tr>
<tr>
<td>59</td>
<td>No rate available</td>
</tr>
<tr>
<td>63</td>
<td>-0.6</td>
</tr>
<tr>
<td>64</td>
<td>2.82</td>
</tr>
<tr>
<td>65</td>
<td>0.33</td>
</tr>
<tr>
<td>69</td>
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<td>70</td>
<td>0.18</td>
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<tr>
<td>73</td>
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<td>76</td>
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<tr>
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<td>94</td>
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</tr>
<tr>
<td>97</td>
<td>0.91</td>
</tr>
<tr>
<td>98</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

Note 1 - indicates downward movement

Note 2 Based on hooking & dipping data

Question 1/18:

What evidence is there that the location of every previous brinewell and cavern is now known?

Response to Question 1/18:

There is an unusually comprehensive record of technical papers, historical accounts and ICI records from the first drilling for haematite in the region to the time of closure of the brinefield. In addition the BGS has unpublished data on brinewells including the records of Thompson back to the early 20th century. In the records there has never been a case where there has been a record of a brinewell or cavern which did not have a known location.
Question 1/19:

What reliance can be placed on the mapping of wet rock head, and the claims in the GSR that its extent is stable?

Response to Question 1/19:

(a) The extent of wet rockhead is based on the BGS memoire for Blackpool prepared by Wilson and Evans (1990). The original assessment was compiled whilst ICI was operating in the area when access was available to ICI personnel as well as to BGS unpublished archive material. The dangers with respect to subsidence/collapse were also understood at that time. Wet rockhead usually occurs at relatively shallow depth, particularly where there is little protective cover from caprock, giving circulating groundwater potential access to the salt. This is most likely to occur where the salt is shallow. Unlike other salt areas in the northwest there are no subsidence features attributed to wet rockhead nor are there any surface salt springs (wiches).

(b) The wet rock head extent was reviewed by the BGS in 2009 and the results were published in report CR/09/037 (Appendix 17). In the later review the wet rockhead included brinewells which recorded features which potentially could be interpreted as wet rockhead but had not been included in the original BGS assessment. Consequently it is believed the limit of wet rockhead identified by the BGS accords with the evidence and is the best estimate which can be made.

(c) The second part of the Question concerns the potential for the migration of wet rockhead. Wet rockhead extent is considered to be stable because of the Hydrogeological assessment. There is no evidence that wet rockhead is migrating or that there is a hydrogeological reason to support wet rockhead migration. Migration of wet rockhead would require a driving head, a continuously replenishment of fresh water a flow path and an exit for brine so that fresh water could continually be introduced to salt. There is no evidence that there is an exit for brine, that a flow path exists or that there is a driving head.

(d) The pond in collapsed Brinewell 88 is adjacent to the western margin of the mapped wet rockhead and it has one of the highest water elevations in the area being at an elevation of 8m OD. BW 88 was said by ICI to be connected to BW 87 therefore some development of anthropogenic wet rockhead can also be considered to have occurred. The water level in the pond remains virtually static; the interpretation must be that the precipitation to the pond must be balanced by the evaporation plus seepage into the ground. The water in the pond is still saline even though collapse occurred in 1994.

(e) The precipitation amounts to some 900mm per annum whereas the evaporation can be expected to be up to about 550 - 700mm. The locally high hydraulic head, the very low rate of seepage into the ground and the high salinity within the pond strongly indicate that there is only a very low flow into the soil, mudstone or salt strata, or into any anthropogenic or natural wet rockhead.

(f) Collapsed ponds provide the most likely opportunity for the development of wet rockhead because of the direct link from surface water to salt rockhead and the high potential head which exists. The evidence points to
extremely low flows from the collapsed brinewells into the soils, mudstone or salt strata and on this basis it is concluded that the migration of wet rockhead is not occurring.

**Question 1/20:**

The buffer zone shown in the drawing number ending 0002 in Appendix B of the GSR for existing brine workings is given as $4r$ where $r = 50$ m. In the case of the caverns, is this measured from the centre of the existing cavern or from the edge of that cavern, and is this to the edge of the proposed gas-storage cavern or to the centre of that cavern?

**Response to Question 1/20:**

The buffer zone on the drawing is shown as $3r$ from the edge of the existing cavern to the edge of the proposed cavern where a sonar survey has been undertaken which defines the cavern perimeter and $4r$ from the centre of an existing cavern where the size of the cavern is not known to the edge of a proposed cavern. The cautious assumption has been made that caverns are not greater than 100m diameter.

**Suitability of the salt body**

**Question 1/21:**

In total, how many samples of Preesall Halite have been chemically analysed and/or geomechanically tested?

**Response to Question 1/21:**

(a) A detailed breakdown of testing undertaken per strata type is provided within the footnotes of Table 4.5 of the GSR. In total the following tests have been undertaken:

- 23 Indirect Tensile Strength tests
- 6 Compressive Strength Tests
- 4 Creep tests
- 8 Constant Mean Stress Dilation Tests
- 6 Unconfined Compressive tests
- 9 insolubility tests
- 4 chemical analyses.
- Some historical information is also available in the salt memoir (Sherlock, 1921)

(b) The composition of the halite and mudstone can be further assessed from the geophysical logs. For comparison the BGS report CR/09/035 (Appendix 14) notes that some projects within the UK have been granted planning consent without the benefit of project specific testing.
Question 1/22:

Chapter 4 in the GSR refers to tests in two boreholes as “currently scheduled”. What are these tests?

Response to Question 1/22:

Samples were selected from core taken in the Hay Nook borehole and shipped to the US for testing. At the time of submitting the GSR the samples had not been tested. Unfortunately on arrival, the samples were found to be unsuitable for testing; consequently these additional tests were not carried out.

Question 1/23:

Given that there is at present limited borehole and seismic data available in the areas for cavern development, at what stage will site investigations be carried out at each of the proposed cavity locations to prove the thickness, purity and geotechnical properties of the Preesall Halite?

Response to Question 1/23:

(a) As in the Response to Question 1/7, it is not considered that the data for this Project is limited. The BGS report CR/08/149, Section 7.2 (Appendix 2) states that the geological data at Preesall are significant, with much relevant detail known about the halite beds, their depth range, thickness, lateral continuity, engineering properties and insoluble content. The BGS reports note that other sites in England which have been granted planning permission have relied at the planning stage on substantially less data than is available at Preesall at this stage in the process.

(b) The polygons in which cavern construction could take place have a lower density of data points than the historical salt cavern field; however, the density is still adequate for the definition of the geology for planning cavern locations. LCC and its technical advisors, Atkins, who have both considered the technical merits of previous CGSL planning applications, have agreed a SoCG on geology (SoCG 1) which acknowledges that the geology is adequately defined for the definition of zones in which caverns can be located.

(c) Should consent be granted, each cavern will have a pilot bore which will be cored in vertical sections in the salt. In addition, samples can be obtained using wireline technology. Formation evaluation will be as described in Section 3.6 of the Proposed Drilling and Completion Programmes for the Preesall Underground Gas Storage Project (Document 9.2.5), which will enable the identification and assessment of geology, insolubles, discontinuities and rock strength. The pilot bore would be undertaken prior to the drilling of the full well as drilling of holes within the halite needs to be restricted to reduce the risks to completed caverns connecting to existing boreholes. In this way the geological model will be continually refined as the further data becomes available. The data will be applied as part of the information used to support detailed applications to the competent authority during the COMAH process.
**Question 1/24:**

How reliable is the salt quality, in view of the mudstone interbed composition with a frequency of 6 to 8% from the Arms Hill borehole and analysis of the downhole data and gamma ray logs suggesting 4 to 12% (paragraph 4.1.1 in the GSR)?

**Response to Question 1/24:**

(a) The salt quality data is considered to be reliable because of the data available from the downhole gamma ray and density logs, FML logs and the insolubility tests. It must also be borne in mind that a lot of information is known about the Halite from other studies in stratigraphically equivalent salt in the northwest. The salt quality should be similar in Preesall to other areas where projects have already been permitted.

(b) The range of 4 - 12% is across the whole area under consideration. The values obtained from the Arm Hill borehole of 6 – 8% fall within this range. The salt quality has also been assessed based on the gamma ray log which is sensitive to the relative mudstone and halite contents see BGS report CR/09/048 (Appendix 7), particularly in Section 3. This technique has also been used in other areas; BGS Report CR/05/230N, ‘Contribution to Nirex review of a Deep Brine Repository’ (Section 3.1) (Appendix 18) used the techniques to define zones of the offshore halite and mudstones within the Mercia Mudstone Group, into three categories:

- Clean Halite - gamma values in the range ~7 to 15 API units
- Argillaceous halite - ~15 to 35 API units
- Halitic mudstone - >35 API units

(c) The majority of the Preesall halite has API units of ~15 or less, although between the mudstone interbeds the gamma values can increase to 20 API units. The higher API unit values (15-20) are associated with the “Haselgebirge” facies in which halite crystals are set in a matrix of mudstone. BGS report CR/09/036 (Appendix 5), Section 2.3, also provides a description of the salt quality at Preesall and compares it to stratigraphically equivalent halite in England in which caverns have been formed for gas storage. The comparison shows that the Cheshire salt bodies have similar insoluble contents to Preesall of 6-11% (see for example Section 2.3.3 of the BGS report CR/09/036 (Appendix 5)).

**Question 1/25:**

With what accuracy of thickness can the mudstone interbeds be identified in the gamma-ray logs?

**Response to Question 1/25:**

Density, neutron, gamma ray, and acoustic velocity logs in oil and gas wells are recorded at speeds of 30 to 60 feet per minute and at a scale of 1 inch equals 20 feet. The accuracy is also affected by the length of the logging tool. Such logs generally permit the measurement of the thickness of mudstone beds within an error of +/-12 -15 inches.
Question 1/26:

In GSR Figure 4.1 halites with up to 25% insolubles are referred to as “clean”. What is the maximum level of impurity before the halite is unable to support reliable cavern construction?

Response to Question 1/26:

(a) There is no maximum level of impurity. Every engineering design for a gas cavern must take into consideration the geological conditions and the reason for the inclusion of impurities in the rock salt. If no information is available from analogous projects, it is necessary to carry out laboratory tests to determine the permeability, the deformation and strength properties, the thermal parameters of the rock salt, and the primary stress state.

(b) It is considered, from information published by the BGS Report CR/05/230N ‘Contribution to Nirex review of a Deep Brine Repository Concept’ (Appendix 18), that halite with insolubles content of up to 25% can be considered to be halite dominated, in other words in practical terms considered to be “clean” halite. BGS report CR/09/036 (Appendix 5) at Section 2.4 also refers to published data by Berest & Brouard in which an operational cavern has been constructed within Haselgebirge salt. The cavern has been operational since the early 1970s and the majority of the cavern volume was created within haselgebirge salt, containing a minimum of 22% insolubles.

Question 1/27:

How valid is the assumption that the interbeds are not permeable to gas because of the presence of halite crystals?

Response to Question 1/27:

(a) The assumption is considered valid because the mudstones are of very low porosity and permeability as a result of their fine grain size and compaction on burial, which further reduces porosity and permeability. The mudstones were deposited in a saline, brine-rich environment which will mean that during burial and diagenesis, halite will have crystallised out from the brine/fluids present in the minute pore spaces, reducing still further the already low permeability and porosity of the mudstones. It should be remembered that the mudstones and halites of the Mercia Mudstone Group (including the successions present at Preesall) are sufficiently impermeable to form the caprock sequence to oil and gas fields offshore in the East Irish Sea (e.g. Ebbrell, 1981; Seedhouse & Racey, 1997; Yaliz, & Taylor, 2003a&b; Yaliz & Chapman, 2003; Yaliz & McKim, 2003). Evidence from cores has shown that halite has formed within joints, which reduces the fracture flow potential.

(b) Direct gas permeability testing was also undertaken in situ by Mesy gmbh in 2004 in the Arm Hill borehole and in 2011 by Golder Associates in the Hay Nook borehole in salt, cap mudstone and mudstone interbeds. The results showed very low permeabilities.

(c) Of particular interest is the permeability of the salt interbeds. An opportunity was taken to test a length within the Hay Nook borehole which had been cored and which encompassed fractures identified by the BGS as
of unknown origin, incipient and faults, (core logging and definitions of the fractures are given in BGS report CR/10/128 (Appendix 9) at Section 3.5). The length of the test section was between 420m depth and 435m depth and included the length cored between 423m and 429m depths. The results of the test confirmed that the interbeds, including a section with suspected faulting, had an extremely low permeability. The test procedure and depths were agreed with Prof Rokahr, who also assessed the results. On the basis of the results Prof Rokahr provided a written statement (Appendix D of the GSR (Document 9.2.2) that included the following:

"On the strength of my 30 years experience in salt mechanics and salt cavern construction, I can therefore confirm that stable, gas-tight caverns can be constructed in the Preesall salt formation for the storage of natural gas."

(d) LCC and its technical advisors, Atkins, who have both considered the technical merits of previous applications, have agreed a SoCG on geology (SoCG 1) which acknowledges that the geology is adequately defined and that the strata have a sufficiently low permeability to accommodate caverns for gas storage.

Question 1/28:

Has the fracturing in the overlying mudstones, the mudstone interbeds and the Preesall halite been recorded in any of the boreholes?

Response to Question 1/28:

(a) A detailed analysis of core fractures was undertaken by the BGS of the core from the Hay Nook and Burrows Marsh boreholes and is reported in BGS Report CR/10/128 (Appendix 9). Full fracture logs are provided within Appendix 3 to the BGS report and fracture property histograms are presented within the main report text. The report in Section 3.5 identifies the origin of recorded fractures as induced by drilling, incipient fractures, faults or of unknown origin. The great majority of fractures were either drilling induced or incipient with only a small number of unknown origin. In reality the drilling process, stress relief and the dynamic response to extrusion, handling and transportation is responsible for most fractures in core. Fractures of unknown origin have been found in the Hay Nook Borehole in the core of the Preesall halite between 423-429m. One of the Golder in situ gas permeability tests was selected to have a test length from 420 to 435m which cover the core length containing fractures of various origins and a fault. The gas permeability tests showed that the strata within the tested length were practically impermeable which indicates that the fractures observed in the core are either not present in-situ or are so tight that gas flow is not possible.

(b) BGS has, in various reports, described core material from the Arm Hill, Hay Nook and Burrows Marsh boreholes that shows fractures infilled with halite in both the interbedded mudstones and overburden succession. FMI logging has also shown the fracture and infill in the interbedded mudstones (Evans et al., in press). Infilled fractures in the overburden have also been described by Wilson & Evans (1990).
**Question 1/29:**

What is the mechanism for sealing the edges of interbeds on cavern formation, given that there are at least 5 identified in the Hay Nook borehole?

**Response to Question 1/29:**

The edges are not sealed and rely on the very low permeability of the rocks as proved by in situ testing.

**Question 1/30:**

Given the presence of fractures in the Preesall halite bed of between 0.5m to 1m, how long does it take for halite to “heal” itself?

**Response to Question 1/30:**

(a) The fractures referred to in this Question are all annealed or healed with secondary halite crystallisation, (i.e. they are not open fractures, but represent former voids subsequently closed by halite crystallisation).

(b) Some of the former fractures/voids may be syndepositional but some clearly post date sedimentation and are ‘geologically old’ fractures. To give an indication of the timescales, BGS Report CR/09/028 (Appendix 4) at Section 4 details the most recent phase of movement to be circa 65 million years ago.

(c) The rate at which halite heals will be a function of temperature, pressure and chemistry. Fractures of this size within saturated brine, however, may be anticipated to heal within a period of the order of a few months to a few years.

**Question 1/31:**

How reliable is the data for permeability of the salt, and what are the minimum limits? The results are not compared with standards or norms so are the levels of permeability at Preesall exceptionally good, merely average, or on the boundaries of acceptability?

**Response to Question 1/31:**

(a) The permeability was measured in situ by Mesy gmbh and Golder Associates using well established industry standard techniques. The permeability values are so low that the rock salt layer can be considered suitable from a geomechanical point of view for the construction of gas caverns.

(b) The following extract is taken from a statement by Berest & Brouard in 2009, Section 2.1.1 in the document ‘Summary Statement of Preesall Gas Storage Project’ provided on the CD provided and at Appendix 19, which provides a summary of salt permeability:

"Most authors consider that, from an engineer’s point of view, salt practically is impermeable. Hydrogeology textbooks define an impermeable rock as a rock whose permeability is smaller than $K =10^{-17} \text{m}^2$. Based on his experience, Prof. Rokahr suggests that salt permeability is smaller than $K =10^{-20} \text{m}^2$. Bérest and Brouard reviewed tightness tests"
performed in a dozen 1400m deep wells of the Etrez and Tersanne natural gas storage sites in France. Average permeabilities were between $K = 1.3 \times 10^{-20}$ m$^2$ (Etrez) and $K = 1.9 \times 10^{-21}$ m$^2$ (Tersanne). Higher values sometimes can be found at shallow depth. For instance, Doe and Osnes found $K = 1.3 \times 10^{-19}$ m$^2$ in two 250m deep wells of the Hutchinson salt formation in Kansas."

(c) This indicates that the intrinsic permeability of the salt in Preesall is well within the range which is generally considered for rocks to be impermeable, and also within the range of $10^{-19}$ m$^2$ quoted by Berest & Brouard for shallow salt in which underground gas storage caverns had been created. Once again it is worth noting the conclusion of Prof Rokahr (provided in Appendix D of the GSR), an international expert in gas storage in caverns, has reviewed the gas permeability test results and made the following:

"... the laboratory tests conducted to date on rock from the Preesall salt formation, and the additional tests in two boreholes, show without any doubt that the salt rock is adequately strong, and that the Preesall salt formation can be classified as gas tight.

On the strength of my 30 years experience in salt mechanics and salt cavern construction, I can therefore confirm that stable, gas-tight caverns can be constructed in the Preesall salt formation for the storage of natural gas."

(d) LCC and its technical advisors, Atkins, who have both considered the technical merits of previous applications, have agreed a SoCG on geology (SoCG 1) which acknowledges that the geology is adequately defined including the assessment of permeability from the in situ testing.

**Question 1/32:**

Are there industry wide standards for sub surface and surface risks arising from underground gas storage?

**Response to Question 1/32:**

(a) There are no international industry-wide standards. Every gas cavern project is unique and individual designs are required; however, in the UK context the HSE report series RR605, RR606 and RR671 established a database of incidents, potential leakage scenarios and gas flux rates to develop a risk assessment methodology and process to determine failure rates for underground gas storage and the significance for land use planning assessments.

(b) In addition, there is the British and European standard BS EN 1918-3:1998 ("functional recommendations for storage in solution mined salt cavities"), which is one in a series of Standards for underground gas storage and surface facilities.

(c) The risk of gas migration was considered within the Risk Assessment Report (Document 9.3.1), which concluded that the risks of gas escape from a cavern or associated pipework leading to human fatality were <1 in 100 million.
If development consent were granted for the Project the precise design would be assessed and reviewed by the competent authority during the COMAH process (see Response to Question 1/7 for further information).

**Question 1/33:**

Are there any other industry-wide standards for cavern design in addition to the “Rokahr Rules” and are these other standards more or less conservative?

**Response to Question 1/33:**

(a) There are no industry wide standards for cavern design.

(b) The term “Rokahr Rules” is not a technical term and has no international status. Specific recommendations were elaborated by Prof Rokahr for the Halite project for the initial design of a cavern field for planning purposes. These recommendations were based on his geomechanical knowledge and experience from other projects, and can be rated as conservative overall. The designs will be developed by more detailed analysis as part of the assessment by the competent authority during the COMAH process.

**Possible seismic risk**

**Question 1/34:**

Was the possible effects of the shale gas exploration in 2011 in the Fylde area considered as part of the Seismic Desk Study (Document 9.2.7) and where is the evidence for the statement in paragraph 2.5.1.1 that “such small magnitude earthquake near Blackpool poses very little hazard to the gas storage project”?

**Response to Question 1/34:**

(a) The shale gas earthquakes were considered in the preparation of the Seismic Desk Study (Document 9.2.7 at Section 2.5.1). The statement that the small earthquakes pose very little hazard is justified in the Seismic Desk Study which has shown that Preesall is located in an area of low seismic activity, even by UK standards, with earthquake magnitudes of up to 4.8M, for earthquake originating less than 4km from the surface. The earthquakes said to be due to “fracking” were up to magnitude 1.5, hence are well within the range common within the UK. The induced seismicity from “fracking” or even collapse of legacy caverns are not anticipated to have any impact on the proposed caverns.

(b) The BS EN 1918 – 3 and the HSE document RR605 do not require the risk from earthquakes to be assessed in cavern design. It is understood that this has been the case for other gas storage schemes within the UK.

**Question 1/35:**

What consequences are there for cavern creation proposed by this application from the possible future programme of shale gas exploration in the Fylde area?

**Response to Question 1/35:**

The view of the seismic experts as reported in the Seismic Desk Study (Document 9.2.7) is that the shale gas fracking events are within the normal intensity anticipated within the UK and will therefore not have any consequences for the
Project. The Seismic Desk Study was reviewed by Prof Bommer, Professor of Earthquake Risk Assessment at Imperial College.

**Question 1/36:**

What are the risks of the formation of each new cavern impacting on the integrity of an operational cavern on the site?

**Response to Question 1/36:**

(a) The design recommendations set out by Professor Rokahr have been accepted worldwide as conservative design rules to be applied prior to the detailed design stage. The recommendations account for geomechanical modelling of cavern fields, including the phasing of construction and operation, and account for geomechanical influencing factors such as stress and temperature change. Specifically in relation to Preesall, insitu pressure and permeability testing has been undertaken to validate rock mechanics testing and numerical design analysis, and detailed geomechanical design modelling has been undertaken to assess the influence area of an operational cavern. All this work concludes that compliance with the design recommendations will lead to no risk of any impact on the integrity of already operational caverns on the site.

(b) In respect of this point, Professor Rokahr commented in May 2012 as follows: "As long as the geomechanical designs for each cavern are adhered to, there is no risk of any impact on the integrity of already operational caverns on the site".

**Surface connections**

**Question 1/37:**

How will the caverns, wells connecting the caverns to the surface and connecting pipelines remain gas tight, considering mudstone interbeds, faults and possible seismic activity?

**Response to Question 1/37:**

The wells will be designed using the latest best practice from the oil and gas industry. The wells will comprise two or more concentric casings with surround cement grout. The casing specified is relatively ductile such as to avoid brittle shear. The design of the grout mixes will be based on the rock/soil chemistry and required strengths etc. The bending stresses within the well casings will be analysed using oil industry standard three dimensional stress software, and safety case design will be undertaken for each well prior to completion of commissioning, with the integrity of the various elements tested in situ in accordance with oil/gas industry practice. Details of the proposed cementation and formation evaluation are provided within Sections 3.5 and 3.6 of the Proposed Drilling and Completion Programmes for the Preesall UGS Project (Document 9.2.5).
Question 1/38:

What are the implications of salt permeability and ground settlement for the Preesall and Fleetwood waste water treatment works?

Response to Question 1/38:

(a) The implications of salt permeability and ground settlement are understood to refer to potential gas migration and subsidence due to cavern closure. These are discussed separately below.

(b) The implications of salt permeability have been addressed in the Response to Question 31. The in situ gas permeability tests in a range of strata have indicated a very low permeability which led to the statement by Prof Rokahr which is included in Appendix D of the GSR and provided in the Response to 1/31 above.

(c) The Risk Assessment (Document 9.3.1) assessed this risk scenario and concluded that the risk was extremely low.

(d) LCC and its technical advisors, Atkins, who have both considered the technical merits of previous applications, have agreed a SoCG on geology (SoCG 1) and safety (SoCG 15) which acknowledges that the salt permeability is adequately low and the risk has been adequately addressed for planning purposes. The risks will be further substantiated to the competent authority, should the Project be consented, as a part of the COMAH process.

(e) The Fleetwood and Preesall waste water treatment works ("WWTWs") lie directly over glacial tills which are low permeability soils. Underlying the soils are mudstones which are also low permeability strata. BGS report CR/09/037 (Appendix 17), summarised in Section 5 and Fig 5.8 of the GSR has identified that the lower levels of the mudstone within the proposed area of development are impregnated with halite, hence the Preesall salt body within this area is not subject to current natural groundwater dissolution. Given this presence of a considerable thickness of low permeability strata, combined with the view of international experts that salt is practically impermeable it is therefore considered that there is no implication with respect to salt permeability.

(f) The second part of the Question refers to ground settlement. This will primarily be caused by closure of the caverns leading to subsidence.

(g) Subsidence was assessed using industry recognised salt SUBSID software with closure rates used in previous applications, which have been deduced from testing and finite element numerical analysis. Existing subsurface voiding due to the existing brinefield and Preesall mine, have also been modelled adopting the same closure rate; modelled surface settlements are typically less than surface settlement monitoring, hence the modelled creep closure rates are therefore considered to represent a conservative condition. The anticipated conservative subsidence contours have been presented within the GSR Figure 5.15, which indicates that the Fleetwood WWTW will not be affected by subsidence. The Preesall WWTW will potentially experience total subsidence of the order of 30mm during the operational lifespan of the scheme.
Figure 5.15 of the GSR showed subsidence contours. This plot has been expanded on Drawing ending 0028 (Appendix 20), to include both the locations of the Fleetwood and Preesall WWTWs.
Section 2: Assessment of significant effects on Morecambe Bay SPA and Ramsar site, and impact on the SSSIs

Question 2/1:

Please provide the linkage information in tabular format, showing how the potential effects of the project on biodiversity and habitat losses, identified in the ES (Documents 5.1 to 5.4) and Habitat Regulations Assessment reports (Documents 3.2 and 3.3), are mitigated by the proposals in the LEMSP.

Response to Question 2/1:

Please refer to the table provided at Appendix 21.

Question 2/2:

Please provide a timeline for the LEMSP, showing start and finish date with regard to the pre-construction, construction, construction and operation and operation phases.

Response to Question 2/2:

The LEMSP will be implemented over a phased programme during the Project’s construction phase (Years 1 to 3, 2013 to 2015). It will be managed for the lifetime of the Project (40 years, 2013 to 2053) which, in addition to the construction phase, comprises the construction and operation combined phase (Years 4 to 8, 2016 to 2019) and the operational phase (Years 8 to 40, 2020 to 2053). Please refer to the timeline in Appendix 22.

Question 2/3:

Please identify (with reference to the field numbers shown on the LEMSP at Figure 14.10 of the ES volume 2B (Document 5.4)) where the 16 ha of land is located which is to be provided at a distance of more than 500m from project related activities, as an alternative habitat for pink footed geese throughout the construction, and construction and operation periods?

Response to Question 2/3:

(a) Since submission of the DCO Application further work has taken place in order to refine certain details relating to the LEMSP. This has involved discussions with tenant farmers, the Environment Agency, Natural England, Lancashire County Council, Wyre Borough Council, Lancashire Wildlife Trust and the Royal Society for the Protection of Birds.

(b) As a result, a revised LEMSP plan (Figure 14.10 v2) has been prepared and is provided at Appendix 25. The LEMSP plan now identifies proposed areas to be managed to benefit pink-footed geese (see fields identified as PFG-1 through to PFG-11 on Plan A of Figure 14.10 v2 in Appendix 25) during the construction phase (Years 1-3) and the construction and operation combined phase (Years 4-8) (refer to the timeline in Appendix 22). The original LEMSP plan was supported by a document provided in Appendix 14.11 of the ES (Document 5.2, Binder 3). This document has also been revised to reflect the changes to the LEMSP plan (see Appendix 24), to clarify the delivery mechanisms of the LEMSP and to clarify the mitigation/enhancement measures relating to pink-footed geese. This
document contains tracked changes to illustrate the changes that have been made to the version that accompanied the DCO Application. In addition, the revised version is provided in Appendix 23 without tracked changes.

(c) A total of approximately 33ha of land (which has been increased from the 16ha originally identified in the DCO Application) is proposed to be managed to benefit pink-footed geese. Of this 33ha, approximately 16ha of stubble and plant material will be retained over winter and not be ploughed in directly after harvest. Approximately 17ha of farmland will comprise a mixture of pasture, winter stubbles (with spilt grain and spoilt potatoes) and winter sown crops.

(d) Although the majority of this land is within 500m of Project related activities, it is considered to provide mitigation for the potential impact on pink-footed geese since not all elements of the Project will simultaneously create disturbance to pink-footed geese. It is therefore considered that a large proportion of this habitat will be sufficient distance from and/or screened from the Project so that it will remain suitable for use by foraging pink-footed geese for most of the construction phase and the construction and operation combined phase. With reference to Plan A of Figure 14.10 v2 (Appendix 25), the land areas proposed to be managed to benefit pink-footed geese comprise the following:

- PFG-1, located outside of the Project’s application boundary to the north of the Project, immediately north of PFG-2.
- PFG-2, located outside of the application boundary to the north of the Project, immediately east of PFG-3.
- PFG-3, located within the application boundary within field number 8-A, to the south of Cote Walls Farm.
- PFG-4, located within the application boundary within field number 12-A, to the south of the Gas Compressor Compound (GCC).
- PFG-5, located within the application boundary within field number 13-A, to the southwest of the GCC.
- PFG-6, located within the application boundary within field number 14-A, to the southwest of the GCC.
- PFG-7, located within the application boundary within field number 15-A, to the southwest of the GCC.
- PFG-8, located outside of the application boundary to the south of the Project, immediately south of PFG-6.
- PFG-9, located outside of the application boundary to the south of the Project, immediately south of PFG-8.
- PFG-10, located outside of the application boundary to the south of the Project, immediately south of PFG-7.
- PFG-11, located outside of the application boundary to the south of the Project, within field number 24-A, at The Heads.
(e) The revised LEMSP plan and the supporting document have been the subject of SoCGs. These SoCGs (on the topic of the LEMSP) have been agreed between Halite and the Environment Agency, Natural England, Lancashire County Council, Wyre Borough Council, Lancashire Wildlife Trust and the Royal Society for the Protection of Birds (see SoCGs 4, 5, 35, 36, 37 and 38).

**Question 2/4:**

As the LEMSP is anticipated to be implemented over a phased programme (paragraph 1.1.4 of the ES volume 1B Appendix 14.11, (Document 5.2)) please explain how this would affect the management and availability of the identified 16 ha of replacement functionally-linked land over the construction and construction and operation periods.

**Response to Question 2/4:**

(a) As described in the Responses to Questions 2 and 3, the 16ha of land referred to in Appendix 14.11 of Volume 1B of the ES (Document 5.2) has since been increased to approximately 33ha (see Plan A of Figure 14.10v2 in Appendix 25 for locations). Of this 33ha, approximately 16ha of stubble and plant material will be retained over winter and not be ploughed in directly after harvest. Approximately 17ha of farmland will comprise a mixture of pasture, winter stubbles (with spilt grain and spoilt potatoes) and winter sown crops.

(b) The approximate 33ha of land would be managed to benefit pink-footed geese for the duration of the construction phase (Years 1 to 3) and the construction and operation combined phase (Years 4 to 8). Although none of the approximate 33ha would be directly affected by the footprint of the Project during the construction phase or the construction and operation combined phase, the amount is proposed to compensate for the fact that some of this land would be disturbed during this 8 year period.

**Question 2/5:**

How will the applicant ensure that any alternative habitat provided to support over wintering pink footed geese which is outside the DCO boundary is managed in accordance with the LEMSP?

**Response to Question 2/5:**

Of the approximate 33ha of land proposed to be managed to benefit pink-footed geese as part of the LEMSP, approximately 20ha lies outside the Application Boundary. This land, which is owned by Halite and let to two tenant farmers, comprises (with reference to the LEMSP Plan A of Figure 14.10v2 in Appendix 25) Fields PFG-1, PFG-2, PFG-8, PFG-9, PFG-10 and PFG-11, and will be subject to covenants requiring the land to be managed by the tenants in accordance with the LEMSP. The tenancy agreement would also include “step-in” rights allowing Halite to undertake the LEMSP ecological mitigation works if the tenant fails to perform (although there is nothing to suggest that such non-performance is likely to arise). The terms of the tenancy agreement are agreed in principle and expected to be signed shortly. A copy letter from the tenant’s agent confirming this is contained at Appendix 26.
Question 2/6:
In view of Natural England’s current position about the adequacy of information submitted for the purpose of the Habitats Regulations, what evidence is there to conclude that there are no residual significant effects on the Morecambe Bay SPA and Ramsar site, taking into account the mitigation to be provided by the LEMS?

Response to Question 2/6:
(a) Natural England’s “relevant representation” to the Examining Authority (dated 10 February 2012 Authority) identified terrestrial, marine and bird disturbance issues for consideration. The current position in relation to each of these issues is that Natural England considers that all issues raised in their “relevant representation” have now been addressed to their satisfaction.

(b) Following the submission of the ‘Information to Support a Habitats Regulations Assessment – Morecambe Bay SPA and Ramsar’ (Document 3.3), a number of matters were raised by Natural England. A document containing responses to these matters was subsequently provided to Natural England. Natural England has reviewed this document and considers that the information submitted for the purpose of the Habitats Regulations Assessment is adequate and agrees with the Habitats Regulations Assessment conclusions of there being no significant effect. The finalised document is presented in Appendix A of the SoCG between Halite and Natural England on the topic of Ecology and Habitats Regulations Assessment (SoCG 2).

Question 2/7:
Does Natural England agree with the applicant’s conclusion of no likely significant effects on the Morecambe Bay SAC as set out in the Habitats Regulations Assessment (Document 3.2)?

Response to Question 2/7:
(a) Although this Question is directed towards Natural England Halite has taken this opportunity to provide a response.

(b) A SoCG has been agreed between Halite and Natural England on the topic of Ecology and the Habitats Regulations Assessment (SoCG 2). Section 3 of the SoCG deals with the Information to Support a Habitats Regulations Assessment – Morecambe Bay SAC, Liverpool Bay SPA, Shell Flat and Lune Deep cSAC (Document 3.2). Section 3.1.21 of the SoCG confirms ”the conclusion of no likely significant effects is agreed.”

Question 2/8:
Would Natural England please confirm whether any proposed operation (whether or not taking place on land included in the Wyre Estuary, Lune Estuary or Winmarleigh Moss SSSIs) is likely to damage any of the flora, fauna or geological or physiographical features by reason of which the SSSIs are of special interest.

Response to Question 2/8:
(a) Although this Question is directed towards Natural England Halite has taken this opportunity to provide a response.
(b) The Wyre Estuary SSSI lies within and adjacent to the application boundary at its nearest point within the saltmarsh and mudflat habitats. This SSSI underpins Morecambe Bay SPA. The Wyre Estuary, lying just south of Lune Estuary is an integral part of Morecambe Bay, one of the two largest areas of intertidal estuarine flats in Britain. It supports the largest area of ungrazed saltmarsh in North West England.

(c) The most extensive areas of saltmarsh within the SSSI are found on the east side of the estuary between Barnaby Sands and Staynall, on the west side north of Stanah and on the north side upstream of Shard Bridge. The former is adjacent to the Project.

(d) The Wyre is nationally important in its own right for wintering and passage wading birds, particularly black-tailed godwit, wintering turnstone and for wintering teal in times of hard weather. Large numbers of lapwing and golden plover use the estuary for roosting at low tide. In close proximity to the Project is the major high tide roost Arm Hill, with smaller ones at Stanah, Burrows Marsh, Barnaby Sands and Knott End Skears. On spring tides birds are displaced from the smaller roosts to Arm Hill which, on occasions, can hold over 1,000 birds.

(e) Lune Estuary SSSI lies approximately 1 km north of the application boundary at its nearest point. It forms part of the Morecambe Bay intertidal system and underpins Morecambe Bay SAC and SPA. Lune Estuary SSSI includes extensive sand/silt flats together with saltmarsh in the form of a number of discontinuous saltings fringing the estuary. The site is designated for the passage and wintering waterfowl it supports, and is used by birds on migration between the breeding grounds in the far north, and the wintering grounds further south. The mudflats are exposed for considerable periods between tides and are rich in invertebrates, providing extensive feeding grounds for waders and for many of the wildfowl, especially shelduck. The sandbanks also provided important low-tide roosting sites for pink-footed geese and other waterfowl and the saltmarshes are important high tide roosts. Some of the saltmarsh habitats are of interest for their breeding bird populations (most notably a nationally important common tern colony on Colloway Marsh, approximately 15 km north-east of the Project). They also collectively support a variety of plant communities and a number of uncommon plant species.

(f) Winmarleigh Moss SSSI lies approximately 750 m north of the application boundary at its nearest point. It is the largest area of lowland raised mire remaining in Lancashire. The main vegetation types are heather and purple moor-grass dominated mire over deep peat, birch scrub and birch woodland. It is also important for the range of invertebrates it supports. These include over 90 species of butterflies and moths, several of which are nationally rare, and 40 species of Diptera. It is the only Lancashire site for the rare bog bush cricket and the moss holds the best populations in the county of the uncommon large heath butterfly.

(g) During the operation of the Project, no damage would occur to any of the flora, fauna, geological or physiographical features by reason of which the SSSIs are of special interest, as none of the above ground infrastructure associated with the Project would be located within these SSSIs.

(h) However, it is acknowledged that some avian species for which the Wyre and Lune Estuary SSSIs are of special interest would use ‘functionally
linked’ land, as would some of the avian species for which the Morecambe Bay SPA/Ramsar is of special interest. Therefore, this was discussed with Natural England in relation to the Habitats Regulations Assessment. A SoCG has been agreed between Halite and Natural England on the topic of Ecology and the Habitats Regulations Assessment (SoCG 2). Section 4 of the SoCG deals with the Information to Support a Habitats Regulations Assessment – Morecambe Bay SPA and Ramsar (Document 3.3). Section 4.1.37 of the SoCG confirms “Natural England is therefore satisfied with the conclusions of the ‘Information to Support a Habitats Regulations Assessment – Morecambe Bay SPA and Ramsar’ that no Appropriate Assessment is required.”

(i) It is therefore agreed with Natural England that there would be no likely damage to any avian species that use ‘functionally linked’ land associated with the Wyre and Lune Estuary SSSIs.

**Question 2/9:**

What progress has been made with the licence applications to Natural England with regard to protected species?

**Response to Question 2/9:**

The Draft Bat Licence Application (NSIP CCLP/21: EPSM2012-4414 A (JG)) and the Draft Great Crested Newt Licence Application (NSIP CCLP/21: EPSM2012-4415 A (JG)) were received by Natural England on 23 April 2012. Both are currently being reviewed by Natural England. The submitted application forms for both applications are provided in Appendices 28 and 29.

**Question 2/10:**

Please explain how the derogation tests in relation to the European Protected Species licence will be met?

**Response to Question 2/10:**

The Reasoned Statements accompanying the Draft Great Crested Newt Licence Application and the Draft Bat Licence Application provide evidence as to how the derogation tests have been met. The Reasoned Statements for both licence applications are provided in Appendices 30 and 31. Section D4 of both the Reasoned Statements contains evidence supporting the fact the ‘no satisfactory alternative’ test (Regulation 53 (9) (a) of the Habitats Regulations) is met. Section D3 of both the Reasoned Statements contains evidence supporting the fact the ‘imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment’ test (Regulation 53(1)) is met. Both licence applications are currently being reviewed by Natural England.
Section 3: Impact of brine discharge to the Irish Sea and associated works

Question 3/1:

Is the Environment Agency satisfied that there have been no changes in circumstances since the issue of the brine discharge licence in 2007 to warrant a reassessment?

Response to Question 3/1:

(a) Although this Question is directed towards the Environment Agency Halite has taken this opportunity to provide a response.

(b) Further to the issue of the brine discharge licence (Consent to Discharge) to Canatxx Gas Storage Ltd in 2007, the Environment Agency transferred the consent to Halite in 2011 (this is contained at the front of Appendix 2.1 of Volume 1B (Binder 1) of the ES (Document 5.2)).

(c) A question was raised by consultees as to whether the sewage outfall pipeline at Rossall, which extends out into the sea for 5.2km and was rock armoured in June - August 2003 had changed the hydrology of the area, thus creating a ‘pooling’ effect to the south of the outfall during flood tides.

(d) The proposed brine outfall is located over 2km to the south of the sewage outfall so it is very unlikely that the rock armour would cause a change to the flowfield at the brine discharge location. The results of the existing near and mid-field dispersion modelling are considered to be still applicable. The presence of the rock armour is likely to cause some variation in the local flowfield close to the brine outfall pipeline due to the vertical extent of the structure and the local shallow water depths. However, the dispersion modelling shows very low concentrations, less than 1% above the ambient summer salinity, at the intersect between the predicted brine plume path and the sewage outfall. This is within the natural variability of the local salinity, which is generally lower than offshore values due to river inputs. It is therefore very unlikely that ponds of elevated salinity would be found in the sewage pipeline vicinity. The Environment Agency and Hyder (Halite’s environmental consultants) therefore didn’t consider the change warranted a reassessment. There have been no other changes in circumstances since issue of the 2007 consent to discharge.

Question 3/2:

Has the applicant carried out any analyses of the saturated brines to determine whether or not they contain any trace metals (pb, sn, cu, zn etc) or associated trace elements (as, sb etc) that might be detrimental to marine habitats?

Response to Question 3/2:

(a) Analysis of saturated brine cannot be undertaken until the leaching process commences. Chemical analysis data is available from several sets of borehole core samples but these data have not recorded any significant levels of trace metals. The analysis has also been compared with similar analysis carried out for the halite at other operational underground gas storage developments as may be referenced in BGS report CR09-036 (Appendix 5). Please refer to the example taken at Arm Hill from the
borehole drilled by Halite, analysis results were included in section 4.2 of the Geological Summary Report (Document 9.2.2).

(b) The Environment Agency has stated in its proposed response to this Question that "A review of the potential for dangerous substances to be found as impurities within the halite deposit was also undertaken from care samples taken in 2005. Although this review found no substances at high enough levels, it was still felt appropriate to add monitoring for around 13 dangerous substances within the monitoring programme for the first 12 months as a precautionary measure".

(c) A discharge monitoring facility would be sited adjacent to the sea water pumping station prior to brine discharge to ensure compliance with the Environment Agency Consent to Discharge which states "The consent Holder shall notify the Agency in writing of any known or planned introduction or material change in respect of discharges from the premises to which this consent relates, to controlled waters that may increase or introduce into the effluent any ‘dangerous substance’ (set out in Annex 1 to this notice as updated from time to time and notified to the Consent Holder in writing), or any other substance considered by the Consent Holder as likely to increase the polluting effects of the Discharge from the facility on controlled waters".

(d) The leaching process uses seawater abstracted from the fish dock at Fleetwood and is therefore taken from the Irish sea. The Irish sea contains trace metals and this will be taken into account when analysing the brine after leaching.

(e) Fully representative chemical analysis would be undertaken from the pilot bore hole core samples should the DCO receive approval.

**Question 3/3:**

What is the purpose of the observation platform at the seawall crossing?

**Response to Question 3/3:**

(a) The observation platform will provide an amenity at the same time as concealing the 900mm brine discharge pipework, which will be laid in a channel cut into the top of the sea defence and set into the new foundations for the steps created down to the beach. In this way there is minimal interference with the integrity of the sea wall.

(b) WBC has constructed 4 observation platforms along the coastal defences at Cleveleys. The Council also proposes a Rossall Improvement scheme which will have a similar observation platform at Rossall. If the DCO is approved Halite proposes to construct the observation platform at Rossall, incorporating the brine outfall pipeline at its own cost and then transfer it to WBC as an amenity.
Question 3/4:

What are the consequences for maintenance and amenity purposes of the loss of vehicular access to the beach and slipway at the seawall crossing site?

Response to Question 3/4:

(a) The observation platform will be centred over the seaward facing wall and will include steps down to the beach. It would therefore close off the end of the existing slipway, which provides vehicular access to the beach. Vehicular access slipway points exist 425m to the north and 370m south of the proposed platform and vehicular access is also available along the roadway at the top of the sea wall to these two alternative slipways while the platform is constructed and it is understood that WBC may accept this as a short-term inconvenience.

(b) A meeting has been arranged for June between WBC’s engineering officers and Halite to discuss the provision of a new vehicular access point at Rossall.

Question 3/5:

Paragraph 9.7.110 of Volume 1A of the ES (Document 5.1) acknowledges there is some uncertainty over whether fish have the ability to avoid lethal concentrations of saline, which could affect relatively large numbers of fish. However the following paragraph concludes that the potential effects of mortality of adult fish through contact with the brine discharge are considered to be not significant at any level. Please explain this apparent inconsistency.

Response to Question 3/5:

(a) As stated in paragraph 9.7.110 of Volume 1A of the ES (Document 5.1), there is some uncertainty relating to the understanding of how fish would respond to the plume and whether they would have the ability to avoid lethal saline concentrations, although this is considered most likely. On that basis, only very limited mortality would occur, hence the conclusion that the potential effects of mortality of adult fish through contact with the brine discharge are considered to be not significant at any level.

(b) Although no significant potential effects are predicted, monitoring would be undertaken as part of the Environment Agency Consent to Discharge to confirm that fish are indeed avoiding the plume. Such monitoring is prescribed in paragraphs 9.8.27 and 9.8.28 of Volume 1A of the ES (Document 5.1). If the monitoring reveals that the plume is causing significant mortality to fish, there are mechanisms for diluting the brine before it is discharged, therefore reducing the saline content. Statements of Common Ground have been agreed with the Marine Management Organisation (SoCG 43), Natural England (SoCG 2) and the Environment Agency (SoCG 11), which cover the assessment of the effects of the brine discharge on fish species.
Question 3/6:

Please confirm that actual commercial fishing in the area of the discharge pipeline is limited to two vessels, and indicate the scale of the potential impact on fishing areas along the Fylde coast given that the pipeline is buried at this location.

Response to Question 3/6:

(a) It is confirmed that there is very little commercial fishing activity in the vicinity of the proposed discharge pipeline. The level of activity and the likely effect of the pipeline are addressed in paragraphs 11.4.39 to 11.4.60 of Volume 1A of the ES (Document 5.1). This assessment was made by a local fisheries expert following interviews with the Fleetwood Fishermen's Association, the North West Inshore Fisheries and Conservation Authority ("NWIFCA"), and the Marine Management Organisation ("MMO") in Blackpool.

(b) In summary, there are only four local commercial fishing boats that are permitted to fish within 6 nautical miles of the shore, and only two trawlers that could fish in this area. Neither of these two vessels operates within 2km of the proposed brine outfall because they report that the seabed is too rough for their fishing gear. They fish to the north and to the west of the proposed discharge pipeline in the Lune Deep and on Shell Flat.

(c) On the shore, some local fishermen wade into the water to fish for shrimps (Crangon vulgaris) using “push nets”, which is a small-scale activity. The shrimp fishing area overlaps with the proposed location of the brine outfall pipeline.

(d) The relationship between fishing grounds and the proposed discharge pipeline route is shown in Diagram 11-3 of Volume 1A of the ES (Document 5.1).

(e) It is concluded that the operation of fishing vessels is not likely to be impeded by the proposed discharge pipeline, since no vessels operate in its immediate vicinity. The activity of shrimp fishermen is unlikely to be significantly affected by the proposed discharge pipeline, although there may be a brief period of disruption in the local area during construction.

Question 3/7:

What is the purpose of the air vent at the railway bridge crossing on Jameson Road and what is the predicted composition of the gas discharge?

Response to Question 3/7:

The railway bridge crossing on Jameson Road and the crossing of the sea wall at Rossall are the highest points in the 8.1km long pipeline that is otherwise more or less horizontal. Ideally this pipeline should flow full and it is therefore necessary to remove the air from the pipeline when the discharge is started up after a shut down. For this purpose vent valves will be located at the two high points described above. The pipeline will carry seawater at raised salinity (brine), from the cavern leaching process. The cavern leaching process is isolated from the gas storage process therefore there is no risk of natural gas entering the brine discharge pipeline. Sea water from the fish dock will contain naturally dissolved air. This may be released from entrainment in the brine if the pressure in the pipeline falls below atmospheric pressure. When the brine discharge is shut down the pipeline will tend
to syphon out into the sea causing the pressure in the line to fall below atmospheric pressure and release the entrained air. When the discharge is started up again this air will be trapped and compressed in the pipeline and restrict the flow of the brine. The air may have a marine odour, but since both vent points are within 1000m of the sea the venting is unlikely to be detectable against the background environment.
3.4 Section 4: Noise impacts

Question 4/1:

Where will the drilling rig be located for the southern Wyre crossing and when in the construction programme and at what time of year is this intended?

Response to Question 4/1:

It is intended that the drilling rig will be located inside the Kneps Caravan Park for the southern Wyre crossing. Drilling will be carried out during the period May – July, during year one of the construction programme.

Question 4/2:

If the drilling rig is to be located on the west bank of the estuary, please provide revised construction noise calculations for the caravan parks at Stanah.

Response to Question 4/2:

(a) The assessment of the noise impacts associated with the southern Wyre crossing as presented in Volume 1A of the ES (Document 5.1) was based on details of plant as provided at the time. Subsequently a contractor has been engaged to provide detailed advice and it has been indicated that more modern quieter plant will be used.

(b) The noise assessment reported in the ES assumed that drilling operations would take place continuously, day and night, for the duration of the drilling works. It has subsequently been indicated that the geology of the site allows an option for intermittent works to be carried out, whereby drilling operations could commence at 06.00 and cease at 18.00. Drilling during the daytime only would however require drilling activities to take place over a longer period than previously anticipated (approximately 14 weeks rather than 9 weeks).

(c) With the daytime drilling option only two 24-hour periods of continuous reaming will be required for the pull through of the conduits, thereby reducing the duration of the night-time noise impact from that indicated in the ES. Reaming is the process used to increase the size of the initial bore hole to accommodate the tubing (plastic or steel) that will be pulled back through the pilot hole. The reaming tool is attached to the end of the drill when it breaks surface at the reception pit. It is rotated and pulled back through the ground by the drilling rig. The rig is rated in tons of pulling capacity, the larger the reamed hole the greater the pulling force. The electricity conduits will require a 100 ton rig. The conduit is attached to the back of the reamer. There is a swivel between the two so that the conduit does not rotate but is merely pulled through the ground. This has to be a continuous operation and is expected to be a 24 hour process for the river crossings.

(d) The options to carry out either daytime drilling (over about 14 weeks), or 24 hour drilling (over about 9 weeks) will be investigated further and discussed with Wyre Borough Council as part of the Section 61 Consent Application process described in the Response to Question 4/5. The benefit of avoiding night-time noise impacts will need to be considered against daytime drilling noise impacts over a slightly longer period.
The assessment reported in the ES was based on appropriate control measures e.g. through adoption of Best Practicable Means (BPM). Further consultation will take place with contractors to select plant and adopt construction methods that are likely to result in lower noise impacts.

The plant to be used and the predicted noise levels are provided in Appendix 32 for the main drilling compound (Table 1), receiving compound (Table 2) and the main drilling compound and receiving compound combined (Table 3). The predicted combined noise level in the absence of mitigation at Kneps caravan park is 53.8 dB(A) (Table 3 of Appendix 32). This predicted noise level is unmitigated. The contractor has indicated that they have prior experience carrying out drilling in close proximity to residential receptors and have erected purpose-built 4m high straw bales to serve as acoustic screens. With screening in place, and no clear line of site, a 10 dB reduction can be assumed.

Agreement has been reached with WBC that a Section 61 consent application will be submitted for works identified to be particularly noisy, where noise sensitive receptors are located close to works, where baseline noise levels are low or where night-time works are to be carried out (see Response to Question 4/5 also which includes an extract from WBC’s letter to Paul Hudson (The Planning Inspectorate) dated 21 May 2012) (Appendix 38). A SoCG has been agreed between Halite and WBC on the topic of Noise and Vibration (SoCG 7).

**Question 4/3:**

Please provide a drawing to cover the west and east banks of the estuary showing construction noise levels in year one, in the same format as given for construction and operation, and operation only phases in Figures 12.3 and 12.4 of the Environmental Statement volume 2A (Document 5.4).

**Response to Question 4/3:**

(a) During the first year of construction, construction noise impacts will vary greatly, depending on the number of activities that are to take place simultaneously, the type of plant to be used at various times and the intensity of the construction activities at various times. The noise contour for first year of construction (refer to Appendix 33 for the contour plans) therefore presents a worst case rather than a realistic case as the highest noise level for each activity has been used. It has also assumed that all works will run simultaneously, which in reality will not be the case for the vast majority of the construction programme.

(b) Works on the access road, the brine pipeline and electrical infrastructure will also be transient in nature and noise impacts from these works will depend on their proximity to receptor locations. For the purposes of graphical presentation, works on the brine pipeline, access road and electrical infrastructure have been presented by a number of points along these work corridors.
**Question 4/4:**

How will operational and care activities in Rossall Hospital be affected by vibration from the construction activities (as distinct from noise assessed in table 12.47 of the ES volume1A (Document 5.1))?  

**Response to Question 4/4:**  

(a) Halite understands that Rossall Hospital comprises a Rehabilitation Unit with facilities to care for 40 inpatients. It will therefore be important to avoid vibration induced disturbance on operations and to patients during the construction phase. Rossall Hospital is located approximately 100m from the proposed Sea Wall Crossing and this separation distance is likely to mitigate the vibration impacts. Further assessment will however be carried out as part of the Section 61 consent process and through further consultation with Wyre Borough Council (see Response from WBC in answer to Question 4/5 below which includes an extract from Wyre Borough Council’s letter to the Planning Inspectorate dated 21 May 2012) (Appendix 38). As part of this process, Best Practicable Means (“BPM”) will be adopted and less intrusive piling methods and use of piling rigs that produce lower levels of vibration will be investigated.

(b) There are no accepted formulae for predicting the passage of vibration through ground due to the non-uniform effects of different ground conditions, although some empirical formulae have been proposed for known ground conditions based on previously measured data. Initial consultation with Hermolle Associates Ltd (consulting and civil engineers) indicates that the subsoil generally consists of marine deposits overlaying clay and that dynamic vibratory techniques will be used to install sheet piles and substructure support piles. The use of appropriately selected piling techniques and piling rigs will reduce vibration impacts from piling.

(c) It is therefore considered that through the use of BPM and the Section 61 process effective vibration controls will ensure that there will be no significant effect on operational and care activities at Rossall Hospital.

**Question 4/5:**

What progress has been made in obtaining Wyre Borough Council’s agreement to construction and operational noise limits?

**Response to Question 4/5:**  

(a) The operational noise limits set out within Section 12.7 of Volume 1A of the ES (Document 5.1) have been agreed by WBC. Section 12.7 of Volume 1A of the ES also includes proposed fixed noise limits for construction activities. However, since the DCO Application submission, it has been agreed with WBC that the adopted approach should be to consider construction activities individually rather than adopting fixed noise limits. This would allow the specific nature of the activities and the environment of the site to be taken into account. The criteria would be based on BS5228, Code of Practice for Noise and Vibration Control on Construction and Open Sites (2008) and would be addressed through a Section 61 consent application process (Control of Pollution Act 1974). A SoCG has been agreed between Halite and WBC on the topic of Noise and Vibration (SoCG 7).
Halite also notes that WBC has provided a comment on this Question in a letter from David Thow (WBC) to the Planning Inspectorate dated 21st May 2012 as follows: "The Council has been in discussions with the noise consultant from Halite and rather than agreeing noise limits for the construction activities, it has been agreed that all construction noise is going to be dealt with through section 61 agreements under the Control of Pollution Act (COPA). This has been agreed and included in the statement of common ground. There is nothing more to do from a noise point of view until the section 61 agreements are drawn up by the consultant."
3.5 Section 5: Landscape Impacts

Question 5/1:

Please explain the components and purpose of the various elements which comprise the Gas Compressor Compound ("GCC").

Response to Question 5/1:

(a) The following is a description of the components and purpose of the various elements which comprise the GCC. The elements are numbered and depicted on the drawing at Appendix 34. General services utilities are included in the description for example compressed air, which do not have a specific location and are therefore not numbered or indicated in the figure.

(b) Two Slug catchers (1) are provided for liquids separation and slug handling at the inlet of the GCC from the caverns. Horizontal vessels are proposed to minimize the height and therefore visual impact. The gas from Slug catchers is fed to Compression or Pressure Letdown & Heating Process Units depending on the pressure of the gas from the caverns and the NTS pressure.

(c) The liquids are letdown under level control to the Condensate Tank. The Slug catchers are proposed due to the possibility of free liquids in the pipeline. Once cavern and pipeline modeling has determined the expected operating conditions and liquids content/quantities the requirement for Slug catchers can be confirmed. It may be possible to provide one Slug catcher to process the entire flow or perform the separation / slug handling functions in the downstream separation equipment to reduce the number of equipment items.

(d) The Compression (2) selection is based on high speed electrically driven machines, which have a number of advantages over conventional compressors including efficiency over a wide operating range and no emissions. For this application two MAN Turbo high-speed compressors have been considered, which have been used in several UK gas storage applications.

(e) Variable Speed Drives (3) are provided for the compressor to minimise power consumption over the range of operating conditions.

(f) Separators (4) are provided on the suction of each compressor to protect the compressor against liquids. The separator liquids are letdown under level control to the Condensate Tank. (5)

(g) Coolers (6) are provided on the discharge of each compressor stage to cool the compressed gas to achieve the NTS specification on withdrawal and meet any cavern injection temperature or pipeline mechanical design limits on injection.

(h) Gas Heaters (7) are provided for gas heating during withdrawal and injection modes of operation. The principal requirement and sizing case for gas heating is during injection mode of operation, although it is used for both modes of operation. Each Gas Heater is fed from a common manifold and is rated for 5 MW. The gas outlet temperature is controlled by
A mixture of glycol and water is proposed as the heating medium for the Heating Medium Packages (8). The heating medium is pumped through the gas-fired boilers by circulation pumps.

(i) A Surge/Expansion Vessel (9) is also provided on the circuit and a heating medium make-up tank and pump provide fresh heating medium to the system.

(k) The gas fired boilers use low-pressure fuel gas from the Fuel Gas System (10) for burning.

(l) After gas heating the pressure is let down to the desired pressure dependent on the operating mode. The pressure drop is generally low for withdrawal and generally high during injection, although a significant range is expected. The gas from heating and pressure letdown unit is fed to dehydration during withdrawal or to the manifolds during injection.

(m) The Dehydration (11) selection is based on Tri-Ethylene Glycol ("TEG"), which can generally be demonstrated as Best Available Technology ("BAT") for this application and has been used on other UK gas storage applications. The dehydration unit is only used during withdrawal mode of operation.

(n) Lean (or dry) Glycol is used to absorb water from the gas in two Glycol Contactors (12), which contain random packing. The purity of the Lean Glycol determines the water content of the outlet gas, and in this case, the gas must achieve the NTS specification plus a margin. Rich (or wet) Glycol containing the water exits the contactor and passes to a regeneration unit, where the water is driven from the glycol using heat. The regenerated Lean Glycol is re-circulated to the Contactor. The estimated seize for each contactor column is around 3 m diameter and less than 15 m height.

(o) Two external Glycol Separators (13) are provided upstream of the Glycol Contactors to protect the packed column against any liquids. External separators are proposed to reduce the height of the column. This option has been used on other gas storage facilities where height is restricted by planning requirements.

(p) Condensate liquids from the Glycol Separators are letdown under level control to the condensate tank.

(q) Two Glycol Regeneration Units (14) are provided to regenerate the rich glycol and supply lean glycol to the glycol contactors. The unit consists of a still column with integrated re-boiler, heat exchangers, and pumps. Stripping gas (low pressure fuel gas) may be required depending on the desired water content of the outlet gas. The regeneration unit includes a burner and incinerator to provide heat for the re-boiler. The burner and incinerator are supplied with gas removed from the rich glycol (including any methanol recovered from the gas) with the balance of fuel demand provided by low-pressure fuel gas.

(r) Rich and Dry Glycol Storage Tanks (15) are proposed to provide buffer volume for the operation and start-up of the dehydration units, and a
Glycol Make-up tank (16) and pump is also proposed to provide fresh Glycol to the system.

(s) An Instrument Air system is proposed to supply instrument quality air to users, such as emergency shutdown valves etc. The system is likely to consist of air screw compressors, air driers and air receivers with a manifold to supply individual users.

(t) Typically, at least two compressors and driers are provided to meet the system availability requirements, which are generally high. Two Air Receivers may also be used. The system may also provide utility (or plant) air to supply tools and other users.

(u) A Nitrogen System is proposed to supply nitrogen gas for plant inerting for maintenance etc. The system is likely to consist of a Liquid Nitrogen vessel and Vaporiser system to provide nitrogen gas at the desired pressure. It is proposed to locate this equipment at the Sea Water Booster Pump Station. The liquid nitrogen is provided by road tanker.

(v) A Fuel Gas system (10) is proposed to meet the gas requirements of the process units including dehydration and heating medium. The fuel gas system typically consists of inlet filtration, fuel gas heater(s), pressure letdown and metering. Two stages of pressure letdown may be required to provide fuel gas at the desired pressure levels. Metering may be to fiscal standard if the amount of gas for burning applications is required to be recorded to a high accuracy.

(w) The fuel gas is taken from the import/export line on the GCC side of the NTS pipeline.

(x) A Methanol System (18) is proposed to supply methanol for hydrate inhibitor. The system is likely to consist of methanol storage vessel and injection pumps to provide methanol at the desired pressure. The methanol is provided by road tanker.

(y) A Vent System is proposed for discharge of emergency and maintenance vent gas to atmosphere. The vent system typically consists a vent stack with sterile area, vent knockout drum (if liquids are possible), and vent collection system. The vent stack is likely to be 16m with a sterile area radius at least 50m to meet the depressurisation requirements of the largest GCC process unit. The sterile area is provided for safety of personnel and/or the public in the event that the vent gases are ignited.

(z) The Vent Stack (17) and sterile area size assumes that the entire GCC cannot be depressurised at the same time, and individual process units are depressurised in a sequence. Sufficient distance must be provided between adjacent process units to ensure that one process unit cannot impact on another process unit, e.g. in the event of fire.

(aa) Condensate System (a mixture of water, methanol, glycol etc.) from the process vessels is collected in the Condensate Tank (5). It is proposed that the condensate is disposed offsite by road tanker using an appropriate third party effluent disposal company.

(bb) Drain Systems will be required to capture, treat and dispose of various water streams that may be expected on the GCC site including rainwater, contaminated and uncontaminated surface water, firewater etc.
**A Potable Water Supply** is required for water use at site buildings.

**Pig Receivers** (20) are associated with the NTS pipeline and gas manifolds to the wellhead compounds. The pipeline to the NTS will need periodic inspection using an intelligent pig. The pig is inserted using a pig launcher located at the above ground installation at Nateby and is removed using the pig receiver at the GCC. The three gas manifolds bring wet gas from the caverns to the gas compressor station and it is possible that the liquids (water and glycol) may condense during withdrawal operation. To prevent accumulation of liquids in the manifolds periodic pigging will be needed to drive liquid out of the pipeline and into the slugcatcher. The pig receivers allow the pig to be removed from the line.

**Question 5/2:**

Is the GCC proposed to be lit?

**Response to Question 5/2:**

(a) The GCC will need to be lit. This will be provided by low level, environmentally sensitive lighting. The lighting scheme will be developed during the detailed design stage. The GCC is not a manned plant and therefore lighting will be turned on only for the presence of an operator. The system will be designed to provide lighting in the particular area where it is required. For example the roads, walkways and various elements of the process may be selected individually. However, in an emergency all the lighting can be activated.

(b) It is not proposed that there will be any permanently installed floodlighting.

(c) The lighting will consist of low level, low energy, access lighting installed along the roads and walkways. Individual lighting units stand approx. 1m high and are fitted with covers and reflectors to prevent light from being directed upwards or into areas where it is not required.

(d) Process plant is typically skid mounted and lighting is provided by individual low energy units attached to the hand rails and fitted with reflectors to direct light onto the equipment only and prevent stray light upwards or outwards from the skids.

(e) It will be necessary to provide lighting specifically for the security cameras inside the GCC. This lighting will produce infra red light, invisible to human eye. It will be provided by strategically located camera/infra red lighting columns, which stand approximately 3m high. These will be located at intervals along the inside of the perimeter security fence.

(f) It should be noted that the effect of lighting is considered in the ES. The methodology section of the Seascape, Landscape, Townscape and Visual Amenity Section at paragraph 14.3.7 of Volume 1A of the ES (Document 5.1) identifies the document Guidance Notes for the Reduction of light pollution (Institute of Lighting Engineers, 2000 revised 05/03) as one of the documents used in the desk study and paragraphs 14.3.25 and 14.3.41 state that an assessment of the Project lighting has also been considered on night-time views.
The baseline night-time landscape of the study area has been considered in terms of the Environmental Lighting Zones (ELZ) and is reported in Appendix 14.3 of Volume 1B Binder 3 of the ES (Document 5.2).

The assessment, in Appendix 14.4 of Volume 1B Binder 3 (Document 5.2) of the ES, has considered the effects of the Project’s lighting, as described in Table 5-5 Embedded Design in Volume 1A of the ES, on the night-time landscape of the ELZ for each character area reported in Appendix 14.3 of Volume 1B (Document 5.2) of the ES for the Project’s construction, construction and operation combined and operation phases.

In paragraphs 1.3.32 and 1.4.18 of Appendix 14.4 of Volume 1B Binder 3 of the ES (Document 5.2), the effects of the proposed lighting within the GCC compound on the surrounding night-time landscape would be limited by the blocking effects of the perimeter mounding and as such would have no significant impact on the overall ELZ for the area.

Question 5/3:

What is the pattern of visits to the Gas Compressor Compound (“GCC”) during operations and for what purpose?

Response to Question 5/3:

(a) The UGS facility will be operated 24/7. It will be operated from a Control room located at the Booster pump Station. The GCC is not manned and entry will be under the strict control of the shift team leader. A tag in/out system will be used for everyone entering or leaving the GCC.

(b) For the purpose of log keeping and safety and security checks, the GCC will be inspected every 4 hours by an outside operator. Therefore, during normal plant operation, it is envisaged that there would be 3 visits each of approximately 20 minutes duration at night.

(c) Planned and Preventative Maintenance activities inside the GCC will normally be carried out during daytime hours. All work will be carried out under safety permit and subject to risk assessment, method statements and/or safe systems of work. Access will be restricted to competent personnel only. It is envisaged that maintenance access is required during most week days. Numbers of personnel will vary between 2 and 20 during major plant outages.

(d) Approved visitors to the GCC will receive induction training before entering the GCC and accompanied by competent personnel throughout their visit.

Question 5/4:

Given that the landscape character areas in which the GCC is proposed to be located are of high landscape sensitivity and low capacity to accommodate the project, why are the mitigation proposals in the LEMSP considered to be sufficient?

Response to Question 5/4:

Overview

(a) This Response provides a summary description of the baseline landscape conditions including the evaluation of the landscape's sensitivity and
capacity of the landscape, the proposed mitigation and enhancement measures, which are contained in the LEMSP, the assessment of effects and a summary of the findings in relation to the landscape adjacent to the GCC as reported in Volume 1A of the ES (Document 5.1)

**Baseline Landscape Conditions and Evaluation**

(b) In order to assess the impacts of a Project on the landscape as a resource in its own right, it is necessary to evaluate the baseline landscape which would be affected. The overarching policy context for UK landscapes is the European Landscape Convention to which the UK is treaty to and which recognises that all landscapes are important, including those not covered by designation.

**Landscape Characterisation**

(c) The baseline evaluation is done firstly by sub-dividing the landscape of the study area into character types and character areas. The former are distinct generic types of landscape which are homogenous in character but not necessarily unique to a particular location. The latter are single unique areas distinct to a specific landscape type. The landscape characterisation work is based partly on a desk study through the review of existing work carried out at the higher level by Natural England, regional government and local authorities.

(d) The results of the desk study and the landscape survey undertaken have informed the Project specific character types and character areas on which the landscape assessment is based and which are presented on Figure 14.1 in Appendix 2B of the ES (Document 5.4). The various levels of landscape characterisation work are summarised in Appendix 14.3 of Volume 1B of the ES (Document 5.2).

**Sensitivity and Capacity**

(e) To determine the sensitivity of each of the Project specific landscape character areas, it is important to understand the key elements and characteristics likely to be affected by the Project and whether or not these elements or characteristics could be replaced or substituted through mitigation. Landscape sensitivity is also about understanding and evaluating the landscape resource in terms of designations and inter-relationships with other character areas and other topics such as biodiversity, cultural heritage and noise (tranquillity). These aspects are summarised in Appendix 14.2 of Volume 1B of the ES (Document 5.2).

(f) It is also possible to evaluate the capacity of the landscape to accommodate the type of change proposed without causing harm to it, through an understanding of the sensitivity of the landscape resources, the nature of the Project and the type of change anticipated. Table 14-8 in Volume 1A of the ES (Document 5.1) identifies a broad, but not exhaustive indication of these criteria. The evaluation of the Project specific character areas in terms of the sensitivity and capacity of the landscape resource is provided in Table 14-15 in Volume 1A of the ES (Document 5.1).

**The Baseline Landscape in the Vicinity of the GCC**

(g) With reference to Table 14-15 in Volume 1A and Figure 14.1 in Volume 2B of the ES (Documents 5.1 and 5.4 respectively), the landscape in and
around the GCC falls within Project specific Landscape Character Type (LCT) 4: Lowland Estuary Edge and within Landscape Character Area (LCA) 4c: Agglebys Farmed Lowland and adjacent to LCA-4d: Clods Carr Farmed Lowland, which lies to the north of it.

(h) These landscapes or any other within the Type are not covered by any formal designation and many of the elements within them are relatively common place such as the field pattern, the mix of arable and pasture land uses, marl pit ponds, meandering rural lanes, field boundary hedgerows, the occasional red brick farm buildings and associated mature vegetation, but many are in a poor state and fragmented. In fact it is the industrial human influences associated with the areas underlying salt with its surface features such as the collapsed brine caverns which are the most distinctive and unique to the locality. However this landscape has other characteristics which need to be considered such as its interrelationship with the adjacent seascape character area of Seascape Character Area ("SCA") 1b: Wyre Estuary. This interrelationship is two-fold in that it provides a relatively tranquil rural backdrop to the estuary’s eastern shoreline and importantly it is functionally-linked to its designation as a Site of Special Scientific Interest (SSSI), which is also an integral part of the wider internationally important Morecambe Bay Special Protection Area ("SPA")/Ramsar.

(i) With reference to Sheet 1 of Figures 14.9d, 14.9e, 14.9f, 14.9g, 14.9h, 14.9j and 14.9k in Volume 2B of the ES (Document 5.4) and the recently prepared photomontage (Figure 5/4/1), which is from a non-public accessible location and accompanies this Response in Appendix 35, it is a combination of the open, relatively tranquil characteristics of the landscape, its low lying and gently undulating landform (see Figure 14.4 in Volume 2B of the ES (Document 5.4)), open views with the sky forming a prominent element and its interrelationship with the adjacent estuary, which on balance determine its high sensitivity and, because of the nature of the Project, it is anticipated to have a low to moderate capacity to change.

Mitigation and Enhancement Measures

(j) Mitigation for the Project is two-fold. Firstly there is embedded mitigation which has been developed as part of the iterative design process. This includes the choice of location of the GCC on the east side of the estuary, on hazard substance grounds, as outlined in the Response to Q5/5 below and its perimeter earth mounding and associated planting. The embedded mitigation is summarised in Table 5-5 in Volume 1A of the ES (Document 5.1).

(k) Secondly there is additional mitigation and enhancement which has been developed in collaboration with the various consultees such as Natural England, the Royal Society for the Protection of Birds, Lancashire Wildlife Trust, the Environment Agency, Wyre Borough Council and Lancashire County Council, and which included detailed discussion and broad agreement on the final height and form of the GCC perimeter mounding and the associated planting. The final arrangement of the GCC perimeter earth mounding is detailed on Figure 14.5 in Volume 2B of the ES (Document 5.4).

(l) This consultation also included detailed discussion and agreement on the ecological mitigation and enhancement measures associated with the
functionally-linked land to the nationally and internationally important SSSI and SPA/Ramsar designations associated with the adjacent Wyre Estuary. The embedded mitigation, additional mitigation and enhancement measures for the landscape and ecology associated with the area around the GCC, and in particular for the functionally-linked land, are encapsulated in the LEMSP (see Appendices 23 and 25).

**The Assessment with Mitigation**

(m) This section provides a summary of the reported potential effects of the Project on the high sensitivity landscape resource around the GCC and the adjacent seascape of the Wyre Estuary which are detailed in Appendix 14.4 of Volume 1B of the ES (Document 5.2). The summary below includes reference to Tables in Appendix 14.4 which describe the specific effect of the GCC, but the magnitude of change and overall significance of effect stated are those reported in the ES for the GCC in combination with all other activity within and/or in proximity to the particular character area being assessed.

**Construction Phase (Years 1 to 3)**

(n) The construction effects of the GCC on SCA-1b: Wyre Estuary is described in Table 1-3 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The overall effects of this phase on the area would have a moderate negative change in Years 1 & 2 and minor negative change in Year 3, resulting in a moderate adverse impact in Year 1 and a slight adverse impact in Year 3.

(o) The construction effects of the GCC on LCA-4c: Agglebys Farmed Lowland is described in Table 1-23 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The overall effects of this phase on the area would have a major negative change in Years 1 & 2 and moderate negative change in Year 3, resulting in a large adverse impact.

(p) The construction effects of the GCC on LCA-4d: Clods Carr Farmed Lowland is described in Table 1-25 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The overall effects of this phase on the area would have a minor negative change in Year 1 and a moderate negative change in Years 2/3, resulting in a slight adverse impact in Year 1, a large adverse impact in Year 2 and a moderate adverse impact in Year 3.

**Construction and Operation Combined Phase (Years 4 to 8)**

(q) The construction and operational effects of the GCC on SCA-1b: Wyre Estuary is described in Table 1-60 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The overall effects of this phase on the area would have a minor negative change in Years 4 & 5 and negligible negative in Years 6 to 8, resulting in a slight adverse impact.

(r) The construction and operational combined effects of the GCC on LCA-4c: Agglebys Farmed Lowland is described in Table 1-66 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The visual influence of the GCC in Year 4 on this area is shown on Sheet 2 of Figures 14.9d, 14.9e, 14.9f, 14.9g and 14.9h in Volume 2B of the ES (Document 5.4). The overall effects of this phase on the area would have a moderate negative change, resulting in a moderate adverse impact.
The construction and operational combined effects of the GCC on LCA-4d: Clods Carr Farmed Lowland is described in Table 1-68 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The visual influence of the GCC in Year 4 on this area is shown on Sheet 2 of Figures 14.9j and 14.9k in Volume 2B of the ES (Document 5.4). The overall effects of this phase on the area would have a moderate negative change, resulting in a moderate adverse impact.

**Operational Phase (Years 9 to 40)**

The operational effects of the GCC on SCA-1b: Wyre Estuary would be the same as that described during Years 6 to 8 of the construction and operation combined phase. However, with the additional mitigation outlined in the LEMSP, the residual effects would have no change by Year 19 resulting in a neutral impact thereafter.

The operational effects of the GCC on LCA-4c: Agglebys Farmed Lowland is described in Table 1-74 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The visual influence of the GCC in Year 19 on this area is shown on Sheet 3 of Figures 14.9d, 14.9e, 14.9f, 14.9g and 14.9h in Volume 2B of the ES (Document 5.4). The overall effects of this phase on the area would have a moderate negative change in Year 9 and a minor negative change in Years 10 to 40, resulting in a moderate adverse impact in Year 9 and a slight adverse impact thereafter.

The operational effects of the GCC on LCA-4d: Clods Carr Farmed Lowland is described in Table 1-76 of Appendix 14.4 of Volume 1B of the ES (Document 5.2). The visual influence of the GCC in Year 19 on this area is shown on Sheet 3 of Figures 14.9j and 14.9k in Volume 2B of the ES (Document 5.4). The overall effects of this phase on the area would result in a minor negative change in Year 9 and a negligible negative change in Years 10 to 40, resulting in a slight adverse impact for the duration of the phase.

**Significance of Effect**

With reference to paragraph 14.3.35 in Volume 1A of the ES (Document 5.1), a significant effect with regard to the Environmental Impact Assessment Regulations is considered to be one of moderate significance or above. With reference to the summary assessment above, the mitigation measures contained in the LEMSP would, over time, reduce the effects of the GCC through screening / integration and by Year 10 the overall impact on the landscape character of the area would be considered not significant. In addition, the effects on the character of the adjacent seascape character of the Wyre Estuary would, by Year 4, be considered not significant and by Year 19 the mitigation measures contained in the LEMSP would have screened/integrated the Project in relation to the Wyre estuary.

**Conclusion**

The landscape in the vicinity of the GCC is not covered by any formal or informal landscape designations and its associated features are relatively common place and fragmented. However, the landscape is considered to have a high sensitivity because of its inter-relationship with the adjacent Wyre Estuary and its natural habitats which are formally recognised through designation as being of national / international importance. With
regard to the nature of the Project and the type of change envisaged (particularly during the construction phase), this landscape is also considered to have a low to medium capacity for change.

(y) It is recognised that the construction phase (Years 1-3) and the construction and operation combined phase (Years 4-8) of the Project would result in a significant effect on the character of this landscape, but over time the mitigation proposals in the LEMSP are considered to be sufficient because they will reduce these effects so that early in the operational phase (Year 10), they would be considered not significant.

**Question 5/5:**

Does the Health and Safety Executive support the conclusion in the Planning Statement (Document 9.1.1) that a location for the GCC on the west bank of the Wyre estuary is unacceptable on hazardous substances grounds?

**Response to Question 5/5:**

The HSE does support the conclusion in the Planning Statement (Document 9.1.1) that a location for the GCC on the west bank of the Wyre estuary is unacceptable on hazardous substance grounds. This is confirmed in section 5 of the SoCG between Halite and the HSE relating to the Deemed Hazardous Substance Consent (SoCG 8).
3.6 Section 6: Brine Well (BW) number 123 and disposal of waste arisings

Question 6/1:

Please provide details of how BW123 will be used for disposal of insoluble waste arisings from cavern formation in terms of:

i) volume of waste

ii) method of transportation

iii) volume of cavern available

iv) how will displaced brine water be disposed of, and

v) what measures will be taken to ensure that there are no unconsented discharges.

Response to Question 6/1:

Volume of waste

i) The 19 caverns that are proposed to be created will be generally cylindrical in shape. Their individual dimensions, shape correction volume and insoluble correction factors are provided in table 6.3 of the Geology Summary Report (Document 9.2.2). The total volume of swept waste may be calculated from this table to be 267,700 cubic metres. The leaching process will provide some degree of control of the volume of waste which may be removed from the cavern as it is formed by choice of location of the discharge pipe. Fine particles in suspension will be removed, but larger material will fall and remain in the sump of the cavern. Removal of insoluble material during the leaching process will maximise the capacity for gas storage and minimise the volume of salt that must be washed. Therefore it is Halite’s preference that as much as possible of the insoluble material is removed. Therefore it is Halite’s preference that as much as possible of the material is removed.

Method of transportation

ii) Insolubles will be carried out of the cavern with the brine and will be separated out of the brine, the bulk by hydrocyclones and then potentially by filtration. The exact configuration of the separation process will be completed during the Front End Engineering Design (FEED), to meet the sea discharge conditions for the brine for turbidity and particle concentrations. The concentrated particles will be stored within a section of the debrining pond from where they can be pumped as a slurry to BW123. It may be necessary on an occasional basis to empty and clean out the debrining pond and this would mean a small number of wagon movements per annum.

Volume of cavern available

iii) A cavern-leaching programme is being developed which will enable a more accurate assessment of the insoluble volumes for each cavern. The figure quoted in i) above for the swept volume is considered to be of the correct order based on the macro approach for this assessment. BW 123 has a volume of 278,500 cubic metres which is adequate for the estimated 267,700 cubic metres of waste quoted in paragraph (i) above.
**How will displaced brine water be disposed of**

iv) Displaced brine from BW123 will be routed back along pipework to the Booster Pump Station. It will be processed through the hydrocyclones and filtration separation process and enter the de-brining pond, or it can be mixed with the fresh brine and used for leaching depending on the brine concentration. The details will be completed during FEED to the satisfaction of the Environment Agency and any other interested statutory organisation.

**What measures will be taken to ensure that there are no unconsented discharges**

v) BW123 will be sampled prior to injection of the slurried insoluble in order to ensure that it will meet all the criteria for the brine discharge consent. The displaced brine will also be regularly sampled before it enters the separation process at the de-brining facility. The final safeguard that there are no unconsented discharges is at the brine discharge. There is a sampling facility located in the grounds of the Seawater pump station. Regular samples will be taken and logged here on a shift-by-shift basis to confirm that the discharge is within specification. This information will be available for the scrutiny of the Environment Agency and they may also carry out their own check samples from this point.

**Question 6/2:**

What progress has been made with the application for environmental permits for:

i) disposal to existing cavern BW123 of the insolubles waste arisings from the cavern formation process, and

ii) use of the drilling wastes as landscaping on site?

**Response to Question 6/2:**

**Disposal to existing cavern 123**

i) Discussions with the Environment Agency have continued following submission of the DCO Application. Appendices 36 and 37 contain 2 letters. The first letter (LNP080512) from Hyder Consulting (UK) Ltd (on behalf of Halite) to the Environment Agency dated 8 May 2012 (Appendix 36) sets out the proposed permitting approach. The second letter (EPR/WP3734CX/A001) from the Environment Agency to Hyder dated 10 May 2012 (Appendix 37) provides a response confirming the approach is acceptable.

Quite separately, Halite has proposed to the Environment Agency that the insoluble waste material could be used to stabilise some of the unstable legacy brine wells. Halite has a maintenance program for the legacy brine wells and has identified a number of brine wells that are likely to collapse within the next 20 – 50 years. Displacing the brine in these cavities with insoluble materials from the new caverns will potentially halt their migration through the mudstone to the glacial layers when the ground will ultimately be unsupported and collapse.

In order to prove this new technology, it is proposed that the transfer is made initially into BW 123 because it is a stable cavern and therefore the development of this process should not cause any risk of premature collapse of the brine well. Once this methodology has been proved however, and
subject to Environment Agency approval, it would be possible to transfer the insoluble materials to unstable caverns in order to improve their stability. There are a number of brine wells within the DCO boundary that could benefit from full or even partial stabilisation.

**Use of drilling wastes**

ii) Drilling contractors have advised that they will remove drilling process material waste (drilling fluids etc.) from the Preesall site for disposal at approved landfill. It is estimated that there will be in the order of 7,000 te of cuttings from the river crossings which will be available for use on the Preesall site. These cuttings will consist of a mixture of sand, gravel and clay. The Environment Agency has advised that there are 2 options available which may be applied for the use of the waste cuttings as follows:

Option 1 – Exemption from the requirements of permitting. The exemption has strict waste type and quantity limits”. Under this permit Halite would expect to be permitted to make use of 5000te of the cuttings;

Option 2 – Permit to allow the deposit of waste for the purposes of recovery. The application for this permit would need justification for the need for the recovery activity (i.e. this would be based on the need for bunds and landscaping as part of the Project). It is Halite's intention to apply for this permit to deposit in addition to the exemption referred to at Option 1 above. Therefore, under this permit Halite would expect to be permitted to make use of the remainder of the estimated 7000te of the cuttings, i.e. 2000te.

The Waste Recovery Plan will propose that the cuttings are transported from the drilling locations at Fleetwood and Stanah to the Preesall site and then used in the construction of landscaping around the wellhead compounds under the exemption and also the permit to allow the deposit of waste.

The overall benefit will be to avoid importing other non waste materials for the construction of bunding around the seven proposed wellhead compounds.

**Question 6/3:**

Paragraph 4.8.4 of the Health Impact Assessment (Document 9.1.7) states that caverns BW118 to BW123 will be used for the disposal of insoluble waste arisings. Are caverns 118 to 122 intended to be used as well as BW 123?

**Response to Question 6/3:**

Paragraph 4.8.4 of the Health Impact Assessment quotes in error a preliminary version of the Project description. It is intended to use only BW123.
Section 7: Access

Question 7/1:
Why is a new road from the A588 to the GCC needed permanently, even if it is accepted as necessary for the construction phase?

Response to Question 7/1:
The proposed underground gas storage facility comprised within the Project will be a top tier COMAH site. As such, it will be necessary that in an emergency there is good unimpeded access to the main Project site. The alternative most direct access into the site for the emergency services would be via Cemetery Lane where there could be obstacles to emergency access such as a funeral in process, cattle being taken for milking or heavy agricultural vehicles. The emergency services will require a standing point from which to muster. The new road will be wide enough to provide for this.

Question 7/2:
Can the applicant confirm that during year one of construction, HGV traffic at the Preesall site will total about 4800, or about 20 per day?

Response to Question 7/2:
The ‘Estimates of Traffic Volumes at Construction Stage’ report prepared by McMahon Design & Management Ltd in June 2011 (refer to Appendix D of the 2011 Transport Assessment which is presented within Appendix 16.1 of Volume 1B of the ES (Document 5.1)), estimated the volume of HGV traffic associated with the Preesall site during the first year of construction would amount to 2,344 HGV movements (or 4,688 two-way HGV movements in total), thereby equating to an average of approximately 20 two-way daily HGV movements.

Question 7/3:
What traffic movements are expected to the well heads during operations?

Response to Question 7/3:
Visits to the wellheads during operation are anticipated to be confined to a site tour every 4 hours.

Question 7/4:
Can the applicant confirm that once operational, total traffic using the Preesall site is estimated to be about 40 light vehicle trips per day?

Response to Question 7/4:
Paragraph 7.13.1 of the Transport Assessment (presented within Appendix 16.1 of Volume 1B of the ES (Document 5.2)) predicts the Preesall site is expected to be staffed by 6-8 operators per shift, primarily for security and maintenance during operation. With reference to paragraph 16.7.31 of Volume 1A of the ES (Document 5.1), it has therefore been estimated that operational and maintenance traffic associated with the Preesall site would amount to approximately 20 light vehicle movements (or 40 two-way light vehicle trips) per day.
Question 7/5:

What is the purpose of the two accesses to the south river crossing temporary compound (west bank)?

Response to Question 7/5:

There are two accesses proposed in this area. The northern most access is for the drilling compound at Kneps Caravan site. The southern access is for entry into the Electricity North West property at Stanah. There is no vehicular access between the two locations.
3.8 Section 8: The pipeline to Nateby

Question 8/1:
What impacts does the pipeline from Hall Gate Lane (A588) to Nateby have on farming operations during construction and permanently?

Response to Question 8/1:

(a) The gas pipeline which runs between Hall Gate Lane (A588) to the NTS feeder at Nateby passes almost entirely through agricultural land. It is only the road crossings which are non-agricultural.

(b) The land is a mixture of grassland for grazing or mowing for livestock production or ploughable land for arable enterprises.

(c) The route selection and method of work are described in the Gas Interconnector Pipeline to the NTS report (Document 9.2.6). The Book of Reference (Document 7.3), land plans (Document 2.2) and work plans (Document 2.3) identify the landowners, construction route and limits of deviation for the construction. The pipeline corridor will comprise a temporary working width within which the pipeline will be laid in a permanent easement. Other than road crossings which may be installed by alternative methods such as thrust boring or augur boring, the pipeline will be installed by an open cut trench method.

(d) The installation of the pipeline will cause short (during the year of construction of the pipeline) and medium term (between years two and four following construction) disruption to the existing farming operations. There will be no permanent impact from the installation of the pipeline as the land will be reinstated and returned to agricultural production. A record of condition will be taken before works commence and the landowners will be given a copy of the record for their land.

(e) The short term impact will result in a loss of grazing or arable production, the severance of parcels of land where the pipeline route divides a field, disruption to drainage systems and water supplies. There may also be other losses in connection with farming subsidies and environmental schemes. The medium term impact will be reduced yields as the soil structure is re-established following reinstatement and any drainage defects rectified.

(f) Mitigation by way of agreed accommodation works will be carried out by the provision of crossing points, temporary fencing, temporary water supplies and cut-off drains to minimise the impact of the pipeline installation. Care will be taken to ensure that topsoil and subsoil are not mixed and are correctly handled during the construction phase. If necessary, noxious weeds growing on the temporary working width will be sprayed or controlled.

(g) The landowner or occupier’s right to compensation for losses is covered by statute in relation to compulsory acquisition of rights. However, Halite have sought to reach agreement with all affected landowners and occupiers. Where terms have been agreed with landowners, Halite has offered a Deed of Grant of Easement which includes detailed appendices setting out Halite’s obligations in relation to the care of the land during the installation.
process, subsequent reinstatement and the scope of compensation for all reasonable losses as a consequence of the works. These provisions include for loss of crop, loss of subsidy or environmental payments, disturbance including the additional time the occupier spends on either a practical day to day basis in dealing with the consequences of the pipeline and in meetings with agents and contractors. Halite will also meet the occupier's professional fees in compiling, negotiating and agreeing all claims for losses.

(h) Whilst the pipeline construction will take approximately 26 weeks between April and October, there will be medium term losses over the subsequent 2 or 3 years as the reinstated ground regains its fertility and soil structure and the drainage network is replaced and where necessary improved.

(i) When the land has been reinstated to the satisfaction of the landowners and occupiers, the temporary fencing will be removed, the crossing points taken out, temporary water supplies reconnected and the land returned to agricultural production.

(j) Halite has approached all the landowners along the pipeline route. Of the 26 land interests, 5 have indicated that they do not wish to negotiate with Halite. The remaining 21 landowners have indicated they are willing to negotiate with Halite. The 21 landowners' advisors are in receipt of draft documentation from Halite's solicitors which is currently being progressed towards completion. An Option for a Deed of Grant of Easement is proposed. This secures the rights required by Halite for the pipeline and the protective provisions for landowners (outlined above).
3.9 Section 9: Hazardous Substances Consent

Question 9/1:
In order to progress the application for deemed hazardous substances consent, the following information is requested from Wyre Borough Council:

i) any current or contemplated use of the land to which the application relates

ii) the way in which other land in the vicinity is being used or is likely to be used; and

iii) any planning permission or development consent that has been granted for development of that other land in the vicinity.

Response to Question 9/1:

WBC has responded to this Question at section 9 of its letter to PINs dated 21 May 2012, a copy of which can be found at Appendix 38 below.
Section 10: Compulsory Acquisition

Question 10/1:

Please give the reasons why permanent acquisition of plots 9 and 13 shown in the Land Plans is required.

Response to Question 10/1:

Plots 9 and 13 shown in the Land Plans (Document 2.2) are the location where the observation platform will be constructed. The observation platform was proposed as a planning benefit related to the project by Wyre Borough Council but in order to ensure delivery of it, Halite must ensure it has the necessary land ownership. As it is a permanent structure, compulsory acquisition of land rather than rights is considered more appropriate. Halite would be entirely open to transferring the observation platform back to WBC upon completion or considering any other alternative land ownership arrangements with WBC relating to it provided appropriate easements are granted to Halite within Plots 9 and 13 in relation to the brine discharge pipeline.

Question 10/2:

In Appendix 2 of the Statement of Reasons (Document 7.1) re plots 49 and 50 where and what works are A16B?

Response to Question 10/2:

The reference in Appendix 2 of the Statement of Reasons (Document 7.1) regarding Plots 49 and 50 to Works “A16B” is a typographical error. This should read as a reference to Works “16B”.

Question 10/3:

Please explain the requirement for rights over plots 49 and 50 shown in the Land Plans.

Response to Question 10/3:

Plots 49 and 50 on the Land Plan are required for temporary use only (no permanent acquisition or rights is proposed). The land will be used as a temporary access and work site (as identified in Schedule 6 of the draft DCO (Document 6.1)). The plots will provide access into Works 16B and 16C for the installation of the brine discharge pipeline between the Fish Dock and where the pipeline crosses Amoundernes Way and provide a construction compound for these works.

Question 10/4:

If all interests in plots 149, 151 to 155 and 157 shown in the Land Plans are being sought, then why are new rights also being sought in relation to these plots?

Response to Question 10/4:

Plots 149, 151 - 155 and 157 shown in the Land Plans (Document 2.2) are hatched blue and pink so that Halite has the power to compulsorily acquire land or rights within those plots. Compulsory acquisition of land is required for the purposes of the permanent access road. Compulsory acquisition of rights is required for the
interconnector pipeline. The precise alignment and land-take for the access road and NTS pipeline is subject to limits of deviation as shown on the Works Plans (Document 2.3). The intention is that once the precise alignment of the access road and NTS pipeline is finalised, Halite would vest only the amount of land and rights that are required within those plots. However, the precise alignment will not be known until after the grant of the DCO. The degree of flexibility comprised in the Land Plans and Book of Reference reflects the limits of deviation shown on the works Plans and has been minimised as far as reasonably possible.

**Question 10/5:**

Plot 147 is part of a public road but is included in the Schedule 6 of the DCO and Appendix 3 of the Statement of Reasons as a plot where temporary possession is required. Elsewhere in the Book of Reference (Document 7.3) where public roads are involved no temporary possession rights have been sold presumably because they are not needed on a public highway. Please confirm plot 147 should be deleted from Schedule 6 and Appendix 3.

**Response to Question 10/5:**

Plot 147 is included in Schedule 6 of the DCO as a plot where temporary possession is required on the basis that the sub-soil beneath the highway will still be subject to temporary possession during the construction of the NTS pipeline. A similar situation occurs at other plots such as Plots 160, 183, 187 and 203. There is no intention to exercise temporary possession rights over the public highway itself and, indeed, this would not be a lawful use of the temporary possession power. Halite therefore does not consider Plot 147 or other plots where a similar situation occurs should be deleted from Schedule 6 of the DCO and Appendix 3 of the Statement of Reasons.

**Question 10/6:**

Plots 159 to 211 (save 205) seek rights with no limitation as to depth. This differs to the approach in other places e.g. plots 95, 96. Is there a reason for this?

**Response to Question 10/6:**

Plots 159 - 211 (save for 205) seek rights relating to the NTS pipeline. Plots such as Plots 95 and 96 where rights are sought in respect of the wells/boreholes from the wellheads to the underground gas storage caverns were limited to a depth of 1,000 metres as this was considered a sufficient depth for the purposes of the Project. A similar approach could have been followed in respect of Plots 159 - 211 but Schedule 1 (Work Nos. 20A - 20H) of the draft DCO (Document 6.1) stipulates that the depth of the pipeline shall not be more than 10 metres below ground surface (or below the bed of a watercourse where applicable). Halite does not consider that a depth limitation is necessary in respect of the Book of Reference rights but in relation to the boreholes/wells covered by Plots 95, 96 and others, it was considered it would provide some additional certainty to the affected landowners.
Question 10/7:

On the Land Plans most of the plots are edged with a dotted green line to show that temporary possession rights are required. In the Book of Reference Part 1 plots 4, 5, 7, 8, 11, 12, 16, 17, 19, 20, 22, 28, 33, 34, 36, 40, 49, 50, 53, 119, and 126 are all referred to as requiring temporary possession rights. Why have only these plots been identified in the Book of Reference as requiring temporary possession rights? Is it because no other rights are sought in relation to these plots other than the right to temporary possession?

Response to Question 10/7:

Halite confirms that the Examining Authority’s understanding is correct. Plots 4, 5, 7, 8, 11, 12, 16, 17, 19, 20, 22, 28, 33, 34, 36, 40, 49, 50, 53, 119 and 126 are not coloured pink or blue in the Land Plans on the basis that they are required solely for temporary possession rights and not compulsory acquisition. On that basis, the Book of Reference identifies that the plots are required for temporary possession so that it is clear they are not required for permanent compulsory acquisition. In respect of all plots where temporary possession rights are sought, they are identified on the Land Plans by the green dotted line and in Schedule 6 of the draft DCO (Document 6.1).

Question 10/8:

Is the purpose for which plots 149, 151 to 155 are being compulsorily acquired accurately described in the Book of Reference, given that this land is the new access road to the site from the A588?

Response to Question 10/8:

This Question covers the same issue as Question 10/4 (Response above). The rights are sought in the Book of Reference in respect of the NTS pipeline and this purpose is therefore correctly stated in the Book of Reference. The plots are also required for the access road but, as indicated above, the land required for the access road will be secured by compulsory acquisition of land rather than rights. This explains why Plots 149, 151 to 155 and 157 are hatched both blue and pink. Where compulsory acquisition of land (as opposed to rights) is proposed, there is no requirement to stipulate in the Book of Reference what purpose the land is being acquired for, although this is covered in the Statement of Reasons (Document 7.1).

Question 10/9:

What is the current position concerning negotiations over plots which are Crown land and the open space certificate required from the Secretary of State?

Response to Question 10/9:

(a) Plot 1 is owned by The Queen’s Most Excellent Majesty in Right of Her Crown and includes a linear strip of sea bed known as the Irish Sea. Negotiations commenced in April 2003 with agents of The Crown and by February 2005 principal Heads of Terms had been agreed including the term, the rent, the rent review provision and other matters. The Crown did not wish to enter into an option at that time and the parties agreed to leave the matter as agreed Heads of Terms.
(b) Other plots in the Book of Reference are owned by The Queen’s Most Excellent Majesty in Right of Her Duchy of Lancaster. These include the north and south river crossing and parts of the foreshore at Rossall. Negotiations commenced with the Duchy in 2003 and a number of Heads of Terms were agreed between the parties. However, the Duchy subsequently confirmed, and continue to confirm that in their view it would be inappropriate and premature to enter into any agreements prior to grant of consent for the Project.

(c) The application for an open space certificate was made to the Department of Communities and Local Government ("DCLG") in November 2011. Halite’s solicitors have corresponded with DCLG and currently await details of timescales for the consideration and determination of that application.

**Question 10/10:**

Is any land owned by statutory undertakers subject to objections against compulsory acquisition?

**Response to Question 10/10:**

(a) Associated British Ports ("ABP") own and operate the Port of Fleetwood and as such have a statutory duty to undertake and provide port facilities and is deemed a statutory undertaker. ABP raised an objection to the use of compulsory acquisition in their Section 56 Representation. An existing Agreement and Supplemental Agreement dated 18th September 2006 and a lease and Deed of Easement dated 19th September 2006 exist between ABP and Halite Energy Group Ltd. These documents contain the rights that Halite require to abstract water from the fish dock, construct and operate the Sea Water Pumping Station and to lay and use sea water and brine pipes through land owned by ABP. ABP’s objection was based on establishing consistency between the terms of the lease and the rights described in the Book of Reference. Meetings and discussions have been held between Halite and ABP since ABP’s section 56 representation and agreement has been reached in principle between Halite and ABP in relation to these matters. The agreement allows Halite to rely on the rights granted in the above documents, rather than the DCO, and includes the removal of plot 53 which was required for temporary occupation. Halite will therefore agree to the removal of Plots 53, 55, 56, 57 and 60 from the Book of Reference, Land Plans and Schedule 6 of the draft DCO. ABP's interest in Plot 59 is stated in the Book of Reference as being excepted from compulsory purchase. This agreement is acceptable to both parties. Amended Book of Reference sheets incorporating the above changes (showing the amendments as track changes) are contained at Appendix 39. Consequential amendments to Schedule 6 of the draft DCO (temporary possession powers) (Document 6.1) will be made and it is intended to submit a revised draft DCO with Halite’s representations to the Examining Inspectors due on 4th July 2012.

(b) Note: Amended Book of Reference sheets (shown in tracked change and “clean” versions) are also contained at Appendix 39 in respect of:

(i) Plot 100 where the owner of the plot was stated as being “Halite Energy Group Limited” and should have read Preesall Energy Services Limited. As with all other PESL plots, PESL’s interests are excepted from compulsory purchase.
(ii) Part 5 of the Book of Reference where local authority land subject to acquisition of rights (as opposed to outright acquisition of all interests) was included within Part 5 in error. As local authority land subject to acquisition of rights is not subject to special parliamentary procedure, these plots can be removed from Part 5 (but remain in Parts 1-3 of the Book of Reference).

(c) The Highways Agency have queried (Relevant Representation 136) the need for the use of compulsory acquisition of rights in relation to the brine pipeline passing beneath Amounderness way (Plot 37), suggesting instead use of licence under the New Roads and Street Works Act 1991. Halite’s solicitors have written to the Highways Agency to explain why land rights are required in addition to the licence. Constructive discussions on the subject have taken place with the Highways Agency, which does not object to the principle of the pipeline passing beneath the A585 but wishes instead to ensure that the most appropriate legal mechanism is used. A substantive response from the Highways Agency is expected in due course.

(d) There are no other Statutory Undertakers that have objected at this stage to the proposed use of compulsory purchase powers.
Question 11/1:

Please supply the corporate structure of the companies involved in current ownership of land within which the project is intended to be constructed and those undertaking the operation, and the relationship between them.

Response to Question 11/1:

Introduction

(a) The development site comprises land owned by Halite Energy Group Limited (Halite), Preesall Energy Services Limited (PESL) and land owned by various third parties.

(b) The extent of the land ownerships owned by third parties (i.e. other than Halite and PESL) are detailed in the Book of Reference (Document 7.3). This Response only deals with the land ownerships of Halite and PESL within the boundary of the development consent order. These interests are detailed on the schedule and plan attached as Appendix 41.

Halite Energy Group Limited

(c) Halite is a private limited company registered in England and Wales under company number 04145789. Its registered office is at Unit 5, St Georges Court, St Georges Park, Kirkham, Lancashire PR4 2EF, United Kingdom.

(d) Halite is a wholly owned subsidiary of HEGL Holdings, LLC, a Delaware limited liability company whose registered office is The Corporate Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801, USA. HEGL Holdings, LLC is itself wholly owned by Halite Energy Holdings, LLC, a Delaware Limited liability company whose registered office is The Corporation Trust Company, Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801, USA.

(e) The corporate structure for Halite is shown on the diagram attached as Appendix 40.

Preesall Energy Services Limited

(f) PESL is a private limited company registered in England and Wales under company number 02673604. Its registered office is Suite B, 29 Harley Street, London W1G 9QR, United Kingdom.

Corporate relationship between Halite and PESL

(g) Halite and PESL are not members of the same group of companies and do not share the same parent company. However, the majority shareholders of PESL have a minority shareholding in Halite.

(h) Ross Kenneth Hill is a director of both Halite and PESL.

(i) PESL historically provided business development support to Halite, but since 2010, these services are performed by Halite.
In 2001 and 2004, PESL acquired salt mineral rights at the Project site which also included ownership of about 80% of the associated land surface of such mineral rights.

On 30 September 2004, PESL sold the deeper virgin salt deposits and associated surface areas to Halite. PESL retained land which contained most of the salt caverns and salt mines. As part of this sale, PESL granted Halite a right of pre-emption over the land retained by PESL so that if PESL ever intended to sell its land, it would first offer it to Halite.

On 25 March 2010, Halite and PESL entered into a deed of covenant and restrictive covenant. This deed restricted PESL’s ability to develop or dispose of its land within the development site without Halite’s consent. The deed also grants Halite access over the land owned by PESL within the Project site.

Halite and PESL are currently concluding a further agreement that will provide Halite with all necessary rights over PESL land to construct and operate the Project. Halite will update the Examining Authority when this Agreement has been formally completed. A letter from PESL confirming that they agree with the content of Halite's Response to this Examining Authority Question is contained at Appendix 42.

Question 11/2:

Please supply evidence of the financial strength of the applicant to meet all the residual liabilities of the proposed project including decommissioning.

Response to Question 11/2:

In respect of liabilities for compulsory purchase compensation, Halite proposes the following mechanism which will provide a high level of certainty that dedicated funds will be available to meet any compensation payable to landowners arising from the exercise of compulsory purchase powers: Halite will commit through the development consent obligation to place funds into a dedicated account equal to the estimated upper level of CPO compensation payable. The proposed amount is £2.5m, based on a valuation undertaken by Halite's land agent, William Bashall Associates, a copy of which is contained at Appendix 43. The development consent obligation would prevent Halite from implementing the DCO or exercising any compulsory purchase powers until the account has been established and is in funds. The development consent obligation would bind Halite to only draw upon those funds for the purposes of payment of CPO compensation and to certify to WBC that this has been the case on each occasion. The development consent obligation will provide a mechanism for an alternative security for compulsory purchase compensation to be approved by the Secretary of State.

With regard to decommissioning costs, the development consent obligation requires Halite, prior to implementation of the Project, to create a fund containing sufficient monies to meet its decommissioning obligations under the DCO Requirements (see Requirements 33 and 34 of the draft DCO - Document 6.1) or a scheme to be agreed with WBC for any decommissioning necessary in the course of construction (more detail to be provided in the draft development consent obligation). The amount to
be placed into the fund will be agreed with WBC prior to implementation
and subject to dispute resolution procedures in default of such agreement.
WBC will then be granted a charge over the fund that can be exercised if
Halite fails to comply with Requirements 33 and 34 in the draft DCO
relating to decommissioning. The development consent obligation will
include a mechanism for seeking WBC’s approval of appropriate alternative
security.

(c) The draft development consent obligation will be progressed with WBC
(and LCC) and it is intended to make a draft available with the submission
of Halite’s representations by the 4th July deadline.

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**Berwin Leighton Paisner LLP**

**1 June 2012**

Doc ref 24312115
Comments from PWG on the Halite Response to Examination Authority’s First Written Questions (1st June 2012)

28th June 2012

Question 1/7

Halite state that “previous applications have proposed a greater number of caverns spread out over a much wider area” (p4,a).

PWG has pointed out in its objection (PWG pp43/44) that in the application which was refused after the Public Inquiry, just 24 caverns were proposed, which were reduced to 20, just 1 more than the present proposal.

The BS EN 1918-3 standard states “the geology of the saline mass should be investigated by seismic survey, if seismic data are not available” (p6,h).

This should apply to the area under Barnaby’s Sands where GC 81-336 has been judged as not fit for purpose. The data from this line were considered “difficult to interpret, of limited use” and were not used in the construction of the BGS model (BGS Report CR/05/183N).

There are no seismic lines which cross the the area where it is proposed to locate caverns 1-6.

Question 1/8

“the latest plots” (i.e. the 2010 Rutherford Model) “are purely to aid visual assessment and no increase in accuracy is implied” (p9,a)

Since the 2005 model was deemed by the Inspector at the Public Inquiry not to be sufficiently accurate for planning permission to be granted, the same has to concluded about the 2010 model.

Question 1/10

“normal faults tend (PWG italics)to have relatively predictable length-displacement relationships, where displacement tends to be approximately 0.01 to 0.02 times the tip to tip length of the fault” (p13,c).

The displacement of the fault at the western end of the Heads is in the order of 143m (PWG p16) implying a strike length of between 7 and 14 km. On the drawing 0001 in the GSR that fault has a strike distance of c 600m.

The East Barnaby’s Sands Fault shows a downthrow of the base of the halite of c 170m. giving a strike length of 8.5 to 15 km, whereas it is shown on 0001 as 1.5 km. Clearly a clarification of this relationship is called for.
**Question 1/12**

Halite states that “seismic reflection data are of good quality” (p14,a). That does not apply to GC81-336 as has been shown above. It should be noted that in response to Question 1/13 (p15) Halite does not give the range of accuracy for GC81-336.

**Question 1/13**

The table (p15,a) provided by Halite does not correspond with the information provided at the Inquiry by the BGS, although it purports to do so (see PWG p32 Figure1).

For IELP 99-25 Halite state that at the east end of the line the base halite tied to the Cote Walls Farm BH is <10m. In fact that borehole only penetrated 4.47m into the halite bed so that the base halite cannot be tied to the borehole data. BGS suggest an accuracy of +/- 20m.

For Can-G at the west end of the line, Halite give an accuracy of 10-15m compared with the BGS figures of +/- 20m for the top halite. The base halite is not stated, the BGS suggesting 40-50m.

These data are not sufficiently accurate for interpolations of the halite bed to be made with any certainty between IELP 99-25 and Can-G, and to the north of IELP 99-25.

However, as the answer to Question 1/14 shows, the seismic lines were used in the construction of the model and the Section 1-1 (p16).

**Question 1/28**

“A detailed analysis of core fractures was undertaken by the BGS of the core from the Hay Nook and Burrows Marsh boreholes” (p24,a).

It should be made clear that only short sections of those boreholes were actually cored. In Burrows Marsh BH cores were taken between 129 and 136m (drilled depth) and 336.5 and 339m, a total of 67.4m. For Hay Nook, 3 sections were cored namely between 220 -229.3, 374-383.15, and 423-430, i.e. a total of just 25.45m (BGS CR/10/128 iii).

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The consequences for cavern creation created by potential shale gas exploration/exploitation have been interpreted by Halite as being purely seismic (p27).

**Question 1/38**

“The Fleetwood and Presaull waste water treatment works lie directly over glacial tills which are low permeability soils” (p29,e).

The glacial tills include thick and laterally extensive lenses of sands of high permeability. One such lens was formerly exposed in the cliffs of the Wyre Estuary just north of the Presaull Works, and could be assumed to extend under the Works.
EVIDENCE FROM

THE PROTECT WYRE GROUP

REFERENCE NUMBER: 10015247

APPLICATION FOR AN UNDERGROUND NATURAL GAS STORAGE FACILITY
UNDER THE WYRE ESTUARY BY HALITE ENERGY GROUP
PLANNING INSPECTORATE REFERENCE NUMBER: EN030001
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PWG Reply to HEG response to “PWG Evidence - Draft Document” on the Geology

The Protect Wyre Group (PWG) submitted a document to Halite Energy Group (HEG) on 7th April 2012 entitled “PWG Evidence - Draft Document” with the intention of soliciting detailed answers from HEG to the Group’s queries on the geology to either establish areas of common ground or to define areas upon which agreement could not be reached. It was hoped that the Group would have obtained a more detailed response to its questions before submitting its report to the Planning Inspectorate on June 6th.

The questions in PWG’s document could not be addressed immediately as HEG’s resources were deployed in answering the questions put to it by the Planning Inspectors and it is accepted that they took precedence. PWG’s document was passed to Mott MacDonald for evaluation and written response, in due course, but too late for the June 6th deadline.

PWG submitted an amended version of this “Draft Document on Geology” to the Inspectorate as part of detailed objection.

This document lists the outstanding issues with page and paragraph references to Mott MacDonald’s response on behalf of HEG which they have already submitted to the Inspectorate together with a copy of PWG’s Draft Document.

MMD states in para 6 on page 1:- *This document (i.e. HEG’s) provides initial comments on the draft Evidence prepared by the PWG, but does not intend to provide an in depth assessment of that evidence. This document then provides answers to the seven specific questions posed by the PWG.*

It is noted that the response from HEG provides initial comments on the PWG Draft Evidence but it is not an in depth assessment of that evidence. Indeed PWG considers that whilst the HEG response deals in detail with some of the issues raised by PWG, many other issues are not addressed at all.
1. Page 2, para 4 MMD states: *In the case of Preesall, the amount of data available to the project in the form of borehole data, data from existing caverns and seismic data is far in excess of most similar projects.*

1.1 The amount of data available in order to construct the 3-D Model may be “far in excess of most, similar projects”. It does not follow that the data is sufficient given the complexity of the geological structure, the shallow depth at which the halite bed lies, the proximity of the old brine wells and mine, and the fact that 80,000 people live within 3 miles of the site.

1.2 The Report of the Inspector following the Public Inquiry into the Canatxx application states that “overall, the information provided by the applicant is neither sufficient nor sufficiently detailed to support the proposals”. The PWG view is that the data from the two additional bore holes do not go far enough to satisfy the requirements as set out by the Geological Assessor at the Inquiry.
2. Page 2, para 4 MMD states:—*We believe there are no significant differences between the BGS model and that presented within the Geological Summary Report presented (Document 9.2.2). There are refinements, but those refinements reflect the natural consequence of additional work, analyses and data being incorporated into the model.*

2.1 Halite asserts that there are no significant differences between the 3-D Geological Model presented in the GSR and that presented by the BGS at the Public Inquiry (2005). The inaccuracy of the British Geological Survey (BGS) model has been demonstrated by the two bores carried out subsequently - Hay Nook and Burrows Marsh - and there is every reason to believe that similar inaccuracies would be revealed if the Halite model were to be tested by further bore holes.

2.2 Regarding the comparison figures (p16 PWG document) for the Burrows Marsh Bore Hole (BMBH), the data from the BGS Model is estimated at a point to the west of the fault. This shows a considerable discrepancy from the bore hole data, adjusted for true vertical depth (p2 para 6).

2.3 Figure 2.1 (response from Halite p3) purports to show the relationships between the BMBH and the East Barnaby's Sands Fault. If the position of the fault is shown absolutely accurately on the Dip Magnitude Maps of the Upper and Lower Surfaces of the halite, then the bore may have just missed encountering the Fault.

2.4 However, that leaves the question of the thickness of the halite bed on either side of the Fault as revealed by those maps. The maps show the upper surface of the halite lying between 15 and 50m from the drilling site, the basal surface 90-150m. The HEG section (Figure 2.1) gives 21-43m for the upper surface, 113-243m for the basal surface i.e. the diagram is at odds with the map evidence.

2.5 In order to fit the evidence, PWG suggests a thickness of the halite bed 170m to the east of the Fault and 220m to the west. In Figure 2.1 the thicknesses are 200 and 386m respectively, although there is some uncertainty because dips are not shown.
3 E-W fracture zone (MMD page 3)

3.1 The dip magnitude maps of the upper and basal surfaces of the halite show that there is a dislocation to the generally N-S trending faults along an E-W line, approximately along northing 464 (see PWG Figure 1 on next page).

3.2 PWG is concerned about the amount of movement and consequent shattering of the rock which resulted in the transposition of the faults. South of this line there is a substantial synthetic fault, north of the line it is antithetic.

3.3 This dislocation also occurs further to the west where it would appear no transposition occurs. However, the basal salt fault line north of the dislocation, although drawn on the dip magnitude map, is not identified by the 3-D modelling.

3.4 Figure 2.2 (HEG response p4) shows extensional folding in an anticlinal segment of the Black Mountains USA and bears no relevance to the Preesall Geology where there is no suspicion of any anticlinal structure in the area between the upper surface faults along line X-X as shown on the PWG Figure 1 (see MMD map 0013).

3.5 The HEG position is that the faults north and south of the zone of dislocation are entirely separate structures and that an east-west fracture zone is not likely to be present, nor is it needed to explain the observed features. PWG remains unconvinced and points out that Cavern 13 would be sited on the line with Caverns 14 and 11 being very close.
**Diagram Figure 1**

Fault lines as shown on dip magnitude maps.

- **US** - Upper Surface of Halite
- **BS** - Basal Surface of Halite

Possible line of Burn Near Fault

Zone of Dislocation
4 It is noted that the dip magnitude maps were created from the top and bottom salt grids and therefore do not identify the Burn Naze Fault, the position and magnitude of which remains uncertain (p4 para 2).

5 With reference to the thickness of the halite in the northern polygon, whilst BW 61 and 77 may be on the margin of the basin, BW 43 lies 300m to the west. The assumption by Halite that 81m of salt in E1 indicates the position of the Burn Naze Fault and the use of this assumption as the basis for the location of caverns 1-6 is extremely questionable (p4 para 2).

6 Halite puts much emphasis on the fact that the location and spacing of caverns follow rules as set out by Professor Rokahr. However, these rules have not been adhered to in a number of cases. To state as part of a planning application that “further numerical analysis would be undertaken as part of any detailed analysis” is not acceptable (p4 para 4).

7 Halite appears to confirm that the maximum volume of gas which could be stored i.e. c 900 mcm would only be achieved during the testing of the caverns and that the maximum volume for the caverns under operating conditions is less. PWG suggests that this would be c 650 mcm (p5 para 2).

8. Wet Rockhead and BW130

a) Halite stresses the unlikelihood of wet rock occurring, citing the conditions in BW 88 as an example. It does not answer the concerns raised by PWG for example regarding the void encountered in BW 130 (p5).

b) A major issue which we ask to be clarified, concerns the request (3rd May 2012) PWG made to British Drilling and Freezing (BDF) for information about their daily drilling report 13 on BW130 which shows a void at the top of the halite.
c) Howard Mew (BDF) replied on the 9th May 2012 stating that this should be dealt with via the Planning Inspectorate’s Examination process and forwarded the correspondence to Halite. The response from Halite (28th May 2012) was that this matter should be part of the PWG representation.

d) PWG has seen a copy of this report and requests that the Inspectorate asks either BDF or HEG to furnish the same to them for examination by the Inspectorate.

9 The possibility of gas migration from caverns or connecting pipe lines across the Burn Naze Fault and penetrating the Sherwood Sandstone or rising into the glacial sands under Fleetwood is dismissed as not credible (p5). However, HEG does not know the position or the size of the Burn Naze Fault nor indeed if there are a series of antithetic step faults on the western side of the graben. Neither does HEG know whether the Fault (or step faults) is annealed. PWG consider it to be vitally important that this be found out before any statement of credibility about gas migration is made.

10 The possibility of Crown Hole subsidence created by cavern collapse was one of the reasons why after Public Inquiry, the previous application was refused. HEG seems content to avow that subsidence on such a scale will never happen (p6).

11 Attached to the “PWG Evidence - Draft Document” were a number of questions to which Halite provided written answers (28th May 2012).

The PWG response to these follows.

Q1 Halite suggests that a confidence level of 95% would be appropriate, although it does not state specifically that the confidence intervals shown in the BGS diagram (PWG Draft Evidence Figure 1) are based on a 95% level of confidence (p8, para 3.1).
Q2 (p8, para3.2)

Cavern 2

Halite states that the top of the halite is probably accurate within +/- 20m and the bottom within +/- 40m (assuming a 95% confidence level?). Given that the nearest seismic line is 700m to the south and the uncertainty about bore hole E1, PWG consider that the confidence intervals are far too low.

Cavern 17

Halite asserts that the top and bottom of the halite bed is defined by seismic line GC81-336. The data from this line were reprocessed in 1996 and rejected by the BGS because they were of poor quality. “A large omission zone exists in the seismic co-incident with the Wyre Estuary…. These data are difficult to interpret, of limited use and have not been used in this study” (BGS Report CR/05/183N). Again PWG questions the accuracy of the confidence intervals given in answer. Seismic line GC81-336 extends across the Wyre Estuary, so it could have been used to identify the position of the Burn Naze Fault if the quality of the data had been sufficiently good.

Q4 The seismic line GC81-336 (along with IELP 99-25) is given as primary evidence for the faulting shown in the model. The quality of the data has been referred to above (p9, para 3.4).

Q5 The PWG assessment of the true vertical depth of the top of the salt at cavern locations 8,10 and 11 is taken from the MMD maps, and differ from the Baker Hughes Table (p11, para 3.5).

Q6 The GSR includes a map showing the location of the caverns in ‘previous proposal’ - January 2010. The application was submitted in 2009 and did not include any map showing the proposed locations of caverns (p12, para 3.6).
Comments from PWG on the Halite Response to Examination Authority’s First Written Questions (1st June 2012)

Geology

Question 1/7
Halite state that “previous applications have proposed a greater number of caverns spread out over a much wider area” (p4,a).

PWG has pointed out in its objection (PWG pp43/44) that in the application which was refused after the Public Inquiry, just 24 caverns were proposed, which were reduced to 20, just 1 more than the present proposal.

The BS EN 1918-3 standard states “the geology of the saline mass should be investigated by seismic survey, if seismic data are not available” (p6,h).

This should apply to the area under Barnaby’s Sands where GC 81-336 has been judged as not fit for purpose. The data from this line were considered “difficult to interpret, of limited use” and were not used in the construction of the BGS model (BGS Report CR/05/183N).

There are no seismic lines which cross the area where it is proposed to locate caverns 1-6.

Question 1/8
“the latest plots” (i.e. the 2010 Rutherford Model) “are purely to aid visual assessment and no increase in accuracy is implied” (p9,a).

Since the 2005 model was deemed by the Inspector at the Public Inquiry not to be sufficiently accurate for planning permission to be granted, the same has to be concluded about the 2010 model.
Question 1/10

“normal faults tend (PWG italics) to have relatively predictable length-displacement relationships, where displacement tends to be approximately 0.01 to 0.02 times the tip to tip length of the fault” (p13,c).

The displacement of the fault at the western end of the Heads is in the order of 143m (PWG p16) implying a strike length of between 7 and 14 km. On the drawing 0001 in the GSR that fault has a strike distance of c 600m.

The East Barnaby’s Sands Fault shows a downthrow of the base of the halite of c 170m. giving a strike length of 8.5 to 15 km, whereas it is shown on 0001 as 1.5 km. Clearly a clarification of this relationship is called for.

Question 1/12

Halite states that “seismic reflection data are of good quality” (p14,a). That does not apply to GC81-336 as has been shown above. It should be noted that in response to Question 1/13 (p15) Halite does not give the range of accuracy for GC81-336.

Question 1/13

The table (p15,a) provided by Halite does not correspond with the information provided at the Inquiry by the BGS, although it purports to do so (see PWG p32 Figure1).

For IELP 99-25 Halite state that at the east end of the line the base halite tied to the Cote Walls Farm BH is <10m. In fact that borehole only penetrated 4.47m into the halite bed so that the base halite cannot be tied to the borehole data. BGS suggest an accuracy of +/- 20m.

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It should be made clear that only short sections of those boreholes were actually cored. In Burrows Marsh BH cores were taken between 129 and 136m (drilled depth) and 336.5 and 339m, a total of 67.4m. For Hay Nook, 3 sections were cored namely between 220 -229.3, 374-383.15, and 423-430, i.e. a total of just 25.45m (BGS CR/10/128 piiii).

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“The Fleetwood and Preesall waste water treatment works lie directly over glacial tills which are low permeability soils” (p29,e).

The glacial tills include thick and laterally extensive lenses of sands of high permeability. One such lens was formerly exposed in the cliffs of the Wyre Estuary just north of the Preesall Works, and could be assumed to extend under the Works.
Corporate Structure

Question 11/1:

*Please supply the corporate structure of the companies involved in current ownership of land within which the project is intended to be constructed and those undertaking the operation, and the relationship between them.*

Halite’s response is:-

(k) On 30 September 2004, PESL sold the deeper virgin salt deposits and associated surface areas to Halite. PESL retained land which contained most of the salt caverns and salt mines. As part of this sale, PESL granted Halite a right of pre-emption over the land retained by PESL so that if PESL ever intended to sell its land, it would first offer it to Halite.

(l) On 25 March 2010, Halite and PESL entered into a deed of covenant and restrictive covenant. This deed restricted PESL’s ability to develop or dispose of its land within the development site without Halite’s consent. The deed also grants Halite access over the land owned by PESL within the Project site.

The Inspectorate will be better able than members of PWG to decide if Halite’s answer is disingenuous but we would point out that Halite has gone to great lengths to convince everyone that HEG is a new company and not simply a continuation of Canatxx Energy or Canatxx Gas Storage.

However in its evidence to the Inspectorate, 30th May 2012, on page 10, para 2.11 PWG offers the evidence from Companies House to show that HEG only became an entity when it did indeed change its name from Canatxx Gas Storage to Halite Energy.

2.11 *The details held at Companies House show that the company was incorporated on 23rd January 2001 as Hamsard 2280 Limited, changing its name to Canatxx Gas Storage Limited on 3rd April 2001 and then to Halite Energy Group Limited on 26th July 2010.*
How therefore could PESL sell salt deposits and associated surface areas to HEG in 2004 (as stated above in (k)) when HEG didn’t exist?

Also HEG says it entered into a Deed of Covenant with PESL on 25th March 2010 which is four months before HEG came into existence.

There appears to be another anomaly which is the existence of Halite’s other company Anglesey LNG Ltd which has Keith Budinger, Dr John Roberts, Michael Brown and David Gray listed as directors -all directors of Halite Energy Group - and this company was also the subject of a name change from Canatxx LNG Ltd on 26th July 2010.

The possibility of bringing regasified LNG to Preesall via a 70 mile sea pipeline from Anglesey featured prominently in earlier Canatxx publicity material - the extract from the web site of Energy-Pedia News, 12th January 2009, is shown below.

Canatxx Gas Storage Limited (CGSL) and Canatxx LNG Limited (CLNG) has retained BNP Paribas Corporate Finance to advise it in seeking strategic investors to take a stake of up to 50% in the Company. The planned gas storage facility is located in the Wyre Estuary at Preesall in Lancashire on the Irish Sea coast. The site is planned to be the largest onshore natural gas storage facility in the UK, with initial working storage capacity of 12 billion cubic feet (bcf) in 2013, increasing to 42 bcf by 2018. Canatxx is also seeking indications of interest from parties to enter into long-term gas storage agreements of up to a total of 20 bcf. The Company is offering withdrawal from storage with firm entry rights into the National Transmission System. Bidders are also invited to express interest in an option to purchase equity and/or terminal usage rights from Canatxx LNG Limited, which owns the LNG re-gasification project at Anglesey, Wales. Canatxx received its planning permission in March 2008 and this is one of the only permitted LNG projects in Europe.
The full article can be read on:-

The overview of the Halite Energy Group and its holding companies does not make any reference to this LNG site in its responses to the Inspectorate but PWG would like to know how the proposed financing of the Preesall project and the provisions of decommissioning, etc would be affected by the existence of another company within their group which might require development funds at the same time.
Evidence from Other Interested Parties

Lancashire County Council - Relevant Representation 151

In an email, 12th June 2012, to PWG from Keith Budinger (HEG CEO), on the subject of PWG’s challenges to the suitability of the geology of the Preesall salt field and the options of meeting to discuss the same, Mr Budinger states:-

“You will have noted that statements of common ground have been reached with Atkins and LCC on geology and above ground safety and it may that we can also review those documents at the meeting and identify areas of the SoCGs which you agree/disagree with”.

PWG declined the meeting on two counts, one that it could have prevented us from submitting our questions and challenges to the Inspectorate by 4th July deadline and two that Mr Budinger had already declared in the same email that :-

“Regarding your comments about provision of “in depth assessment”, I should clarify that Halite will not be producing a more detailed response to your April 2012 document and the focus of our written documents will be through the formal Examination timetable”.

The Group saw this as an attempt by Mr Budinger to play down PWG’s challenges on geology by reconfirming that Atkins for LCC and MMD for HEG had reached Statements of Common Ground (SoCG) on geology and this caused us to re-examine what had actually transpired between Lancashire County Council (LCC) and HEG.

Lancashire County Council informed the Inspectorate in their letter, 10th February 2012, that:-

Whilst the County Council does not object to the proposal at this stage, it reserves the right to object at such time as a full and proper assessment of the application has been made, and a local impact report prepared which shows …..

….. That the geological assessment is sufficient to demonstrate the geology of the area
is capable of accommodating the proposed development without creating migratory pathways for gas.

In the SoCG the first sentence in 2.7.2 states “The geology has been defined by a three dimensional model which has been based on geophysical surveys, boreholes and historic drilling records”.

In short, HEG has identified an area of salt (referred to as the Northern Lozenge) which hasn’t been mentioned or established as being suitable for gas storage in any of the previous planning applications and this same area has never been physically investigated with on-site boreholes or seismic lines.

PWG contends therefore that the SoCG for this Northern Lozenge has been agreed on a set of propositions, probabilities, models and desk studies and contend that this is in opposition to the recommendations of the Assessor at the Public Inquiry where Canatxx were urged to undertake physical site investigations before any cavern design was undertaken.

PWG suggests to the Inspectorate that the Group’s challenges about the suitability of the salt for gas storage are indeed valid and not mitigated by a SoCG based on theoretical values, however detailed they may be.

Canatxx (HEG) have had almost 20 years (PWG p19, para 4.7) to prove their theories by drilling test boreholes but they have elected not to do this so their exploration of the Northern Lozenge has to remain theoretical.
Halite - Lancashire County Council - COMAH

In the same letter to the Inspectorate, 10\textsuperscript{th} February 2012, LCC states its requirements:-

“\textit{That the application demonstrates that the development would not present an unacceptable risk of gas migration, given the relationship of the proposal to former operations and its proximity to residential areas on the east side of the estuary, and the more densely populated Fleetwood peninsula throughout its operation, decommissioning and long term aftercare management}”.

and

“\textit{That a full risk assessment for the proposal has been carried out that would address the fear and distress within the local communities attributable to the nature of the proposal and the potential consequences of any accident / incident occurring}”.

and

“\textit{The proposal would maintain appropriate distances between establishments and areas of public use, in accordance with the provisions of the SEVESO II Directive, and that any measures to maintain appropriate distances can be achieved without the closure of a section of the Wyre Way within the application boundary on a permanent basis}”.

It is PWG’s understanding that Halite would be responsible for the on-site emergency plan(s) for gas storage under COMAH and its eligible pipelines to junctions with the national network and our thoughts on the company’s ability to discharge this responsibility have already been recorded in our evidence.

The Group further understands that according to “HSE Guide to COMAH Regulations 1999 as amended” the responsibility falls to LCC who “must prepare an adequate emergency plan for dealing with the off-site consequences of possible major accidents’

Including:-

‘the arrangements established to help with the emergency response on site’.
PWG has stated in its evidence that the ‘off-site consequences’ following a gas migration from the proposed site would require a plan to evacuate residents from the Fleetwood Peninsula or the Over Wyre villages which we suggest would fall to LCC to organise.

Not wishing to become involved in semantics, in LCC’s representation, it states on page 5:-

“The Preliminary Quantitative Risk Assessment concludes there is no risk of gas leaking from the caverns necessitating large scale evacuation. Whilst it is acknowledged that the proposal would be subject to COMAH, and which would minimise the risk of accidents involving dangerous substances, and to limit the impact of the proposed development on people and the environment in the event an accident were to occur, it is considered that an emergency plan to provide for any such risk or incident should be provided”.

In our opinion, three words from the end it says ‘should’ but we contend that there is no ‘should’ but there is a ‘must’ according to COMAH regulations and whilst there is no criticism of LCC’s particular choice of word, the ability to comply with this element of the COMAH regulations may hang on this very point.

To mitigate against a gas migration and to minimise the potential threat to life that might subsequently occur, the necessary evacuation of residents is a distinct possibility.

PWG (page 96, para 8.59) suggests that this would be an impossible task and unless LCC can demonstrate otherwise by producing such a plan, it has to be considered that this application would not meet the standard required by COMAH regulations and therefore we suggest that the granting of the Development Consent Order should not be considered until it is proven that COMAH regulations can be met.
United Utilities

It was surprising and indeed of great concern to note the absence of any comment from United Utilities (UU) to the Inspectors on the possibility of gas migration from the proposed site to the Fleetwood Waste Water Treatment Works (WwTW) and the Fylde Coast Interceptor Tunnel.

This was discussed at length in PWG’s evidence (page 86, section 8).

Para 8.10 specifically comments on the interchange between Halite and United Utilities

This is not only a concern of the Protect Wyre Group; United Utilities informed Halite of their concerns on this matter in July 2011 when they said:-

“The risk of gas escaping the caverns and entering the tunnel provides a clear route for passage of leaked gas all the way along the front to south Blackpool”.

See also

Para 8.60 records United Utilities concerns as expressed to Halite Energy in June 2011:-

“Fleetwood WwTW: located on the west of the Wyre Estuary, this works is less than 2 miles away from the gas storage caverns and is a very significant works serving the whole of the Blackpool and Fleetwood area (a population of up to 426,000 during peak season)”.

See also

Para 8.70 records where Unite Utilities further commented to Halite Energy in 2011

“The developer would have to satisfy UUW that sufficient boreholes / ground water investigation had been done to understand / assure UUW that the development would not increase the risk of future explosions of gas impacting upon the treatment facilities or sewers draining to these works”.

“
PWG asks that the Inspectors consider this omission and that they request reasons from UU as to why they have made no further comment to the Inspectorate about their concerns.

If UU have indeed had their concerns addressed by Halite, in spite of there being no available borehole data on the ground between the WwTW and the Halite site, it must be of interest to the Examination to understand what assurances or guarantees have been offered and the foundation that any such assurances have been based upon.
The Wyre Way & Knott End Golf Course - COMAH

The third italicized paragraph on page 19 of this document refers to LCC’s statements (see below) about COMAH and the potential to close the Wyre Way.

“The proposal would maintain appropriate distances between establishments and areas of public use, in accordance with the provisions of the SEVESO II Directive, and that any measures to maintain appropriate distances can be achieved without the closure of a section of the Wyre Way within the application boundary on a permanent basis”.

Similarly in PWG’s evidence to the Inspectorate 30th May 2012, we commented upon this matter

2.13 The Planning Inspectors are asked to also consider the implications of COMAH and HSE legislation which will almost certainly cause the closure of the Wyre Way to the public - something the Secretary of State opposed in her decision letter of 16th October 2007.

And again in section 6 where we additionally commented upon the proposed new well head being sited upon land not owned by HEG but by the Knott End Golf Club.

6.28 Halite appear to be following the same path as the previous Canatxx regime in overlooking this basic requirement and continue to expose members of the public to risk whilst walking the Wyre Way, and with them becoming a potential unwitting ignition source should their presence possibly with smoking materials coincide with a loss of containment incident.

6.29 Halite have modified the earlier Application but in so doing have located a new well head position onto the south end of the Knott End golf course. By doing so they have now included well heads on either side of the Wyre Way and thus ensure that ramblers, dog walkers, children and the like are passing between well heads as they legitimately continue to enjoy use of this age old route.
There are two additional points that PWG would like to raise on this matter.

The first is that in addition to the users of the Wyre Way being endangered by the position of the proposed new well head, (see 6.34), our estimates of distance from the well head to the southerly greens and tees at Knott End Golf Club would place the club’s members, visitors and staff within the accepted 250 metre exclusion zone from a well head whilst using the course.

The screen grab below offers a rough estimate of distances.

It is hoped that Knott End Golf Club will make their own representations to the Inspectorate about the proposed siting of the new well head on their land highlighting the dangers it might pose to their members, visitors and staff and also to the future financial viability of the Club.
If this scheme were to go ahead with the well head at this location, PWG is of the opinion that it would probably propel Knott End Golf Club towards closure as the reduced course playing length and the potential dangers posed made it commercially unsustainable.

The second additional point to be made refers to LCC’s concerns about the Wyre Way being closed on a permanent basis.

PWG has raised significant concerns about the perceived inadequacy of security provisions in the Halite scheme and it has concerns that the assurances given at the planning stage might well be overturned if the development were to go ahead. This could possibly involve the total closure of the Wyre Way in the area and indeed the golf course as well.

One would like to think that the conditions laid down when a Development Control Order is granted remain in force both during the development and operational phases but there would be nothing to stop HEG applying for a variation of their scheme to extend their security boundaries or the scheme could even be sold on to another developer who might take a totally different view about the implementation of COMAH and indeed seek to ring fence the entire site - thus closing the Wyre Way and enclosing some of the golf course playing area.

This possibility was highlighted by an article in the Hull Daily Mail on Friday 29th June 2012 where Scottish and Southern Energy plc and Statoil (UK) Ltd sought to relocate the main well head and the main access to one of their facilities at Aldbrough and to add a new warehouse facility, much to the concern of the local residents who had previously enjoyed a good relationship with the developer. The residents’ reported comment below raises a number of issues on the matter:-

“Residents are concerned the planning system has failed to adequately control the development to date, with claims the complex built bears little resemblance to what was originally proposed and approved”.

An extract from the Hull Daily Mail article is shown below and the full story can be read at:-

The company behind one of the country's largest onshore gas storage facilities have been told to improve relationships with the community.

Councillor John Whittle said the trust of Garton and Aldbrough residents in SSE and Statoil was "eroding about the same rate as the coastline".

His comment came as the energy firm's application to relocate the main access to one of their facilities was approved, subject to bridleway improvements, community funding, traffic and landscaping and environmental matters.

The decision had been deferred from earlier this month for more time to be considered on the scheme.

Speaking after the meeting, Steve Mattinson, vice-chairman of Garton Parish Council, said: "It is not the decision we wanted and it is disappointing.

"We are not against the gas storage, we just want the companies involved to speak to the residents as good neighbours.

"In the past, they haven't done the landscaping they said they would do and we feel let down."

Residents are concerned the planning system has failed to adequately control the development to date, with claims the complex built bears little resemblance to what was originally proposed and approved.

Mr Mattinson said: "Although their application wasn't deferred, as we would have liked it to have been, it was evident the companies were sent a clear message not to treat the residents as they had done in the past. The councillors told them the last few years have been unacceptable.

"We will be looking carefully at all the details and if it they are not being enforced we will be hassling them."

Nine caverns are nearing completion and another nine are being proposed in a second phase of the £400 million project after the development was approved four years ago.

The latest permission, approved in County Hall in Beverley yesterday, was to move the main wellhead platform further inland, together with the construction of a new centre warehouse facility and a new access road.

The companies said the move is necessary because of an increase in the rate of nearby coastal erosion.

However, the plans triggered concerns from residents. Some fear the extension of the existing facility, along with plans to increase the working hours of the plant to a 24-hour
operation, will turn an area of open countryside into a sprawling round-the-clock industrial site.

Mr Mattinson said a community liaison group set up to work with SSE and Statoil, existed in name only and there had been no representatives from the companies at the last few meetings.

Accepting that any development proposal can only be judged on the merits of what is proposed it does beg the question if this the right development for this area and what future safeguards the residents of Wyre might have if this scheme were to go ahead.
Response to Panel’s Further Written Questions of 18th July 2012

FROM

THE PROTECT WYRE GROUP

REFERENCE NUMBER: 10015247

APPLICATION FOR AN UNDERGROUND NATURAL GAS STORAGE FACILITY
UNDER THE WYRE ESTUARY BY HALITE ENERGY GROUP
PLANNING INSPECTORATE REFERENCE NUMBER: EN030001
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PWG offers the following comments on the questions asked in Annex ‘A’ on 18th July 2012

Geology

Q4

The data from the Hackensall Hall E1 BH used by the BGS in the 2005 Geological Model are taken from the BGS Memoir “Geology of the country around Blackpool” (Wilson and Evans 1990). The details of the core are given in the Appendix 1 (p71) which shows 5.49m of no core at the top of the Preesall Salt, followed by 66m of halite interspersed by 5 marl bands indicating that this is the full sequence of the halite bed. The bore was drilled in 1940 for ICI and cored from 38.71m (i.e. from the top of the Breckell’s Mudstone).

Halite Energy Group (HEG) claims (HEG comments on LIRs, RRs and WRs etc July 2012 - 3.114 (see Doc HEG 8 listed in Appendix 1)) that “there are no significant differences between the BGS model and that presented within the Geological Summary report”. Clearly this is not the case.

The HEG claim that the halite is sufficiently thick in the area of caverns 1-6 is based on the assumption that the Burn Naze Fault is encountered in Bore Hole E1. PWG strongly refute this and has set out the evidence in its submission (Geology Section 5.3 (Doc PWG 5)) and its comments on the HEG response to the Examination Authority’s first written questions (Geology p8 para5 (Doc PWG 7)).

PWG asks the Inspectors to look at section 0004 in the GSR showing the E1 borehole ending in the halite, which it plainly doesn’t.

The attitude expressed by HEG to the uncertainty of the location of the Burn Naze Fault is stated in 3.135 (Doc HEG 8). “The situation is therefore not viewed as a major concern”. PWG avers that this is very definitely a major concern because it calls into question whether caverns 1-6 can be created safely without the clarification as to the thickness of the halite bed in this area.
Q5

PWG has already questioned the use of the seismic line GC 81-336 by HEG (PWG comments on HEG’s response to the first written questions - Cavern 17 p10 (Doc PWG 7)). The BGS were concerned about the poor quality of the data from this seismic line and did not use them in its 2005 model. Now HEG is claiming that the geology of the area under Barnaby’s Sands (the southern polygon) is verified by this seismic line (see HEG answer to PWG questions 28th May 2012 - Questions 2/3, pp8/9 (Doc HEG 4)).

Q7

The Burrow’s Marsh BH indicates a thickness of halite at this point of c320m true vertical depth. This is an estimate because

a   the bore was drilled at an angle of 28 degrees

b   the halite bed dips to the west - estimates from the top of the halite bed give 14 degrees.

PWG in its submission (Doc PWG 5) draws attention to the difference in the thickness of the halite between the 320m in the bore and the BGS model of 225m. PWG sets out a possible explanation for this discrepancy (pp 31-35) and asked HEG to account for this (p34 3.6.5). The HEG diagram 3.125 (Doc HEG 8) does not fit the map evidence (p5 para 2.4 - PWG reply to the HEG response to the PWG draft evidence (Doc PWG 7)) regarding the relationship of the East Barnaby’s Sands Fault to the depth and thickness of the halite bed on either side. PWG questions the use of 320m as the thickness of the halite in the 2009 model and suggests that the BGS 2005 model of 225m is more accurate.
Q10

PWG calculations (in metres) for the halite bed from west to east across the two polygons proposed for caverns are shown below.

**Northern Polygon**

<table>
<thead>
<tr>
<th></th>
<th>West</th>
<th>Centre</th>
<th>East</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 BH</td>
<td>317</td>
<td>296</td>
<td>196</td>
</tr>
<tr>
<td>BW 43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BW 77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top of halite</td>
<td>398</td>
<td>401</td>
<td>317</td>
</tr>
<tr>
<td>Base of halite</td>
<td>81</td>
<td>105</td>
<td>121</td>
</tr>
</tbody>
</table>

**Southern Polygon**

<table>
<thead>
<tr>
<th></th>
<th>West of Fault</th>
<th>East of Fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>No evidence</td>
<td>530</td>
<td>371</td>
</tr>
<tr>
<td>Burrow’s Marsh BH</td>
<td>754</td>
<td>541</td>
</tr>
<tr>
<td>BW 123</td>
<td>220</td>
<td>170</td>
</tr>
<tr>
<td>Top of halite</td>
<td>?</td>
<td>324</td>
</tr>
<tr>
<td>Base of halite</td>
<td>?</td>
<td>459</td>
</tr>
<tr>
<td>Thickness</td>
<td>?</td>
<td>135</td>
</tr>
</tbody>
</table>

The depth and thickness of the halite bed to the west of the Burrow’s Marsh BH is a matter of conjecture, i.e. they can only be based on interpolation from E-W seismic lines IELP 99-25 and Can G. PWG has drawn attention to the data from Hay Nook BH and BW 130 which indicate a sizeable fault across the western Heads Peninsula (PWG submission 2.4-2.5 p30m (Doc PWG 5)).

In reply to Q1/10 (EA first set of questions (Doc HEG 6)) HEG state that normal faults tend to have a relatively predictable length. In that case the western Heads Fault extends under Barnaby’s Sands affecting the siting of the caverns in the southern polygon.
HEG claims that because IELP 99-25 shows far less faulting than CanG, the area under the southern polygon is unaffected. In 3.123 (p35) (Doc HEG 8) HEG claims that there is no direct evidence for the fault in GC 81-336 thus ignoring the fact that the BGS rejected the data from this line because of their poor quality.

The 2009 Geology model shows a graben under the southern polygon where the top halite is at c370m, the bottom at 740m and the thickness at 370m (see Section 2-2’ Map 0003 GRS). These figures are based on interpolation from the two seismic lines which lie at considerable distances to the north and south (600-650m in the case of Cavern 17). Do the calculations also use the data from the Burrow’s Marsh BH, and the data from GC 81-336?

Q13

The PWG position is that “detailed analysis in due course” is not sufficient given the inadequate evidence presented by HEG.

The extra evidence on geology in response to the Assessor’s Report following the Public Inquiry, is limited and does not satisfy the basic conclusion regarding the granting of planning permission “The current level of uncertainty inherent in the geological model is such that the range of possible outcomes in terms of cavern locations and capacities is so wide that the impact of the scheme in planning terms cannot be established” (Inspector’s Report p241 Assessor’s Report 6.40) as quoted in the PWG submission (7.4 p41 Doc PWG 5).

One issue which is still outstanding and which HEG appears to be reluctant to examine, is the void encountered in BW 130 by BDF when drilling and the implications which arise for the southern part of the southern polygon.

In PWG’s submission to the Inspectorate, “Response to Evidence & Reports” dated 2nd July, PWG sought clarification on this matter from both British Drilling & Freezing (BDF) and HEG - see para 8 Wet Rockhead and BW130.

In para 8 d) PWG stated that it had seen a copy of this report and requested that a copy be provided to the Inspectorate for further examination. As this doesn’t seem to have happened a copy of the document, whose provenance we have no reason to doubt, is shown on the following pages. As it is an A4 copy of an A3 page thus it is presented in 4 sections.
Appendix 1
Documents referred to

1. HEG Application      January 2012
2. EA First Written Questions      April 2012
3. PWG Draft of Evidence on Geology      7th April 2012
4. HEG response to PWG Draft Evidence on Geology      26th May 2012
5. PWG submission of evidence to EA      30th May 2012
6. HEG response to EA First Written Questions      1st June 2012
7. PWG comments on HEG response to PWG Draft Evidence on Geology      2nd July 2012
8. HEG comments on LIRs, RRs, and WRs etc      3rd July 2012
Safety, Fire Management and Emergency Planning

Q25

Evidence presented at the Public Inquiry by Hyder Consulting quoted ‘a zone of 250 metres radius would cause danger to humans and a radius of 100 metres would experience the risk of spontaneous ignition’

When two actual emergencies involving highly flammable gas incidents occurred, the relevant Fire and Rescue Services set up exclusion zones of 200 metres and 200 yards. (Ref: Greater Manchester Fire Service incident 6th June 2011, and Lancashire Fire Service incident 6th July 2012)

Despite the evidence from the Inquiry together with experience from real incidents, HEG appear content to provide greatly inferior protection to members of the public with separation distances between wellheads and members of the public far less than these quoted distances.

PWG wishes firstly to draw the Inspectors’ attention to the fact that the road tanker crash on 6th July 2012 caused Lancashire Fire & Rescue to implement a 200m exclusion zone around the overturned vehicle and by comparison, the 20,000 litres of LPG it was carrying was a miniscule quantity in comparison to the quantities of gas envisaged to be stored in HEG’s caverns.

Secondly PWG would also ask the Inspectors to review PWG’s statement on pages 19 & 20 of its Response to Evidence & Reports document of 2nd July where PWG stated:--

The Group further understands that according to “HSE Guide to COMAH Regulations 1999 as amended” the responsibility falls to LCC who “must prepare an adequate emergency plan for dealing with the off-site consequences of possible major accidents”

Including:--

‘the arrangements established to help with the emergency response on site’. PWG has stated in its evidence that the ‘off-site consequences’ following a gas migration from the proposed site would require a plan to evacuate residents from the Fleetwood Peninsula or the Over Wyre villages which we suggest would fall to LCC to organise.
Evacuation might not be a concern of HEG but it is a major concern to local residents who will have no option other than to live in fear of the consequences of any gas escape from the proposed site.

To date PWG sees no evidence of LCC having to compile or publish any plan to evacuate residents should the need arise and the report from the local newspaper, the Blackpool Gazette, on the 9th July 2012 (see page 14) demonstrates just how fragile the road system in the Over Wyre area is and it serves to show how easily and quickly one of the major ‘escape’ or evacuation routes could be rendered unusable.

Indeed, out of the 10,852 resident responses submitted to PWG, 10,007 on both sides of the river expressed concerns about the adequacy of evacuations procedures should a major incident occur.

Halite’s CEO, Keith Budinger, addressed a meeting of Fleetwood Town Council on 7th August and said that there would never be a need to evacuate Fleetwood. How Mr Budinger can make such a definitive statement is open to conjecture but it perhaps underlies the fact that no major emergency evacuation planning appears to being considered - the Titanic was thought by its designers to be unsinkable and thus as we all know, contingency plans for the worst possible event were not considered.

This differs greatly from the USA where on Wednesday 8th August 2012, as the second article shows, residents’ safety appears to be paramount (see article on page 16). - Extract from ABC News.

The sink hole is probably from a salt cavern where crown hole collapse has occurred. If that were to happen on the old brine field then the pipe lines to the GCS from the well heads and from the GCS to the NTS would probably be affected.

Crown Hole collapse in the new caverns could probably only occur during the washing out phase or after decommissioning but what happens if any neighbouring caverns are full of gas from a previous phase of development?
Blackpool Gazette Articles


Published on Friday 6 July 2012 07:31

A TANKER which was carrying thousands of litres of gas sparked a major chemical alert.

The heavy goods vehicle was being driven along the A588 Head Dyke Lane in Pilling close to Midwood Caravan Park yesterday when it went into a ditch.

The driver managed to scramble out of the cab to safety, but an emergency exclusion zone was set up after it emerged the stricken tanker was carrying 20,000 litres of liquid petroleum gas, (LPG)

Fire crews and staff from the Environment Agency checked for leaks to try to safeguard the 200m exclusion zone from the risk of an explosion.

Baz Scott, a Preesall resident, said: “I heard all the sirens, it’s not unusual round here but there were lots of them so realised it was large incident.

“There was an exclusion zone put in place but I could see the police cars and fire engines and the tanker behind them in the ditch.

“It’s lucky it wasn’t punctured when it crashed.

“It is worrying to think what could have happened as 20,000 litres of gas would create a considerable bomb.”

Lancashire Fire and Rescue Service confirmed it received a call from the panicked driver at 7.39am when he told them he had gone into the ditch.
Head Dyke Lane and Green Dick Lane were closed as the emergency services worked to recover the vehicle safely.

A fire service spokesman said: “A gas monitor was brought in to check for leaks and that helped firefighters decide what the next steps were to recover the vehicle.

“The driver told us there were no leaks and the electrics were isolated but fire crews sprayed water on to the vehicle as a precaution.

“It was recovered as soon as it is safe to do so.”


Published on Monday 9 July 2012 08:28

A MAJOR route through Wyre will be closed for “several days” after a tanker overturned on the road.

Lancashire County Council says the A588 Head Dyke Lane, Pilling, will be closed to through-traffic until temporary highway repair works have been carried out.

The road is completely closed between Preesall and Pilling, just west of Lamb’s Lane, with a signed diversion in place via the A585, A586 and the A6.

Traffic for Pilling is advised to go via Garstang or Lancaster, and traffic for Preesall and Knott End is advised to go via Shard Bridge and Hambleton.

The closure is needed after the HGV overturned, causing major damage to the road.

Highways bosses said major earthworks will be needed to restore the structure of the road before it can be resurfaced.
Mysterious Louisiana Sinkhole Raises Concerns of Explosions and Radiation


A nearly 400-foot deep sinkhole in Louisiana has swallowed all of the trees in its area and enacted a mandatory evacuation order for about 150 residences for fear of potential radiation and explosions.

The 400-square-foot gaping hole is in Assumption Parish, La., about 50 miles south of Baton Rouge.

The sinkhole sits in the middle of a heavily wooded space where it has consumed all of the soaring cypress trees that had been there. Flyover photos show some of the treetops still visible through the mud.

Authorities enacted a mandatory evacuation for between 100 and 150 homes in the area, but most people have chosen to stay, according to the Mayor's Office of Emergency Preparedness. If any of the dangers seem to become more imminent, the order will be escalated to a forced evacuation.

While officials are not certain what caused the massive sinkhole, they believe it may be have been caused by a nearby salt cavern owned by the Texas Brine Company.

After being used for nearly 30 years, the cavern was plugged in 2011 and officials believe the integrity of the cavern may have somehow been compromised, leading to the sinkhole.

On Thursday, Louisiana's Department of Natural Resources required that Texas Brine drill a well to investigate the salt cavern as soon as possible, obtain samples from the
cavern and provide daily reports on their findings. It could take up to 10 days to set up the drilling process, even with an expedited process.

"We have to arrange for the driller. We have to pick a location. We have to be very careful to not be in a point that's too close to the sinkhole because of the weight of the rig," Texas Brine Company spokesman Sonny Cranch told ABCNews.com today. "We don't want to aggravate the situation."

The sinkhole is on the outside edge of the salt dome where this particular brine well is located.

“There are some indications that it very well may have been connected, but there’s just indications,” Cranch said. “There’s nothing concrete that has connected the sinkhole to the cavern.”

There was bubbling in the water and the sinkhole is near areas where there has been exploration for oil and gas in the past, which would make the presence of low levels of naturally occurring radioactive material (NORM) possible.

The state's Department of Environmental Quality said water samples from the sinkhole showed oil and diesel on its surface, but initial readings did not detect radiation.

In the days after the sinkhole opened up on Aug. 3, nearby Highway 70 was closed down because officials discovered that the sinkhole caused a 36-inch natural gas pipeline to bend and feared the possibility of an explosion, according to ABC News' Baton Rouge affiliate WBRZ.

“That’s why the mandatory evacuation is going to stay on, because there is a risk for explosion,” John Boudreaux of from Assumption Parish Emergency Preparedness said at a meeting with residents on Tuesday, WBRZ reported.

“We are determined to do everything we can to find the answer,” president of Texas Brine Mark Cartwright told the residents.

Some community members were visibly frustrated with the situation and lack of answers.

“You can give us a straight answer because that’s all we want,” one woman said at the meeting. “We want to know when we can come home and be safe. Because you all go home after a days work. You’re safe, but we’re not.”

Gov. Bobby Jindal issued a declaration of emergency allowing the Governor's Office of Homeland Security to assist in the efforts if necessary.

“This is extremely serious and it’s been going on for too long to still be at this point,” Kim Torres, spokeswoman for the Office of Emergency Preparedness, told ABCNews.com today. “The people are very aware of how serious this is.”

Further reports are available on the internet from CNN

Possible impact on local infrastructure

Q20

The question refers to the SoCG, 13th June 2012 in relation to the Preesall WwTW owned by United Utilities (UU) but PWG would ask the Inspectorate to revisit this SoCG document in relation to the Fleetwood WwTW and the Interceptor Tunnel.

In section 8.5 onwards of its Response to Evidence & Reports document of 2nd July PWG presents a scenario that it felt was worthy of geological investigation and specifically in 8.20 we state that HEG has not identified the exact position of the Burn Naze Fault.

In the SoCG between HEG and UU it states in 3.1 that “UU was concerned that the leakage of gas through fissured ground might have a significant impact on UU wastewater assets....”

In the agreement in 3.3 it says:

“UU has been reassured by Halite regarding the above issues linked to the leaking of gas”

and whilst admitting its basic mathematical error it goes on to say

“UU has been reassured by Halite that its infrastructure is not at risk from the project and that there appears to be a low risk of gas migration after Halite shared its data”.

It appears from the SoCG that, based simply on assurances from Halite, UU no longer feel that the adjacency of the caverns poses any threat to their infrastructure. There is no indication that any geological investigation of the ground in question has been undertaken in order to verify this assumption!

UU’s satisfaction appears to come from the comfort of the correction of their mathematics where UU understood that the gas caverns and their infrastructure resided at similar depths, i.e. 26m, but they have now been informed that the caverns will be at 225 - 300m below ground.

As shown by the Hutchinson, Kansas incident, a separation distance of a few hundred metres is no guarantee that gas will not migrate into the tunnel. The Hutchinson incident showed how gas can migrate up to 8 miles underground through variable strata.
HEG has still not done any geological investigation on the ground between the proposed caverns and the Fleetwood UU infrastructure so UU can presumably only have been offered desk study ‘evidence’ by HEG.

To our knowledge there are no known boreholes in the ground between the two sites which might validate HEG’s ‘assurances’ as to the long term safety of the UU’s infrastructure.

In the agreement UU state “that there appears to be a low risk of gas migration” which by implication means that UU accepts that there is some risk.

The statistical figures offered suggest a low risk of gas migration but do not mention the massive consequence if an accident were to happen and PWG suggests that this marginal salt lens with its cracks, fissures and faults and the unknown position of the adjacent Burn Naze Fault cannot be accepted as the norm nor can concerns be massaged away with statistics.

The catastrophic consequences of such a gas migration and the suggested unsuitable nature of the geology together with the lack of any borehole test data or other investigations into the geology conducted by UU, leads PWG to request that the Inspectorate independently evaluates the ‘assurances’ that HEG offered to UU.
The above mentioned document contains many references to PWG’s evidence and as expected HEG seeks to dismiss or diminish PWG’s statements, questions and observations.

We do not intend to engage in a tit-for-tat exercise but some of HEG’s observations require a correction or challenge.

Section 9 - National Need for the Project

3.224 PWG doesn’t consider that it has a misunderstanding of the status of the NPS and whilst it is agreed that no maximum storage limits have been imposed PWG intended to illustrate that with the volumes of gas storage available from other already approved schemes and with those other ‘non-marginal’ schemes, away from centres of population, awaiting planning approval, the target that the government set itself for gas storage will be exceeded.

We therefore suggest that HEG’s relatively small and marginal Preesall scheme does not support their claim that there is a NEED for this development - we suggest that at best it would be a supplementary ‘nice to have’ for government statistics but most certainly ‘not nice to have’ for the residents of the area.

Section 10 - Community Liaison Panel

The effectiveness or failure of the CLP is something for the history books and isn’t worthy of too much time being spent upon it other than it might be useful to other NSIPs in the future.

3.230 HEG asserts that “there was a considerable level of resistance from PWG…and from a number of parish councils”.

Protect Wyre Group Response to Panel’s Further Written Questions of 18th July 2012 (Annex A)
Planning Inspectorate Number: EN030001          PWG Reference Number: 10015247
14th August 2012          Page 20 of 31
It has to be said that the Parish Councils speak for themselves and as does PWG and we suggest that any hostility towards the Independent Facilitator was probably of her own making.

Representatives of the Parish Councils and of PWG requested a meeting with Ms Senior to discuss a way forward with the CLP. She declined any contact and was intransigent in her approach to the setting up of the Panel.

The various groups independently came to the decision that they couldn’t see any point in continuing with the CLP charade where on the one hand Ms Senior insisted that a maximum of 15 delegates could form the CLP whilst on the other she sought to populate some of those limited 15 places with ‘HEG friendly’ delegates who represented no one other than themselves (and Halite) - see 3.233. Hardly a way forward in involving the community we suggest.

3.232 This paragraph illustrates PWG’s point about having access to HEG’s technical team. If one considers that questions would be raised at a CLP meeting which subsequently proved that it would require a member of the HEG technical team to provide an answer - such an answer could only be provided one month later, at the next CLP meeting, subject to the resources being requested and made available by HEG. The other problem with the CLP approach was that it wasn’t ‘single topic’ as the PWG’s and the Wyre Community Group’s direct meetings were and also the CLP was time limited which the direct meetings weren’t.

PWG’s and HEG’s ultimate approach of direct meetings led to a much more conducive and useful exchange of views. So HEG’s comments in this para seem to be at odds with what actually took place.

3.233 With whom were the individuals who didn’t represent a wider organisation supposed to liaise?

PWG’s understanding of the function of the CLP was to allow leaders of community groups to put forward combined group and community views and that is was not there to allow panel members to voice their specific and individual concerns.

3.235 How Ms Senior considers a range of CLP meetings to have been successful when there were only a handful of delegates in attendance (some representing themselves alone)
doesn’t seem to stack up. Maybe the appraisal of any CLP’s success should be written up and commented upon by an independent and not by the Facilitator who is unlikely to be critical of their own work.

Section 12 - Resident’s Objections

PWG would ask the Inspectorate to revisit the claims made by HEG about HEG’s own efforts on the community consultation exercise - para 3.238 onward.

It was only to be expected that PWG would receive feedback from the residents who visited the exhibitions, as many PWG members also did in person. PWG members felt that they were able to judge first hand and from the comments made to us the effectiveness of HEG’s efforts and the overall effectiveness can perhaps be measured by the fact that whilst a total of 359 people attended the exhibitions only 84 completed questionnaires and 41 sent emails or letters.

HEG do not state in their report if the exhibitions and responses indicated that they were positively received by the community. PWG’s views are that they served little purpose as many of the detailed questions that residents asked went unanswered. The efficacy of this presumption will no doubt be borne out in the analysis of the 84 and 41 responses that HEG have provided as part of their submission.

In 3.239 HEG states “the consultation comprised a wide range of activities including 6 community exhibitions” and as PWG is comprised of residents itself, PWG members have been the recipient of those mail shots and letters from HEG explaining the proposed scheme. HEG also maintained a website from which the public could keep pace of their developments.

It is therefore somewhat disingenuous to suggest (3.245) that the PWG questionnaire was not based on balanced and adequate information when those homes receiving the questionnaires had by default also been the recipients of the multiple media pieces from HEG itself. We mustn’t lose sight of the fact that in addition to the recent media exposure of HEG, residents in this area have been subjected to almost 10 years of Canatxx ‘spin’ and ‘corporate bullying’, as many see it, and there can be no doubt about residents having real and well founded concerns.
PWG has over the last 10 years of campaigning developed an understanding of the concerns of the area’s residents on both sides of the River Wyre and we simply paraphrased and canvassed the residents on the known main concerns in the leaflet. The top 10 for want of a better phrase.

It has to be said that whilst we asked the 10 most talked and asked about concerns there were some surprises to us, one of which was that the proposed scheme wasn’t seen by all the residents as being a terrorist target which might be explained away as a real concern to those that were aware of it and of no concern to those that hadn’t thought about it.

The other slight anomaly was the number of Fleetwood Peninsula residents who were not concerned about gas migration in the Over Wyre area and likewise with Over Wyre residents not being concerned about gas migration towards Fleetwood. These anomalies can be found in a lower percentage of the responses where all the 10 boxes were not ticked. Whilst this perhaps shows human nature at its best, it didn’t detract from the overwhelming numbers that fear gas migration.

If the Inspectorate uphold the fact that the residents fears and concerns of the proposed scheme are well founded then this fact has to reflect on the inadequacy and short comings of the HEG publicity machine and the effectiveness of their statutory community consultation.

HEG has gone to great lengths to convince the public that HEG is a ‘new’ company and that the old Canatxx has gone. Members of the public, to the best of our knowledge, have never been convinced by this and they have always viewed HEG and Canatxx as one and the same, albeit with a name change. This fact (see papa 3.88) was finally borne out by HEG’s barrister, Mr Michael Humphries, at the last hearing of the Inspectorate at the North Euston Hotel on 24th July 2012, confirming that HEG was indeed formed by a name change of the former Canatxx Gas Storage Ltd on 26th July 2010 and that Canatxx and Halite are the same legal entity.

What Halite has omitted to take from PWG’s statistical analysis of the responses received is that over 50% of the residents chose to add their own comments which we suggest lifts the PWG survey well above a conventional tick box exercise and that it presents a true picture of residents’ fears and objections to this proposed scheme.
Some general comments on other matters which PWG feel need correction

3.94 HEG state: “It should be noted PWG chose not to submit a formal response to the statutory consultation, despite Halite offering them an extended period of time in which to do so”.

HEG appears to be seeking to exonerate themselves from their failing or reluctance to supply the information requested by PWG the exchange of letters and extracts from two relevant emails will hopefully clarify the position.

The original letter from HEG, 20th September 2011, is appended followed by PWG’s response.

The text below is an extract from HEG’s email to PWG, 12th June 2012.

Regarding your comments about provision of “in depth assessment”, I should clarify that Halite will not be producing a more detailed response to your April 2012 document and the focus of our written documents will be through the formal Examination timetable. To a large extent events have now overtaken us with the submission of Halite’s response to the Examining Inspectors questions (38 on geology) and the submission of PWG’s written representation. We are not therefore proposing to provide any further written assessment of your report outside the Examination although we remain very open to meeting with you to try and establish common ground and address your areas of concern.

I hope you understand that our geology team has been very focused over the past month or so in responding to the Examining Authority’s questions in a relatively short space of time and that this has had to be given priority over providing a more in depth written to PWG at this advanced stage of the proceedings. There was of course an extensive public consultation on the project during 2011 prior to the application being submitted. PWG never provided a formal response to that consultation which would have allowed a meaningful and in depth dialogue to have commenced at a much earlier stage in the process which indeed is why the “IPC” (now PINS) places so much emphasis on pre-application consultation. I did indeed write to your Chairman on the 20th September 2011 asking if PWG were going to submit to Halite a summary of your position on our proposed project. I received no response to that request (copy of letter can be forwarded on request).
The text below is an extract of PWG’s email response 5th July 2012

I understand your view of the pre-application process and accept that many other parties chose to engage early - that was their choice.

However, there is also a resources issue to consider - the statutory bodies and other organisations with paid members of staff might not be concerned about how many iterations of the pre-application documentation that they wade through as they are all fully employed and being paid for their time and they have the opportunity to do this during their working week.

PWG members are voluntary and unpaid and the work undertaken is done in the members’ spare time - time that we should be spending with our families or spent relaxing - some of us do have daytime jobs and have to address matters other than the additional and significant workload which Halite’s DCO imposes upon us. Thus I don’t feel that it is unreasonable for us to wait until we see the complete application to make best use of our time.

The problem of an incomplete application is not of our making and not one that we ought to compensate for by undertaking additional work.
20th September 2011

Mr I Mulroy  
Chair  
Protect Wyre Group  
Village Farm  
194 Park Lane  
Preesall  
FY6 0NW

Dear Mr Mulroy

HAZARDOUS SUBSTANCES CONSENT

I write further to your email dated 16th September 2011 and my subsequent reply of the same date regarding the above Consent. As promised please find enclosed an A3 map.

Further to your email dated the 12th September 2011 regarding gas storage volumes, I will send you a response to this next week.

As you know Halite is in the process of finalising key reports and documents in readiness of our application to the IPC. An important part of this work is the completion of a Consultation report which will outline how Halite has consulted with statutory consultees and the community over the past few months.

As part of this process we have written to a number of statutory consultees that have not formally responded to us, to ensure that any feedback they have is included within our report.

Although Protect Wyre Group has held meetings with our team, and we have exchanged various communications including meeting minutes, we have not yet received a formal response from you. In your email to me dated 2nd June 2011 you declined our offer to extend the consultation deadline to enable you to submit your response.
For completeness I would like to clarify if the Protect Wyre Group is going to submit to Halite a summary of your position on our proposed project, based upon all the information we have exchanged since 4th April 2011. Should you be in a position to submit a response, it would be helpful if you could do this by 30th September 2011.

I look forward to hearing from you and please do not hesitate to contact me by email or telephone 01772 672244 if I can be of any further assistance.

Yours sincerely

KEITH BUDINGER
Chief Executive
Halite Energy Group

Enc
Dear Mr Budinger

In anticipation of PWG submitting an account of any remaining unanswered questions or queries to the Planning Inspectorate on or before 4th July, I have reviewed our documentation to ensure that we offer a complete and robust account of matters outstanding between us.

I will start by addressing a number of points arising from your email to Howard Phillips, 12th June 2012.

You write in para 2 “We are not therefore proposing to provide any further written assessment of your report outside the Examination although we remain very open to meeting with you to try and establish common ground and address your areas of concern”.

I think Howard and I are of the view, endorsed by other key members within PWG, that there is little point in us both using our valuable resources discussing the responses that have been made to date. It is because we consider the responses incomplete that a meeting was envisaged. PWG will now refer the outstanding questions to the Inspectors for their consideration and we will ask them to ask Halite for the information if indeed they consider the information as relevant to the Examination as we do.

In your para 3, I agree that the Examining Authority’s questions took priority over PWG’s and I appreciate the demands on time that the prescribed timetable has imposed on us all. However you appear to exonerate Halite from being able to answer PWG’s questions within the timescale (see 2nd sentence) where you infer that PWG has been tardy with its formal response and you quote a letter sent to me, dated 20th September 2011, a copy of which you kindly supplied. The letter, 20th Sept 2011, is headed “Hazardous Substance Consent” and in that letter you state “Halite is in the process of finalising key reports and documents in readiness of our application to the IPC”. You go on to suggest that PWG’s response is required to allow you to complete a report on how you have interacted with statutory consultees and the community. This, I suggest, was your Community Consultation report and not anything to do with Hazardous Substance Consent.

In para 4 of this same letter, 20th Sept 2011, you refer to an email from me in which I decline an extension to the consultation deadline. My response (copy appended) specifically states that you should, for the purposes of competing your report, consider the community consultation exercise closed. I also go on to confirm our ongoing dialogue on geology, seismic activity and brine discharge.
I suggest therefore that in answer to your ‘challenge’ that PWG never provided a formal response by the dates stated was because it was evident that halite had still failed to supply sufficient information to allow the group to formalise its report. I also fail to see the connection between your heading of Hazardous Substance Consent and the Community Consultation report but that’s a mute point.

The key point from all of this is that PWG has submitted a report, not as complete as we would have hoped to do, but a report with a list of outstanding and unanswered questions and that this was done to comply with the Inspectorate’s timetable.

I pride myself on diligence in answering emails and letters and I can only conclude that a written response to your letter of 20th September was overlooked due to the intense activity surrounding the suppression of halite’s findings into the blow out at Brine Well 45, all of which is documented.

Referring again to your email to Howard Phillips, 12th June, and our current suggestion here that a meeting without detailed answers would be less than fruitful, I enclose a summary response on geology which will form the basis of our submission to the Inspectorate on or before 4th July.

There is another outstanding matter concerning British Drilling and Freezing (BDF) and you will hopefully be aware that PWG approached Howard Mew at BDF requesting more information about their 9th January 1990 Daily Drilling Reports 13 & 14.

Mr Mew declined our request stating that it would be inappropriate for BDF to reply and he referred the matter to Nick Taylor and nothing has been mentioned since. A request for this BDF question will also be put to the Inspectorate.

In closing I would add that we hope to have our report finalised and submitted to the Planning Inspectorate by the weekend but obviously anything you wish to add before that time will be considered.

Regards

Ian Mulroy
Section 7 – Blow out at Brinewell 45

3.185  *PWG appears to misunderstand or misrepresent the facts.*

PWG contends that it understands the facts and that it doesn’t misunderstand or misrepresent any of them. PWG also maintains HEG’s account of the activities surrounding the brinewell blowout remain inconsistent with the timescales observed by residents.

HEG have stated that they do not wish to comment upon the Police investigation (3.173) as this is not considered of material relevance - that is their choice. PWG contend that if the cause of the blow out was sufficiently understood by HEG then the Police investigation would have been unnecessary.

PWG contends that there is probably a bit of HEG being wise after the event and whilst it states in para 3.184 that “*Halite is aware that compressed air was present in BW45 from the ICI records*” it’s open to conjecture if HEG knew of this before the blow out.

3.191  *In paragraph 7.27 of PWG’s WR it is claimed that Mr Harding (of Mott MacDonald) confirmed PWG’s suggestion that it would take 90 tonnes of force to rotate the casing or alternatively about 45 tonnes of force if the casing had already corroded somewhere in the middle section. PWG also claims that Mr Harding confirmed PWG’s suggestion that it would require a significant piece of machinery to accomplish this, in the order of a pile driver. Halite strongly refutes these statements and Mr Harding has stated that he did not confirm either of these statements from PWG.*

PWG maintains that its account of the interchange between itself and Mr Harding is correct and that this was witnessed by the 80 or so people in the room, many of whom would testify to what was said or not said on that evening.

It is not a matter of major importance now so PWG doesn’t intend to enter into protracted who said what to whom and when unless the Inspectorate consider this to be of material relevance and a specific hearing on the matter is called for.
3.192 **Future monitoring/maintenance of the legacy brine field:**

In 7.46 PWG asked how HEG intends to undertake the maintenance and monitoring exercise on the brine wells on parts of their estate, farmed and managed by Mr Peter Taylor, when levelling posts were removed, allegedly by one of Halite’s contractors, in January 2010.

We would ask the Inspectorate to decide if this question requires a definitive answer from HEG.
# THE INFRASTRUCTURE PLANNING (EXAMINATIONS PROCEDURE) RULES 2010

Preesall Underground Gas Storage Facility, Lancashire

## HALITE RESPONSE TO EXAMINING AUTHORITY’S FURTHER WRITTEN QUESTIONS

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INTRODUCTION

1.1 The Panel of Examining Inspectors (the “Panel” or “Examing Authority”) set out a list of further written questions (“Further Written Questions”) to Halite Energy Group Limited (“Halite”) pursuant to Rule 8 of The Infrastructure Planning (Examinations Procedure) Rules 2010 (the “Procedure Rules”) at Annex A of its letter dated 18 July 2012 relating to Halite’s application for a development consent order to authorise the construction and operation of an underground gas storage facility and associated development, including a brine pipeline and gas interconnector pipeline, in Preesall, Lancashire (the “Project”). This document sets out Halite’s Response to those further written questions at paragraph 5 below.

1.2 Separately, pursuant to Rule 17 of the Procedure Rules, the Panel requested in a letter of 2 August 2012 that Halite supply answers to five further questions on compulsory acquisition and other matters. Halite’s Responses to those questions can be found at paragraph 6 below.

1.3 PINS stipulated 15 August 2012 as the due date for Halite’s Responses to its questions of 18 July and 2 August 2012. This document was submitted to PINS within that deadline.

SUBMISSIONS FROM KNOTT END GOLF CLUB; PWG; AND D.S., M.J. AND R.S. JACKSON

2.1 Halite has noted that the following representations have been submitted by Interested Parties to the Examining Authority commenting on Halite’s Responses to the Examining Authority’s First Written Questions:

2.1.1 A letter from Knott End Golf Club dated 29 June 2012;
2.1.2 A report from PWG dated 3 July 2012; and
2.1.3 Comments on Halite’s response to the Examining Authority’s First Written Questions from D.S., M.J. and R.S. Jackson dated 26 June 2012 (together the “Interested Party 4 July 2012 Submissions”).

2.2 Halite has reviewed the Interested Party 4 July 2012 Submissions. Halite wishes to make clear that it does not agree with the points raised in those submissions, but considers that the key points with which Halite disagrees have already been addressed in Halite’s submissions in the course of the Examination to date. Halite notes that the Interested Party 4 July 2012 Submissions were submitted in advance of the Examining Authority issuing its Further Written Questions on 18 July 2012. Halite is therefore proceeding on the basis that any points arising in the Interested Party 4 July 2012 Submissions, upon which the Examining Authority wished to see further information provided by Halite, were raised in those Further Written Questions. Accordingly, in order to limit, sensibly and proportionately, the amount of written material submitted to the Examining Authority, Halite does not propose to respond further to the Interested Party 4 July 2012 Submissions, save as requested to do so by the Examining Authority.

DEFINED TERMS

3.1 For ease, this document uses the following defined terms:

“BGS” British Geological Survey
“CGSL” Canatxx Gas Storage Limited

“COMAH” Control of Major Accidents and Hazards

“COMAH Regulations” Control of Major Accident Hazards Regulations 1999

“DCO” Development Consent Order

“DCO Application” Halite’s application for a DCO (PINS reference EN030001)

“EA” Environment Agency

“ES” Environmental Statement

“GCC” Gas Compressor Compound

“GPR” ground penetrating radar

“GSR” Geology Summary Report (Document 9.2.2)

“Halite” Halite Energy Group Limited

“Hazardous Substance Consent process” the process for obtaining hazardous substance consent under the Planning (Hazardous Substances) Regulations 1992

“HSE” Health & Safety Executive

“LCC” Lancashire County Council

“LEMSP” Landscape and Ecological Management Strategy Plan (submitted with the DCO Application) (as amended)

“LIR” Local Impact Report

“mcm” million cubic metres

“Project” underground gas storage scheme subject of the DCO Application

“Requirements” requirements at Schedule 9 of the draft DCO (Document 6.1)

“RR605” the report entitled “An appraisal of underground gas storage technologies and incidents, for the development of risk assessment methodology” prepared by the BGS for the HSE and available on the HSE’s website

“RR606” the report entitled “Scoping calculations for releases from potential UK underground gas storage facilities” prepared by Quintessa for the BGS for the HSE and available on the HSE’s website

“SoCG” Statement of Common Ground

“UGS Facility” underground gas storage facility forming part of the Project

“WBC” Wyre Borough Council

3.2 Documents submitted with the DCO Application are referred to by their name and document reference, for example “Gas Interconnector Pipeline report (Document
Appendices referred to in the Responses below are supplied with this document. A full list is provided at paragraph 4 below.

Statements of common ground are referred to by their topic and reference number in the list of statements of common ground in Document H2 submitted by Halite to the Panel on 6 June 2012, for example “a statement of common ground on geology (SoCG 1) and safety (SoCG 15)”.

ENCLOSURES

The following appendices are provided with this document:

1. Drawing No. 277663/MMD27/G/DR/00/XX/00027 (Question 9);
2. Drawing No. 277663/00029 (Question 10);
3. Drawing No. 277663/00030 (Question 10);
4. Drawing No. 277663/00031 (Question 10);
5. Professor Rokahr’s CV (Question 11);
6. Letter from Professor Rokahr (Question 11);
7. Logs for BW130 (Question 17);
8. Revised proposal for Seawall Crossing of Brine Outfall Pipeline (Question 27);
9. Diagram entitled “Slurry Return Process to BW123” (Question 29); and
10. Photomontages (Question 29).

FURTHER WRITTEN QUESTIONS FROM PANEL LETTER OF 18 JULY 2012 AND RESPONSES

Section 1: Geology

The geological model

Question 1:

The three additional boreholes drilled in Monks Lane were to investigate the depth to rockhead (response to Question 1/6, document ref. H 1). Does this mean wet rockhead or the thickness of the drift deposits, and did the boreholes penetrate the halite?
Response to Question 1:

5.2 The three additional boreholes in Monks Lane were intended to define the thickness of the drift soils and did not penetrate to the halite. The purpose of these holes was to inform the subsidence risk assessment which requires the input of the thickness of the drift soils to the subsidence assessment model.

Question 2:

5.3 Did any of the Fugro boreholes in or adjacent to the area of the northern polygon (for example FBH 35 and 38 shown on drawing number ending 0027 at appendix 17 of document ref. H1), penetrate the halite and were any of them used to extract brine?

Response to Question 2:

5.4 The FBH boreholes were for shallow geological purposes for infrastructure and foundation design and did not penetrate the salt deposit. None of these exploratory holes were used to extract brine.

Question 3:

5.5 The maximum horizontal displacements recorded in Figures 3.2.3 and 3.2.4 in the Seismic Desk Study (document ref. 9.2.7) refer to ground profiles proved in boreholes FBH 30 and FBH 37. What are these profiles?

Response to Question 3:

5.6 These profiles refer to the types of shallow soils that were encountered within boreholes FBH 30 and FBH 37, as these were considered to represent the least favourable soil conditions because they encountered weaker alluvial soils which are more prone to larger displacements and liquefaction in earthquake events as discussed in Section 3.2.2 of the Seismic Desk Study (Document 9.2.7).

Question 4:

5.7 The BGS 2005 geological model (reference no 8 in the GSR document ref. 9.2.2) gave the thickness of the halite in the Hackensall Hall E1 Borehole as 81m. This was later (2009) changed to over 200m on the assumption that it was penetrated by the Burn Naze Fault. Who commissioned the borehole, was the borehole cored, and what thickness did the original borehole description assign to the halite?

Response to Question 4:

5.8 The Hackensall Hall E1 Borehole was drilled by ICI (Alkali) Limited in 1940. It was drilled in two stages, the first down to 1,073 ft 6 ins (327.2 m), with rockhead (top salt) being encountered at 1,041 ft (317.3 m) below surface. The borehole was subsequently deepened to 1,448 ft 6 ins (441.5 m). The borehole was cored and general descriptions of the strata recorded with poor downhole conditions indicated by descriptions “core worn away” or “core lost” recorded at levels within the overburden mudstones and halite beds of the first drilling phase. No core was retained from either drilling phase.

5.9 The borehole descriptions record top halite at 1,041 ft (317.3 m) and the base of the halite at 1,306 ft 6 ins (398.2 m), a thickness of 265 ft (c. 81 m). Beneath the halite the borehole proved a series of red and grey marls (with or without gypsum)
to TD at 1,448 ft 6 ins which are assigned to the Thornton Mudstones that underlie the Preesall halite.

5.10 The BGS 2005 model included the actual thickness of the salt deposit as encountered within the borehole without any refinement for geological interpretation. The later model took into consideration the surrounding information and the interpretation of salt thickness and the location of the Burn Naze Fault. The later BGS models interpreted that the Burn Naze Fault passed through the Borehole E1, consequently the model was updated to show a greater thickness of salt to the east of the fault.

Question 5:

5.11 GC81-336 seismic line shown in BGS report CR/05/183N (reference no 8 in the GSR document ref. 9.2.2) has a large omission zone across the estuary which extends down to a depth below the halite. However, the model in the GSR shows thicknesses of salt approx 400m to 420m in the southern polygon area. What is the evidence to support this thickness?

Response to Question 5:

5.12 It is correct to say that the original BGS 2005 report recorded that line GC81-336 is of poor quality and difficult to interpret, especially in the area of interest. As a result, the line had not previously been interpreted and any information from it is not, therefore, incorporated in the geological model. The thickness has been interpolated from surrounding seismic lines and borehole data.

5.13 However, in 2008/09 the Burrows Marsh Borehole was drilled vertically to 120 m depth then drilled directionally out from east of the Wyre Way, south-westwards beneath the marshland (east of Barnaby Sands). Its main aim was to test the halite beds and provide additional evidence of their depth and thickness in that region (and the southern polygon area). The results of the borehole were incorporated in the 3D geological model.

5.14 The Burrows Marsh Borehole was drilled to provide data for two important reasons:

1. To prove the halite beneath the area of marshland extending from Burrows Marsh in the south and in the southern area of the polygon area; and

2. To tie the seismic line GC81-336 in that area and immediately to the east of the large omission zone related to the estuary, and to tie the seismic line GC81-336 in that area and immediately to the east of the large omission zone related to the estuary.

5.15 It achieved both objectives and data from its results have been incorporated into the current 3D geological model, providing important data on the presence and attitude of the beds hereabouts.

5.16 The surfaces for the top and base halite across the project area are based upon information from existing boreholes around the project area, and seismic reflection data, which was reprocessed in 2005. These data revealed that the surfaces generally deepen westwards beneath the estuary and to a maximum beneath the area of Barnaby Sands. The surfaces in the model reflect this deepening from the north, south and east and represent extrapolation based upon the dip of the surfaces coming into the area of interest. The dips of the surfaces are also proved by the dips of strata obtained in the boreholes, notably the BGS drilled and fully logged Coat Walls Farm Borehole, in which dips of up to 14 degrees are recorded.
5.17 The 3D geological model honours the data within the proximity of the Burrows Marsh borehole.

5.18 In summary the model at this location is based on interpolation between seismic lines, borehole and brinewell logs. As noted in the response to Question 1/8 in the First Written questions a detailed explanation has been provided for the analysis of surfaces within the geological model.

**Question 6:**

5.19 BGS Report CR/05/183N (reference no 8 in the GSR document ref. 9.2.2) recorded a strong “intra Coat Walls Mudstone” reflector in seismic lines GC 86-DV371, IELP 99-25, CAN 97F and CAN 97G. This bed was presumably recorded in several of the cored boreholes in the area and in the geophysical logs. What is its thickness and lithology?

**Response to Question 6:**

5.20 The 2005 reprocessed seismic reflection data represented data derived by the most recent and up to date processing techniques and software. The reprocessing provided data with a higher frequency content and increased resolution in the shallower section, which was most pertinent to the investigation and characterisation of the halite beds. Earliest processing of the hydrocarbon exploration data had been targeted mainly at the deeper levels of the seismic section that would be imaging the potential source and reservoir horizons within the Carboniferous and early Triassic (possibly Permian) section. This data was improved during the 1995 reprocessing stage, but by 2005, processing techniques had again provided an improvement in the quality of data produced.

5.21 In 2005 the seismic reflection data were reprocessed using the same processing sequence and parameters, with generally good quality obtained. The higher frequency content in the shallower section provided some detail on the overburden mudstones (the Coat Walls and Breckells mudstones of the Kirkham Mudstones) and a through going seismic stratigraphy was noted and which was observable on all lines in the project area. A package of reflections arising from within the lower part of the overburden succession provided good control for character matching the seismic reflection lines and confirming the top and base halites for lines not adjacent to the salt exploration wells Arm Hill #1 (IELP99-25) and The Heads (GCE-86-DV371: see BGS report CR/05/183N at Appendix 15 of Document H1). Subsequently, the Hay Nook #1 and Burrows Marsh boreholes provided control points for the calibration of seismic lines Can97-G (see BGS report CR/09/048 at Appendix 7 of Document H1) and GC81-336 (see Response to Question 5 above). Synthetic seismograms were generated from the high quality downhole geophysical logs (sonic and density logs) of Arm Hill, The Heads and Hay Nook to tie the seismic reflection lines on which they lie.

5.22 The package of reflections can be traced back through the synthetic seismograms to the downhole geophysical logs (sonic and gamma ray) to identify the levels within the overburden mudstones from which the reflections arise. In the Arm Hill Borehole, for example, the package of reflections described above relate to sequences between c. 150 m and around 240 m, some 210 m to 120 m above the level of the top halite (see figure below – brown and orange correlation lines). These correspond to small increases and decreases in the sonic velocity log and clear changes in the gamma ray logs, the patterns of which demonstrate that a recognisable series of units are identified and can be correlated between the salt exploration boreholes (BGS report CR/09/048) and those ICI brinewells down which
gamma ray logs were recorded at Appendix 7 of Document H1 (see various BGS reports noted above).

5.23 The gamma and sonic logs demonstrate that the mudstones can, on log character, be subdivided into a number of very recognisable and laterally continuous sequences, though these units have not been studied in detail to date (see BGS reports CR/09/048 at Appendix 7 of Document H1 and CR/09/040 at Appendix 6 of Document H1). Those ICI brinewells down which gamma logs were recorded, and two fully cored and described BGS stratigraphic boreholes through the overburden mudstones and in which gamma logs were also acquired (Hackensall Hall and Coat Walls Farm), also reveal the same log patterns, further extending the area over which the lateral continuity of the overburden successions can be correlated using geophysical logs (CWF cored the entire mudstone overburden succession and into the top c. 5 m of the Preesall halite).

5.24 The Arm Hill #1 Borehole was continuously cored from a depth of 349.6 m to TD at c. 609 m (refer Ratigan, 2005) and as such does not provide evidence of the nature of the overburden at the depths of the reflections seen on the seismic reflection data. The other salt exploration boreholes do not provide sufficient cored mudstone from the overburden succession to reliably characterise the entire overburden succession. However, the two BGS stratigraphic boreholes cored the entire thickness of the overburden mudstones, proving almost entirely red-brown structureless or grey green laminated mudstones, with variable gypsum and/or halite veining and gypsum porphyroblasts (BGS core report CR/10/128 at Appendix 9 of Document H1).

5.25 As well as tying the Arm Hill Borehole, the seismic reflection line IELP99-25 also ties the nearby BGS Coat Walls Farm Borehole. The reflection package is also present on the seismic line at the CWF location, where as noted, the overburden succession is described as almost entirely red-brown structureless or grey green laminated mudstones, with gypsum and/or halite veining and gypsum porphyroblasts (BGS core report CR/10/128 at Appendix 9 of Document H1). This is likely to represent sequences laterally equivalent to those between 120 and 210 m above the top halite in Arm Hill – between c. 70 and 160 m above top halite at 281 m in CWF.

5.26 The core descriptions for the two BGS stratigraphic boreholes provide evidence for changes in mudstone type, perhaps associated with variations in the gypsum and halite content, are associated with changes in velocity, apparently large enough to
generate reflections from within an apparently monotonous sequence of mudstones interrupted only occasionally by thin (< 1 m thick) halite beds (such as seen in ICI well BW22 c. 110 m to the west of CWF borehole). There are no other recorded lithologies such as beds of sandstone or limestone within the Coat Walls and Breckles mudstone overburden succession. This is supported by descriptions of the Coat Walls and Breckells mudstones elsewhere in Lancashire (e.g. Wilson & Evans, 1990).

**Question 7:**

5.27 BGS Report CR/10/128 (reference no 20 in the GSR document ref. 9.2.2) describes the thickness of the halite in the Burrows Marsh Borehole as 320m. The geological sketch at paragraph 3.125, document ref. H3, gives the thickness as 390m. According to the BGS report this is the apparent thickness proved in the borehole. What thickness was used in the model?

**Response to Question 7:**

5.28 The thickness of salt used in the model was 320m. The sketch given at paragraph 3.127 of Document H3 was in response to paragraph 5.41 of the PWG evidence dated 31 May 2012 and was intended to assist PWG with the interpretation of the plan position of the Burrows Marsh Borehole with respect to the East Barnaby Sands Fault and the deviated borehole trajectory. The sketch was simplified and did not correctly show the inclination of the salt to the west of the Barnaby Sands Fault. The detailed BGS drawing given in Figure 6 of BGS report CR/09/040 (Appendix 6 of Document H1) provides a scale drawing. The drawing is reproduced below:
Question 8:

Would Lancashire County Council please provide a copy of the assessment undertaken by specialist consultants on behalf of the County Council, referred to at paragraph 11.2 of the LIR.

Response to Question 8:

Although this is a question for LCC, Halite’s understanding is that the reference to an assessment in paragraph 11.2 of LCC’s LIR refers to a combination of discussions, correspondence, reviews of geological data and reviews of reports, undertaken by Atkins, rather than to the production of a single assessment report.

The geological assessment of the Project has been undertaken for LCC by Atkins, who had also acted for LCC in respect of the previously submitted schemes by CGSL. As such, Atkins has a good understanding of the geological issues associated with the Preesall halite. Given the history of the CGSL projects, Halite’s geology team was keen to work closely with LCC and Atkins to ensure that all of the geological and safety issues that had previously been raised were dealt with to its satisfaction. Halite’s geology team initially undertook a review of all of the previous geological work and produced a draft geological summary report, which identified the two polygonal areas for the creation of caverns for discussion with LCC and Atkins. Seven meetings and presentations were held with Atkins between 20 May 2010 and 22 September 2011; with correspondence throughout the course of that period. These dealt with issues and points of clarification raised by Atkins. These assessments led to the finalisation of the Geology Summary Report.
Question 9:

5.32 Please provide a further amended version of drawing MMD -277663-G-DR-00-XX-0027 at 1:5000 scale giving additionally the indicative positions of the 19 caverns.

Response to Question 9:

5.33 The amended drawing, given reference 277663/MMD27/G/DR/00/XX/00027, is provided at Appendix 1 of this document.

Question 10:

5.34 In the light of the geological model presented in the GSR (document ref.9.2.2) and the range of subsequent answers to specific questions about data, please confirm what is the calculated depth from the surface to the top of the halite bed, the thickness of the halite, and the depth of the bottom of the halite bed in the two polygons proposed for caverns, from the eastern boundary to the western boundary in each case.

Response to Question 10:

5.35 The clearest way to provide the data requested, Halite believes, is to include the polygons on the contoured drawings for base salt, top salt and salt thickness.

- Top of halite depths (drawing 277663/00029 at Appendix 2 of this document);
- Base of halite depths (drawing 277663/00030 at Appendix 3 of this document); and
- Thickness of halite (drawing 277663/00031 at Appendix 4 of this document).

5.36 In addition, prominent contour depths or thicknesses are shown on the west and east boundaries of the polygons, as requested.

Distances between caverns and other relevant structures

Question 11:

5.37 The Rokahr design recommendations are stated to be internationally accepted (response to Question 1/36, document ref.H1). Please provide evidence of which international geological bodies have endorsed the recommendations intended for cavern design given in the GSR table 6.1, and examples of where they have been applied to underground gas storage projects in salt strata with mudstone interbeds.

Response to Question 11:

5.38 There are no international or national standards for the design of caverns as each site and, indeed, each cavern needs to be examined on its individual merits and be
subject to the COMAH process. The Rokahr design recommendations are a
dimensioning concept that serves two objectives on assessing cavern spacing at
the planning stage: to provide cavern stability and gas tightness. The Rokahr
design recommendations were developed by Professor Rokahr based on his 30
years of experience of cavern design in salt (see Professor Rokahr’s CV at
Appendix 5 of this document). This experience includes dimensioning caverns in
denmark, Netherlands, Italy, USA, Switzerland, Thailand and Germany (see
references 8, 29, 31, 37, 51-53, 55, 56, 69-66, 68 and 91-95 of the CV at
Appendix 5).

5.39 The Rokahr design recommendations are generic, taking account of this experience
and knowledge of the Preesall geology. They are conservative and cautious
because they are not based on individual cavern analysis, which is carried out
following the grant of consent as part of the COMAH process. However, Halite has
carried out enough survey work and analysis at this stage to ascertain that up to
19 gas storage caverns can be safely created in part of the Preesall halite. The
Geology Summary Report (Document 9.2.2) and SoCG 1 (Document H2) make this
clear.

5.40 Halite has chosen to adopt the conservative Rokahr design recommendations at
Preesall because:

(a) Professor Rokahr has a national and international reputation based on
decades of successfully designing and constructing cavern layouts;

(b) Professor Rokahr has the confidence of LCC and their technical consultants
(Atkins); and

(c) Halite appreciates that, because of the planning history of the Preesall site,
a cautious approach is necessary to the planning of its Project.

5.41 Mudstone interbeds within salt deposits are not unusual within the UK and have not
been the cause of significant problems in existing caverns. In particular the
permeability of the salt and mudstone interbeds was measured in situ in the Hay
Nook and the Arm Hill boreholes. The results showed that both salt and the
interbedded mudstone had very low permeability to gas which enabled Professor
Rokahr to make the statement:

“On the strength of my 30 years of experience in salt mechanics and salt cavern
construction, I can confirm that stable, gas tight salt caverns can be constructed in
the Preesall salt formation for the storage of natural gas.” (see Appendix 6
of this document)

5.42 Should the DCO be granted, the actual layout and design of the caverns will be
determined by the COMAH process, relying on detailed individual cavern analysis
rather than simply relying on the Rokahr design recommendations. Requirement 6
of Schedule 9 of the draft DCO (Document 6.1) specifically allows for such changes
to be made within the parameters; provides that all caverns will be created in the
polygons; and stipulates that there will be no more than 19 operational caverns.
The operational capacity of gas to be stored will be no more than 600m cu metres
(see the description of Work No.1A in Schedule 1 of the draft DCO (Document
6.1)).

Question 12:

5.43 Drawing number ending 0002 in appendix B of the GSR refers to possible cavern
diameters of 60m and 80m (assuming r=30m and 40m). How do these diameters
relate to the dimensions for the caverns shown in drawing number ending 0009 in appendix B of the GSR and the response to Question 1/20 (document ref. H1) which refers to diameters not greater than 100m?

**Response to Question 12:**

5.44 The cavern diameters on both drawings are the same. The maximum cavern size proposed is 100m diameter, Cavern 11 on the drawing. The distances between proposed caverns and existing features are given below in Halite’s Response to Question 13.

**Question 13:**

5.45 Paragraph 3.115 (document ref. H3) refers to cavern locations/shapes as “indicative” and to be determined by “detailed analysis in due course”. Please confirm the ‘safe’ distance that would be used to separate the boundary of a cavern from:

- an adjacent cavern
- a fault
- the top and bottom of the halite
- an ICI cavern of known shape
- a former brine cavern of unknown shape and any brine run that may be connected to it
- wet rockhead.

**Response to Question 13:**

5.46 The Rokahr design recommendations are not intended to suggest that lesser distances would not be safe; they are conservative separation distances which have a margin to accommodate uncertainties. As the project proceeds from planning to COMAH, more data becomes available and individual cavern analyses are undertaken.

5.47 Table 6.1 of the Geology Summary Report (Document 9.2.2) defines the distances as follows:

<table>
<thead>
<tr>
<th>Structure Adjacent to Proposed Cavern</th>
<th>Separation Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>an adjacent cavern</td>
<td>3R</td>
</tr>
<tr>
<td>a fault</td>
<td>3R</td>
</tr>
<tr>
<td>the top and bottom of the halite</td>
<td>R and 0.2R</td>
</tr>
<tr>
<td>an ICI cavern of known shape</td>
<td>4R</td>
</tr>
<tr>
<td>a former brine cavern of unknown shape and any brine run that may be</td>
<td>5R</td>
</tr>
<tr>
<td>connected to it</td>
<td></td>
</tr>
<tr>
<td>wet rockhead</td>
<td>4R</td>
</tr>
</tbody>
</table>

5.48 It is intended that in preparation of the pre-construction safety case that detailed numerical analysis would be undertaken for each cavern which will take into consideration the actual proposed cavern depth, shape, dimensions and operating
pressures together with any additional refinement of the geological model. The numerical analysis would take account of the geological context, which will be informed with further geological data and the actual proposed cavern details.

5.49 The detailed design, for example, may result in cavern heights smaller than the maximum allowed in the generic design guidelines. Numerical analysis may show that the separation distance between caverns could be larger, or smaller, than the generic design recommendations.

5.50 This is similar to what happens elsewhere in the UK. For example, planning approval has been given for the King Street scheme in Cheshire, where there is a separation of only 90m for caverns with a maximum diameter of 110m.

5.51 The final design of each cavern will require approval by the Competent Authority under the COMAH process who would review in detail all analyses and designs undertaken prior to granting permission to proceed with construction. Following construction, the results of the additional data from the pilot holes, down hole surveys, cavern washing results and pressure testing would be submitted and scrutinised by the Competent Authority prior to approval for operations being granted, again, as part of the COMAH process.

**Question 14:**

5.52 In those cases where the positions of the geological boundaries cannot be precisely defined will the margin of error be added to the 'safe' distance?

**Response to Question 14:**

5.53 As stated above, the Rokahr design recommendations are not to be understood as minimum safe distances, but are conservative design assumptions at the planning stage. For example, gas tightness only requires the presence of a small amount of salt as evidenced by the 0.2R requirement at the base of a cavern. In the case of a 30m radius this equates to a separation distance of only 6m which includes a margin for safety. The separation of 3R between a cavern and a fault would give a separation distance of 90m. These aspects are also taken into consideration by the Competent Authority when considering the pre-construction safety plan and the pre-operation safety plans. As noted in Halite’s Responses to Questions 11 and 13 above, as the project proceeds from planning to COMAH, more data becomes available and individual cavern analyses are undertaken. The scope for amendment to the separation distances is included within the draft DCO (Document 6.1) at Requirement 6 of Schedule 9.

5.54 Therefore, the margin of error is not added to the “separation distance” (which is considered to be a more appropriate term than “safe distance”) because, as stated at paragraph 5.53 above, the Rokhar design recommendations are not minimum safe distances.

**Question 15:**

5.55 What additional surveys would be carried out, prior to the submission of the pre-construction safety report to the Competent Authority required by the COMAH Regulations, to ensure that the positions of the halite boundaries, the faults and the former brine workings are determined with sufficient accuracy for the 'safe' distances to be applied?
Response to Question 15:

5.56 Should development consent be granted, it is intended that further surveys would be undertaken. The surveys would be designed by expert bodies such as the BGS or specialist contractors to provide further detail on the geological structure. Such surveys could comprise 2D seismic lines or even 3D surveys of each polygon.

5.57 In addition the pilot holes for each proposed cavern will be logged from chippings and core from critical locations. Down hole data would be obtained whilst drilling or following hole formation to prove strata boundaries and structure at the hole location. The formation parameters will be assessed as described in the Review of the Proposed Drilling and Completion Programmes report, Section 3.6 (Doc 9.2.5) from downhole measurements, downhole geophysics and from laboratory testing of samples.

5.58 In addition to the formation evaluation for the casing design additional geological surveys would be considered based on the availability and reliability of downhole exploration tools which can operate in deviated boreholes. It is important to note that, currently, methods such as single borehole or cross borehole ground penetrating radar ("GPR") are capable of investigating up to 50m or so (depending on conditions) laterally from the pilot hole. The GPR data, in combination with the other formation evaluation data, such as gamma logs, could allow some assessment of the extent of the salt laterally as well as vertically at each pilot hole location. The need and extent of downhole surveys will be judged bearing in mind the level of data obtained at that time, the particular cavern parameters and requirements of the Competent Authority at the COMAH stage.

Question 16:

5.59 Paragraph 3.114 (document ref. H3) states that boreholes cannot be used to explore the cavern sites because they create sterile zones. Why is this and how will the thickness and properties of the halite be determined at the proposed cavern sites if boreholes cannot be used?

Response to Question 16:

5.60 The greatest risk for a release of gas from a completed cavern is from a previous borehole (see the HSE's RR605 and 606 reports (available on its website) and the Risk Assessment Report (Document 9.3.1)). Whilst methods of cementing and completing boreholes can give some assurance that migration pathways can be sealed, it has been assumed in the risk based approach to date that a 2R separation distance is applied to exploratory holes which have penetrated the salt deposit by a significant distance.

5.61 As noted in Halite’s Response to Question 15, the thickness and properties of the halite at each cavern location will be determined from direct observation within the pilot borehole, testing of core and down hole surveys.

Question 17:

5.62 What method will be used to determine the positions of any brine runs that might have developed when the area was worked by wild-brine pumping?

Response to Question 17:

5.63 It is proposed that all pilot holes for caverns will investigate the salt rockhead boundary to verify the level and the condition of the salt/mudstone interface.
These investigations could comprise all, or a selection of, coring, down hole surveys such as gamma ray, density, temperature and calliper logs. These surveys will provide targeted data on salt rockhead conditions at each proposed cavern location.

5.64 It is considered that the evidence from the old ICI brinewells indicates that there are only limited areas where natural wet rockhead has led to the formation of brine in significant quantities. The drilling of BW130 has been referred to by other parties as evidence of a brine run being present because, it was thought by them, the drill rods had dropped 5m close to the mudstone/salt interface. The logs for BW130 for the relevant depth are provided at Appendix 7 to this document. These clearly show that there is no reference to the drill dropping and no reference to a void. There is a full lithology log and no reference to core loss. There is also no evidence at the surface of subsidence zones from brine runs. In most cases, brine runs were forced or constructed. Consequently, no surveys are proposed to further investigate the polygon areas for the presence of natural brine runs.

5.65 BGS report CR/09/037 Table 2 (Appendix 17 of Document H1) provides data on natural wet rockhead features and BGS report CR08/114 (Appendix 1 of Document H1) also provides this information. The brinewells in which features indicative of natural wet rockhead were observed are located to the east where salt is at or close to geological rockhead where the salt is at shallow depth and most commonly where there is little or no mudstone rock cover. The features indicative of wild brining are more common in Cheshire where there is evidence of substantial development of brine at (salt) rockhead. This evidence includes brine springs (wiches) and longitudinal subsidence features. These features have not been observed in Preesall.

5.66 CR/09/037 Table 4 (Appendix 17 of Document H1) gives details of the man induced connections between brinewells. The connections were forced between existing brinewells, hence they all lie within the identified brinefield which has a 4R buffer zone separating them from any proposed cavern. In practice the proposed caverns are at greater distances than the minimum 4R separation generic design guideline.

5.67 In summary, there is no surface evidence of brine runs and only limited data on natural brine being recorded during brinewell drilling. The features identified in the old brinewells which may infer natural wet rockhead were most common where the salt is at shallow depth to the east of the area. The proposed caverns are located further to the west and at greater depths, in an area where Halite considers it unlikely that there will be brine runs. The potential for the presence of brine runs will, nevertheless, be investigated at proposed cavern locations and will form part of the technical justification in pre-construction and pre-operational safety case reports.

Question 18:

5.68 The response to Question 1/34 (document ref. H1) states that the "low seismic risk" and the hydrofracturing “are not anticipated to have any impact on the proposed caverns”. Figure 2.4.2 in document ref. 9.2.7 records several earthquakes with magnitude >4.0ML within 50 miles of the Preesall site. Given that the most vulnerable part of the facility with respect to seismicity is likely to be the lazy-S boreholes where they pass through faults, has this risk been assessed?

Response to Question 18:

5.69 The risk of pipeline/casing fracture at a fault in mudstone has been included in the Risk Assessment Report (Document 9.3.1).
Section 3 of the Risk Assessment Report (Document 9.3.1) deals in detail with underground risk in general. Table 3.3 identified potential sources for gas escape, with Source S2 assigned for a fracture of a pipeline at a fault. This source risk was translated into the qualitative risk assessment, where it was considered that sources of gas and sensitive receptors could be linked by various pathways. In total, 31 linkage scenarios were identified where Scenarios 5 to 7 and 19 to 22 within Table 3.6 specifically considered pipeline fractures at faults and their potential impacts on receptors.

The pathway efficiency was taken into consideration in the assessment of risk as discussed generally within Section 3.10. The migration of gas escaping from a fault was considered in scenarios where the gas migrated along a fault, identified as Pathway P4 or from the fault through mudstone strata, Pathway P8. The further connection to old brinewells/mineworkings, superficial soils and wet rockhead, Pathways P6, P5 and P7, respectively, were also considered.

The transmisivities of the potential pathways were discussed within Section 3.10 in general and considered in Table 3.8 and Appendix C, in particular.

Appendix C, Section 2.1 considered sources of gas from a pipeline at a fault and Sections 2.2, 4, 5 and 6 considered pathway attributes. Pathway lengths were considered within Appendix C, Table C2. Source risk assessment was considered within Table C3, with Risk References 2.1, 2.2 and 2.3 considering pipeline fractures at a fault. Assessment of gas migration along pathways is further assessed in Tables C4, C5 and C6 for each of the Scenarios which included a gas escape at a fault.

In conclusion, the Risk Assessment Report (Document 9.3.1) found that the greatest risk was for a cavern which intersected an unknown borehole. This is the same as the findings in the HSE report RR606. The risk for this scenario was estimated to be very low at about 1 in 120 million. The risk from gas escaping from a fractured pipeline along a fault and other pathway types to reach sensitive receptors was estimated to be even lower and practically impossible.

**Question 19:**

From the information provided on drawings MMD-277663-G-DR-00-XX-0027, MMD-277663-G-DR-00-XX-0002, and Figure 1.32, Volume 2A of the ES (document ref.5.3), it would appear that casings to caverns 16 to 19 will cross a fault to connect the cavern to the wellhead. Please provide a risk assessment (including seismic risk, Question 18 above) for the scenario of failure of a casing where it passes through a fracture zone associated with a fault.

**Response to Question 19:**

As discussed in Halite's response to Question 18 above, the Risk Assessment Report, Document 9.3.1 together with the assessment of seismicity in the Seismic Desk Study (Document 9.2.7), has provided a robust assessment of the risk of a casing passing through a fault.

The discussion below expands on the assessment of the risk context for a pipeline through a fault at shallow depth by commenting on the likelihood that a seismic event will cause a ground rupturing event, the ability of the proposed pipeline design to accommodate ground displacement, and potential well head monitoring which would be able to detect such a failure should it occur.
Likelihood of Ground Rupture

5.78 There are existing mines in salt within the UK and Europe which have tunnels and addits that pass through faults in salt and mudstone strata. Appendix 5 of the HSE report RR605 reported on underground storage incidents and there was no reported incidence of any ground rupturing following seismic events. In addition section 2.4.2 of the Seismic Desk Study (Document 9.2.7) specifically addressed the potential for near surface rupture and concluded that the hazard of surface fault rupture in the UK and at Preesall is extremely low and can be dismissed. This is in accord with the absence of case studies within the UK recording rupturing of infrastructure as a result of seismic events even though there are numerous tunnels and pipelines in rock at depths of less than 500m which pass through faults. The BGS report CR/08/149 Section 3 (Appendix 2 of Document H1) states that:

"The UK lies in a tectonically quiet setting away from major plate boundaries, unlike, for example, San Fransisco. British earthquakes are generally small and the larger, more infrequent, events tend to be deeper, typically centred at depths of between 5 and 15km. The result is that the likelihood any fault reactivation causing a direct rock rupture is extremely small: such an event has never happened anywhere in the UK since at least the Quaternary times (up to 1.8million years ago).

Seismic events in the Preesall area have not been of sufficient intensity or magnitude to cause damage to surface structures; the maximum observed intensity in historical times is 5 EMS, which is just below the damage threshold (felt by most indoors, small objects fall over). The Preesall area is, therefore, of low seismic activity even by UK standards with seismic hazard at the site about average for the UK. Future seismic hazard at the site relates to the effects of large (in UK terms) earthquakes at moderate distances.

Earthquake waves are more powerful on the surface than at depth because ground motion is a function of movement of the free (ground) surface. Recorded accelerations thus decrease quite rapidly with depth with the result that a structure deep underground does not suffer the same forces as near surface and surface structures."

5.79 There are no specific requirements in BS EN 1918-3 or RR605/RR606 (available from the HSE's website) to consider fault reactivation from seismic events. Nonetheless a Seismic Desk Study was undertaken to inform on seismic risk (Document 9.2.7).

5.80 The BGS Report CR/05/183N has been added to by the Seismic Desk Study (Document 9.2.7), undertaken by Mott MacDonald and Prof Bommer (Imperial College). The Seismic Desk Study (Document 9.2.7) also concluded that the fault rupture hazard is low and that any fault reactivation in the future would be at depth and would be very unlikely to cause rupture within the caverns or at shallower depths.

Ability of the Proposed Design to Accommodate Ground Strains

5.81 The proposed well design has been undertaken to take account of stresses during installation and operation. As a consequence, the casing thickness is greater than would normally be the case for vertical wells. In addition the properties of the well casings have been chosen to be ductile, rather than brittle. Ductile casings can accommodate strain better than brittle materials and tolerate some displacements without rupturing.
There will be a minimum of two casing strings: an intermediate 13 3/8” casing cemented into the rock. An internal 9 5/8” production tubing will be isolated within the intermediate casing. The annulus between the intermediate casing and production tubing will be filled with a fluid, such as nitrogen gas.

The combination of ductile casing and a fluid filled void around the inner production tube allows small ground strains to be accommodated without rupture.

Potential to Monitor

In the event of a seismic event it would be possible to monitor parameters such as gas pressure and flow rate within the pipeline, fluid pressure within the annulus and gas composition within the annulus. A combination of one or more of these parameters would enable an assessment of casing integrity to be undertaken.

In summary no evidence has been presented within the HSE’s RR605 report (available on the HSE website) or the Seismic Desk Study (Document 9.2.7) that earthquakes have caused ground rupturing leading to damage of pipelines or tunnels at shallow depth. The Seismic Desk Study has estimated that the risk of surface fault rupture is so low it can be dismissed. Nonetheless the pipeline design has the capability to accommodate some ground displacement and a monitoring regime could be designed to detect leakage within the annulus. These aspects would be developed as part of the technical justification within the COMAH process.

Possible impact on local infrastructure

Question 20:

The response to Question 1/38 (Document H1) indicates that a ground settlement in the region of 30mm may be experienced at Preesall WWTW during the life of the project. What are the views of United Utilities on the consequences of this for the treatment works, as the SoCG dated 13 June (document ref. H3) does not deal specifically with this point.

Response to Question 20:

Halite met with United Utilities geologists and engineers on 9 August to discuss the potential for subsidence arising from the operation of the proposed UGS Facility.

Matters discussed included the magnitude, timescale, consistency, impact of fracking and potential flooding of settlement/subsidence during and post operation; as well as the current and ongoing monitoring of subsidence across the Project site.

In addition, Halite discussed the Protective Provisions which have been proposed at Schedule 8 of the draft DCO.
5.90 A position statement between Halite and United Utilities in respect of subsidence has subsequently been agreed in principle and the details of monitoring in the protective provisions for sewer undertakers at Schedule 8 of the draft DCO are in the process of being finalised.

Section 2: Further Information

Question 21:

5.91 SoCGs 1 and 15 (document ref. H2) do not contain a section on “data not accepted” as is the case with nearly all other SoCGs. Can these sections be provided please?

Response to Question 21:

5.92 There is agreement with both LCC (and their consultants Atkins) and WBC on the assessment methodology, baseline data and assessment findings in the following documents (see section 2 of SoCGs 1 and 15 (Document H2)):

9.2.1 Legacy Brinewell Impact Assessment (Document 9.2.1);
9.2.2 Geological Summary Report (Document 9.2.2);
9.2.3 NTS Interconnector at Preesall Pipeline Subsidence Assessment Report (Document 9.2.3);
9.2.4 Assessment of Brinewell 45 Incident, Subsurface Aspects (Document 9.2.4);
9.2.5 Review of the Proposed Drilling and Completion Programme (Document 9.2.5);
9.2.7 Seismic Desk Study (Document 9.2.7);
9.3.1 Risk Assessment (Document 9.4.6).

5.93 Halite therefore understands that there is no “data not accepted” in the above documents.

Question 22:

5.94 SoCG 15 (document ref. H2) excludes the safety justification of the storage caverns and risers. What are the reasons for this exclusion, and please can LCC provide more information on their concerns?

Response to Question 22:

5.95 SoCG 15 (Document H2) deals with above ground risk only. The risk assessment for underground works, including the storage caverns and the risers, is contained within the Geology Summary Report (Document 9.2.2) and SoCG 1 (Document H2).

Question 23:

5.96 Paragraph 2.33 (document ref.H3), (response to Wyre Borough Council’s Local Impact Report), states that the “assessment of geology and cavern locations has taken account of the available guidance particularly BS EN 1918-3, HSE RR605,
606, 671 and BS8485”. Please can the Applicant detail which clauses of these documents have been taken into account and why.

Response to Question 23:

5.97 The documents referred to are descriptive in terms of requirements rather than being definitive requiring strict compliance. BS EN 1918 – 3 is a standard which specifies procedures and practices which are safe and environmentally acceptable. It covers functional recommendations for design, construction, testing, commissioning, operation and maintenance. The European standard specifies common basic principles and relies on more detailed complementary national standards. Cognisance of the recommendations has been made in particular with respect to Section 4.

5.98 RR605 (available from the HSE’s website) provided an appraisal of underground gas storage technologies and incidents for the development of a risk assessment methodology. It provides a comprehensive review of methods and issues not only within the UK but also in Europe and globally. Following the wide ranging global review, the document discusses the factors relevant to developing gas storage caverns in salt. Halite has taken account of the information included in the report particularly at Sections 4, 6 and 8.

5.99 RR606 (also available from the HSE’s website) reports the examination undertaken on behalf of the HSE into the potential for leakage of stored natural gas from underground salt caverns. In particular, Halite took account of Section 6.1 on Assessment Methodologies and Section 6.4 on Assessment Scenarios in developing its own risk assessment approach. The results of scoping calculations in Section 7 were reviewed with respect to Halite’s approach and the transmisivities of different potential pathways.

5.100 RR671 provided information of failure rates for underground gas storage and the significance for land use planning. The failure rates for different scenarios were taken into consideration when formulating Halite’s approach to the assessment of underground risk.

5.101 BS8485 is concerned with new development on ground affected by methane and carbon dioxide. It is not strictly relevant to gas risk assessment from underground caverns but is concerned about the impact of migrating gas on the risk to occupiers of buildings. It provides guidance on an approach to hazard identification and risk appraisal. In particular, it specifies that a site conceptual model approach is used which defines potential sources, pathways and receptors. Section 5 deals with site categorisation. This approach was adopted in the risk assessment.

Question 24:

5.102 Are the security measures proposed for the well heads which are designed to be unobtrusive to meet landscape requirements (low-lying mounds, transparent mesh security fencing) at the same time sufficient to meet likely COMAH requirements?

Response to Question 24:

5.103 As the wellheads themselves are below ground in covered concrete bunkers the low mounding is for landscaping purposes only. In other words, the low mounding is not a security measure.

5.104 In respect of security generally, Halite will have to demonstrate in its COMAH safety reports that the security measures identified in the application are adequate
to ensure major accident hazards are properly controlled. There are no specific requirements in the COMAH Regulations regarding security but general duties under the Health and Safety at Work etc Act 1974 would apply (e.g. to ensure that persons do not inadvertently enter the site). Detailed discussions with the Competent Authority (namely, the HSE and EA) will not take place until there is an approved project.

5.105 Halite has discussed this matter with the HSE which has confirmed that transparent high security low visibility mesh fencing would normally be considered adequate and is commonly used on COMAH and other high security sites, for example the underground gas storage facility at Holford in Cheshire, which is now operational.

5.106 In addition to the high security fencing, there will be anti-personnel razor wire along the top of the fence, and in the compound itself there will be movement detectors and infrared cameras.

5.107 Halite therefore considers that the landscaping measures proposed for the well heads will be consistent with likely COMAH requirements.

**Question 25:**

5.108 What standards are applicable for the appropriate minimum distance between publicly accessible land such as a public footpath and the secure parts of the proposal (wellheads, GCC, the booster pumping station etc)?

**Response to Question 25:**

5.109 There are no applicable standards for an appropriate minimum distance between publicly accessible land such as a public footpath and a secure part of the Project for example a wellhead compound.

5.110 The safety of the public in regard to the locality of a Top Tier COMAH site is determined by the HSE as part of the Hazardous Substance Consent process.

5.111 Based on the assessment carried out by the HSE the risk to persons on Knott End Golf course and members of the public using the Wyre Way is considered to be acceptable and the Wyre Way would not need to be closed.

5.112 SoCG 8 (Document H2) between Halite and the HSE states that “HSE has assessed the risks from the maximum quantities of hazardous substances identified in the proposed project and is satisfied that the deemed Hazardous Substance Consent applied for as part of Halite’s DCO Application can be granted”.

5.113 For the avoidance of doubt, the Hazardous Substance Consent process determines whether a hazardous substance can be stored on a site; and the COMAH Regulations determine how a project will be constructed and operated to ensure that major accident hazards are properly controlled with respect to the hazardous substance concerned.

**Section 3: Noise Impacts**

**Question 26:**

5.114 The noise calculations given in the ES section 12.7 (document ref 5.1) refer to noise levels at Harbour Village at a distance of 50m from the drilling compound, whereas figure 1.16 in the ES Volume 2A (document ref.5.3) shows that the houses
at Harbour Village are located immediately adjacent to the drilling compound. Please provide:

- revised worst case noise calculations for the closest houses at Harbour Village
- a statement about consultation with the owners and recent residents of Harbour Village with regard to noise levels from 24 hour working over a period of 12 weeks (May to August)
- details of the screening and landscaping proposed to mitigate noise/nuisance/disturbance/dust and to screen the temporary compound for construction referred to in paragraph 3.539 (document ref. H3 as requested in the relevant representation from Persimmon Homes)
- clarification about whether the revised working practices for the Southern Wyre crossing given in the response to Question 4/2 (document ref. H1) also apply to the Northern Wyre crossing.

Response to Question 26

5.115 The noise calculations given in the ES section 12.7 (Document 5.1) were indeed based on noise levels at Harbour Village at a distance of 50m from the drilling compound. Based on the site layout drawings available at the time of the assessment, this was assumed to be the ‘worst case’ separation distance as reserved matter approvals had not been given for the remainder of the development and no detailed layout plans were available showing how the development would progress. However, immediately prior to the submission of the DCO Application, updated drawings were obtained, showing the closest residential property to be nearer the drilling compound (Figure 1.16 in the ES Volume 2A (Document 5.3)).

Revised worst case noise calculations for the closest houses at Harbour Village

5.116 It is acknowledged that as the Harbour Village development has progressed, houses have been and will be built closer to the proposed drilling compound. As requested, Halite has undertaken revised ‘worst case’ prediction of noise impact which assumes that houses will be built within 5m of plant within the drilling compound.

5.117 Since the ES submission Halite has engaged a drilling contractor and it has been indicated that modern quieter plant will be used than was assessed in the ES. This is reflected in the “worst case” prediction below. The drilling contractor also confirmed that drilling outside normal construction working hours would not be required when drilling under the River Wyre. The work to drill under the river would take up to 28 days of daytime drilling per pipeline. There are four pipelines to be installed.

5.118 The plant to be used at the main drilling compound and the associated noise levels (sound pressure level at 1m in dB(A)) are shown in Table 1 and Table 2.
Table 1 Plant and Associated Noise Levels for Main Drilling Compound

<table>
<thead>
<tr>
<th>Plant</th>
<th>Distance (m)</th>
<th>Number</th>
<th>Lp (dB(A))</th>
<th>% On-Time</th>
<th>Total Lp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling Rig</td>
<td>1</td>
<td>1</td>
<td>82.9</td>
<td>100</td>
<td>82.9</td>
</tr>
<tr>
<td>Power Pack</td>
<td>1</td>
<td>1</td>
<td>84.9</td>
<td>100</td>
<td>84.9</td>
</tr>
<tr>
<td>Recycling Plant</td>
<td>1</td>
<td>1</td>
<td>84.9</td>
<td>100</td>
<td>84.9</td>
</tr>
<tr>
<td>BBA Pump</td>
<td>1</td>
<td>1</td>
<td>79.4</td>
<td>100</td>
<td>79.4</td>
</tr>
<tr>
<td>Mud Pumps</td>
<td>1</td>
<td>2</td>
<td>75.0</td>
<td>100</td>
<td>78.0</td>
</tr>
<tr>
<td>Generator</td>
<td>1</td>
<td>1</td>
<td>70.3</td>
<td>100</td>
<td>70.3</td>
</tr>
<tr>
<td>Workshop</td>
<td>1</td>
<td>1</td>
<td>80.4</td>
<td>75</td>
<td>79.2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>90.2</strong></td>
</tr>
</tbody>
</table>

Table 2 Plant and Associated Noise Levels for Receiving Compound

<table>
<thead>
<tr>
<th>Plant</th>
<th>Distance (m)</th>
<th>Number</th>
<th>Lp (dB(A))</th>
<th>% On-Time</th>
<th>Total Lp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Pumps</td>
<td>1</td>
<td>1</td>
<td>75.0</td>
<td>100</td>
<td>75.0</td>
</tr>
<tr>
<td>Generator</td>
<td>1</td>
<td>1</td>
<td>70.3</td>
<td>100</td>
<td>70.3</td>
</tr>
<tr>
<td>JCB</td>
<td>1</td>
<td>1</td>
<td>80.4</td>
<td>70</td>
<td>78.9</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>81.8</strong></td>
<td></td>
<td><strong>80.8</strong></td>
</tr>
</tbody>
</table>

5.119 The predicted unmitigated noise level at the closest residential property at Harbour Village as a result of the drilling compound is indicated below (Table 3).
Table 3 Predicted Unmitigated Noise Level at closest residential receptor at Harbour Village

<table>
<thead>
<tr>
<th>Site</th>
<th>Harbour Village (Sound Pressure (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant</td>
<td></td>
</tr>
<tr>
<td>Drilling Rig</td>
<td>68.9</td>
</tr>
<tr>
<td>Power Pack</td>
<td>70.9</td>
</tr>
<tr>
<td>Recycling Plant</td>
<td>70.9</td>
</tr>
<tr>
<td>BBA Pump</td>
<td>65.4</td>
</tr>
<tr>
<td>Mud Pumps</td>
<td>64.0</td>
</tr>
<tr>
<td>Generator</td>
<td>56.3</td>
</tr>
<tr>
<td>Workshop</td>
<td>65.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>76.3</strong></td>
</tr>
</tbody>
</table>

5.120 The predicted unmitigated noise level of 76.3 dB(A) set out in Table 3 is ‘worst case’ in that a separation distance of 5m from all plant within the drilling compound to the closest receptor has been assumed.

5.121 Mitigation techniques would be deployed to further reduce noise levels from the drilling compound. The drilling contractor has recommended using acoustic curtains around the noise producing plant which can reduce the noise levels by more than 10dB (i.e. to at least 66.3dB(A)). This technique has been effective when drilling operations have been located close to private properties. Further details are given in response to the query regarding screening below.

Consultation with the owners and recent residents of Harbour Village with regard to noise levels from 24 hour working over a period of 12 weeks (May to August).

5.122 The Harbour Village at Fleetwood is being developed by Redrow Homes and Persimmon Homes, both of whom have been party to the consultation process. The Persimmon Homes development is closest to the proposed drilling compound. At the time of the pre-application consultation, the Persimmon Homes houses were at an early stage of construction and none were completed or occupied. However, following concerns raised by Persimmon Homes, a meeting was held in May 2012 to discuss the noise issue and copies of the project documentation were made available to pass to prospective purchasers.

5.123 Halite visited the Redrow Homes development in October 2011 to confirm that sales staff were aware of the Halite project and that potential purchasers were being notified. No comments or representations were received from Redrow Homes as part of the consultation process.
Details of the screening and landscaping proposed to mitigate noise/nuisance/disturbance/dust and to screen the temporary compound for construction

5.124 To meet the requirements of BS 5228 ‘Code of practice for noise and vibration control on construction and open sites’, it is necessary to ensure that construction noise limits are below 75 dB(A) during daytime working. Consultation with WBC is currently being undertaken in terms of agreeing noise limits at the Harbour Village development. As part of the Requirements at Schedule 9 of the draft DCO (and the Section 61 process), a Code of Construction Practice (Requirement 23) and a Noise Management Scheme (Requirement 28) will be agreed with WBC to achieve agreed construction noise limits.

5.125 The drilling contractor engaged by Halite has indicated that they have prior experience in undertaking drilling in close proximity to residential receptors and have previously erected acoustic curtains or similar to serve as acoustic screens. With this screening in place (but no other mitigation), and no clear line of sight, a 10dB(A) reduction or greater can be achieved bringing the noise impact to 66.3 dB(A) at the façade of the closest receptor facing the site. This presents a possible worst case prediction.

5.126 British Standard BS 5228-1:2009 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise’ contains at Table E.2 (Significance based on fixed noise limits and eligibility for noise insulation and temporary rehousing) the following:

*Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*

- 70 decibels (dB) in rural, suburban and urban areas away from main road traffic and industrial noise;
- 75 decibels (dB) in urban areas near main roads in heavy industrial areas.

_*These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19.00 and 22.00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours.”_*

5.127 This demonstrates that the predicted noise level with screening of 66.3dB or less at the closest receptor is likely to be acceptable. In addition, it should be noted that:

(a) the noise prediction is worst case with all plant located at the closest possible point to the property and running continuously, no attenuation for soft ground or any correction for wind direction;

(b) the use of acoustic curtains is likely to lead to a reduction of greater than the assumed 10dB; and

(c) further mitigation could be utilised as outlined below.

5.128 Further mitigation measures to reduce construction noise could include:
(a) Careful selection of plant, construction methods and programming. Only plant conforming to relevant national or international standards, directives and recommendations on noise and vibration emissions should be used;

(b) Construction plant will be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers, screens or site hoardings where these are located between the plant and the buildings;

(c) Static and semi-static plant/equipment (e.g. compressors and generators) will be fitted with suitable enclosures where practicable;

(d) Personnel will be instructed on Best Practicable Means to reduce noise and vibration as part of their induction training and as required prior to specific work activities;

(e) When plant is not being used, it shall be shut down and not left to idle;

(f) Vehicles shall not wait or queue on the public highway or on the worksite with engines running;

(g) Methods of work and vehicular routes will be selected with regard to minimising noise impact;

(h) Where practicable, all audible warning systems and alarms will be designed to minimise noise. Broadband reverse alarms should be fitted to all vehicles;

(i) Site staff will be briefed on the need to comply with the Section 61 Consent and accompanying conditions;

(j) Local residents will be consulted in advance of the works commencing;

(k) Localised mobile screening will be used where reasonably practicable to reduce the noise levels from handheld tools such as drills; and

(l) Personnel will be briefed to minimise shouting on site.

5.129 In respect of dust, the following mitigation measures would typically be considered to mitigate against construction dust impacts:

(a) Regular visual monitoring of construction activities to identify significant dust sources;

(b) Development of dust control procedures for all significant dust generating activities;

(c) Location of potentially significant dust sources away from construction site boundaries wherever possible;

(d) If appropriate, the adjustment of the alignment of the haul roads to avoid passing close to sensitive receptors, where practical;

(e) Water suppression in dry conditions to reduce dust emissions (use mobile bowsers or fixed sprayers as appropriate);
(f) Regular cleaning of hard surfaces in areas where construction or related compounds are close to sensitive receptors;

(g) A speed limit applied to all construction vehicles working on the site, including all vehicles using the haul roads; and

(h) Wheel washing of mobile plant and HGVs as they exit the site onto the highway.

Clarification about whether the revised working practices for the Southern Wyre crossing given in the response to Question 4/2 (document ref. H1) also apply to the Northern Wyre crossing

5.130 Halite can confirm that for both the Northern Wyre and Southern Wyre crossings, drilling will be from west to east. There will be two mud pumps at each of the north western and south western drill sites and one mud pump at each of the north eastern and south eastern reception sites.

5.131 The predicted noise levels for both the Northern Wyre and Southern Wyre crossings have been carried out assuming a 200 tonne rig will be used. However, for the Southern Wyre crossing, a 100 tonne rig may be used.

5.132 It is currently assumed that the drilling process for both crossings will be similar in that drilling will be carried out during the daytime. At the Northern Wyre crossing, four conduits will be required as opposed to two conduits at the Southern Crossing.

Note

5.133 As proposed by the Panel at the DCO specific issue hearing on 24 July 2012, Halite is seeking to agree noise limits with WBC for inclusion in the Requirements at Schedule 9 of the draft DCO. Halite will provide an update on this when the next revised version of the draft DCO is submitted to the Panel on 31 August 2012.

Section 4: Landscape Impacts

Question 27:

5.134 Please provide a diagram showing the new slipway location referred to in the response to Question 3/4 (document ref. H1).

Response to Question 27:

5.135 The diagram provided at Appendix 8 of this document and entitled “Revised Proposal for Seawall Crossing of Brine Outfall Pipeline” shows the proposed observation and a modification to the existing access ramp to the beach.

5.136 In this proposal a landing would be created approximately halfway down the ramp and a new continuation of the ramp returned parallel to the existing section. The width of the ramp may be increased to provide adequate turning circle for their maintenance vehicles.

5.137 This proposal has been agreed in principle with WBC’s Engineering Department.

Question 28:

5.138 The tallest elements of the GCC are the glycol dryers at 13m high (18.5m AOD) and the vent stack described as either 15m or 16m high in the text / drawings
Mitigation measures are described at section 14.8 of the ES (document ref 5.1), by cross reference to the Landscape and Ecology Management Strategy Plan at figure 14.10 of the ES Volume 2B, document ref. 5.4 and Appendix 14.11 of the ES Volume 1B, document ref. 5.2). What opportunities are there for possible additional mitigation such as increasing the height of the earth mounding, placing the GCC lower in the landscape or specifying all planting as native woodland, rather than dense scrub.

**Response to Question 28:**

5.139 The purpose of the mitigation measures in relation to the GCC seek to achieve a balance between screening the various elements within it in terms of (i) views from the local footpath network, (ii) the adjacent functionally-linked land associated with the international and nationally important ecological habitats of the Wyre Estuary and (iii) flood risk. With reference to Table 14-1 in Volume 1A of the Environmental Statement (Document 5.1), these mitigation measures have been developed as a result of significant consultation with a range of organisations and the tenant farmer. There were a number of meetings held during the summer and autumn of 2011 to discuss the proposals, including several site visits. The mitigation also forms part of the Landscape and Ecological Management Strategy Plan ("LEMSP") (Appendix 25 of Document H1) which has been agreed by reference to the SoCGs with Natural England (SoCG 35), the Environment Agency (SoCG 36), Lancashire County Council (SoCG 5), Lancashire Wildlife Trust (SoCG 38), Wyre Borough Council (SoCG 4) and the Royal Society for the Protection of Birds (SoCG 37). Each SoCG can be found appended to Document H2.

5.140 With reference to Table 14-19 in Volume 1A of the Environmental Statement (Document 5.1) and Figures 14.2, 14.7 (sheet 1 of 3) and 14-9h, 14-9j and 14-9k in Volume 2B of the Environmental Statement (Document 5.4), the users on the bridleway BW1 (Receptor VR4.6), footpath FP45 (Receptor VR4.10a & 4.10b) and footpath FP46 (Receptor VR4.12) which have a view to the GCC, would at worst experience a slight adverse (not significant) visual impact during the Project's operational phase. With reference to Figure 14-9g in Volume 2B of the Environmental Statement (Document 5.4), the users on the Wyre Way, which runs concurrently with footpath FP42 (Receptor VR4.4a), would also have a view to the GCC. Although it is reported that the views from the Wyre Way would experience a moderate adverse (significant impact), the main visual impact on these views would result from the closer foreground features such as the wellhead compound perimeter fencing, although the upper part of the glycol dryers and the adjacent vent stack would be discernable, albeit minor elements beyond.

5.141 It is recognised that the proposed mitigation provides screening of most elements within the GCC and those elements which would be visible above the mound and planting i.e. the glycol dryers and vent stack would form a minor to unobtrusive element in these views. With reference to Figure 14-5 in Volume 2B of the Environmental Statement (Document 5.4), it is also important to consider the form of the mounding and associated planting as a new feature in the landscape and in views. Halite is of the opinion that, although the profile of the mound is artificial, its overall appearance (in the context of the wider landscape setting) is in keeping with the undulating, rolling nature of the landscape and forms overall an unobtrusive new landscape feature.

5.142 With reference to the three design opportunities outlined in Question 28, Halite responds, as follows:

- **Opportunities to increase the height of the mounding –** In order to do this, more agricultural land and/or require a steeper mound profile would be
required. The downside to this would mean the further loss of functionally-linked land associated with the Wyre Estuary SSSI and SPA/RAMSAR designations and/or create an artificial feature which could potentially be incrementally more noticeable in the wider landscape;

- Opportunities to lower the GCC – The Compressor buildings, substation, electrical and instrument building cannot be lowered as this would conflict with the Flood Risk Assessment. However, other elements of the GCC, including the glycol contactors which are the tallest vessels, have been located at 1.5m below the floodplain;

- Opportunities to specify all planting as native woodland, rather than scrub – The provision of screen woodland planting would provide better cover for predators, which would conflict with the principles of the LEMSP.

5.143 In summary, Halite considers that the mounding proposals around the GCC achieve an optimum balance between the requirements to minimise the effects of the Project on the local landscape, its visual amenity, the international and nationally important natural habitats and flood risk. The proposals have been developed following extensive consultation with the key statutory bodies and consultees responsible for ecological and landscaping matters.

**Question 29:**

5.144 What equipment would be required to pump slurry to BW 123, and pump the return displaced brine to the booster pumping station? If equipment and control panels are to be located at BW123, please provide a plan and photomontage of the view from the Wyre Way.

**Response to Question 29:**

5.145 The diagram provided at Appendix 9 entitled “Slurry Return Process to BW123” gives a high level overview of the leaching process and slurry feed and return process.

5.146 Brine and mudstone slurry and brine return pipelines will be included under pressure pipelines referred to at Work No. 11 of Schedule 1 of the draft DCO (Appendix 1 of Document H4) and will be laid between the Booster Pump Station (Work No. 4) and Wellhead Compound No 7 (Work No 2G). These pipelines are expected to be approximately 100mm nominal bore. The slurry mixture and brine return will be transferred from the wellhead compound to BW 123 and returned to the compound by temporary pipelines, approximately 50m in length, details of the routing to be agreed with the tenant farmer. The preference will be for these to be buried in the ground at 1m depth. The temporary pipelines will connect to a tee piece at BW123 by flexible armoured pipes above ground level. There will be isolation and bypass valves and instrumentation at the wellhead, but no pumps. This equipment will be protected from the weather by means of a simple enclosure.
5.147 There will be a stock fence around the wellhead during the operation of the slurry return.

5.148 The photomontages provided at Appendix 10 of this document show BW123 with the slurry return arrangement as described above as viewed from the Wyre Way. The photomontages of the BW 123 location were both created from panoramic photographs taken from the Wyre Way. The first was taken at approximately 12m from the wellhead viewed towards the north west. The second was taken at approximately 70m from the wellhead looking towards the south south west.

Section 5: Compulsory Acquisition

Question 30:

ABP interests are intended to be removed from the DCO but a number of plots remain in the Book of Reference:

- Plot 59: ABP’s interest is recorded but excepted from acquisition
- Plot 62: ABP’s interest is recorded but not excepted from acquisition of rights. What is the position?

Response to Question 30:

5.150 Plot 59 is the site for the location of the sea water pumping station.

5.151 Halite will rely on the rights granted in a lease and Deed of Easement, both dated 19th September 2006 between ABP and CGSL.

5.152 Plot 62 is an area of 23 square metres, situated on the foreshore on the western bank of the Wyre Estuary. The parcel is not shown to be occupied exclusively by Redrow Homes Ltd., Associated British Ports or the Queen’s Most Excellent Majesty in Right of Her Duchy of Lancaster. Nor is it included in the Deed of Easement dated 15 September 2006 referred to above under Plot 59. To avoid the risk of a ransom strip being created in the light of no clear and definitive ownership information, the interest of ABP has been recorded but not excepted.

Question 31:

Please explain the reason for deleting Electricity North West Limited, United Utilities Water plc, and National Grid Gas plc from Part 5 of the Book of Reference.

Response to Question 31:

5.154 The companies referred to in the question are statutory undertakers. Pursuant to Regulation 7 of the Infrastructure Planning (Applications: prescribed Forms and Procedure) Regulations 2009 Part 5 only requires land to be specified:

(a) The acquisition of which is subject to special parliamentary procedure;
(b) Which is special category land;
(c) Which is replacement land.

5.155 Statutory undertakers’ land does not fall into any of these categories (see definitions in Regulation 2 of the above Regulations) and therefore those
companies have been removed from Part 5 of the Book of Reference (Document 7.3).

**Question 32:**

5.156 On what basis does the Applicant consider that a depth limitation is not necessary in respect of the rights sought in relation to plots 159-211(save 205) relating to its NTS pipeline.

**Response to Question 32:**

5.157 Plots 159 – 211 (save for 205 – the site for the Gas Metering Station) relate to the gas pipeline connecting the gas storage facility to the NTS pipelines.

5.158 The depth at which the pipe is laid will be determined by the ground conditions and features encountered along the route. Ideally, 1m of cover between the top of the gas pipe and the surface of the land will be sufficient to be below most land drains and all potentially damaging agricultural operations. However, where deep and open drains are to be crossed or other features that might include roads or tracks, it may be preferable or necessary to lay the pipe at a greater depth to provide adequate protection for the features and maintain the safe integrity of the gas pipe.

6 QUESTIONS ON COMPULSORY ACQUISITION AND OTHER MATTERS FROM PANEL LETTER OF 2 AUGUST 2012 AND RESPONSES

**Question 1:**

6.1 The response from Wyre Borough Council of 21 May 2012 regarding the observation platform is noted. With regard to plots 9 and 13 (which are proposed to be acquired for the construction of the observation platform) would the Applicant please explain if are these required only for the viewing facility in connection with the Rossall Improvement Scheme or is there another purpose connected with or linked to the application?

**Response to Question 1:**

6.2 Plots 9 and 13 are required for two purposes:

1. The primary requirement is to provide an access route for the brine discharge pipework to be laid in a channel over the top of the sea defence (this is in Plot 13) and vertically down to the shore line in front of the sea defence (this is in Plot 9) where it will continue to be laid in a channel to the point of discharge;

2. The secondary requirement for the Plots 9 and 13 is for the installation of an observation platform for the benefit of the public. This will be constructed over the route of the brine pipeline and therefore form part of the making good of the sea defence.

**Question 2:**

6.3 The response to question 10/2 of the Examining authority’s first written questions (Doc.ref H1) is noted. However, can the Applicant explain why rights in the land are being sought when also seeking to acquire the freehold, which would enable the Applicant to create whatever rights they choose in the land?
Response to Question 2:

6.4 We presume the Question should refer to the response to Question 10/4 of the Examining Authority’s First Written Questions rather than Question 10/2. As indicated in that response, compulsory acquisition of land (Plots 149, 151-155 and 157) shown in the Land Plans (Document 2.2) is required for the purposes of the permanent access road. Compulsory acquisition of rights is required for the interconnector pipeline. The eventual compulsory acquisition land take for the interconnector pipeline and access road will not be the full extent of the limits of deviation. However, the precise alignment of the access road and interconnector will not be known until after the grant of the DCO. Assuming the DCO is granted, the intention is that part of the land within those plots (149, 151-155 and 157) required for the access road will be vested as an outright acquisition. Part of the land will be subject to the vesting of rights in respect of the interconnector pipeline (the intention is that the rights will be adjacent to the area of land vested outright). That will then leave part of the plot where no land or rights are vested (although the full extent of the plot will be required for the purposes of construction and temporary possession). By limiting the outright acquisition of land in this way, this will allow more land within those plots to be retained by the landowner and is therefore considered to be a more proportionate approach.

Question 3:

6.5 The response to question 10/10 (b) (ii) of the Examining authority’s first written questions (Doc. ref H1) is noted. Local authority land which is subject to the acquisition of rights has been removed from Schedule 5 of the Book of Reference. Please explain the reason for doing so.

Response to Question 3:

6.6 We have reviewed the position on this and confirm that local authority land which is subject to the acquisition of rights should remain in Schedule 5 of the Book of Reference as was the case with the version of the Book of Reference submitted with the DCO application on 30 November 2011 (Document 7.3). The reason it was suggested in our response to Question 10(b)(ii) of the Examining Authority’s First Written Questions that such land could be deleted from Part 5 was on the basis that Section 128 Planning Act 2008 states that special parliamentary procedure only applies to the extent that a development consent order authorises the compulsory acquisition of "land". As it is only intended to acquire rights in local authority land (in respect of the plots suggested to be removed from part 5), it was considered that Section 128(2) was not applicable. However, upon further review, it is considered that Section 128(2) does apply due to the definition of "land" contained in Section 159 Planning Act 2008 which encompasses “rights”.

6.7 Halite, therefore, proposes that Part 5 of the Book of Reference in this respect should be in accordance with the original version submitted with the DCO application (Document 7.3).

Question 4:

6.8 Please advise if Halite Energy Group Limited, the Applicant, is a person falling within section 129(i) (e) of the Planning Act 2008 and if so, why?

Response to Question 4:

6.9 Halite does not consider that it is a person falling within Section 129(i)(e) Planning Act 2008.
Question 5:

6.10 The response to question 4/2 of the Examining authority’s first written questions (Doc.ref H1) is noted. Would the Applicant please confirm whether the noise calculations provided in Appendix 32 relating to Kneps Caravan Site also cover the adjacent Flints Caravan Park, and if not please provide specific noise calculations.

Response to Question 5:

6.11 Predictions were carried out to the closest caravans at Kneps Caravan Site (approximately 40m) as indicated by green arrow on the image below.

6.12 Flints Caravan Park is situated opposite the main entrance to Kneps (approximately 330m from the drill site) as indicated by red letter ‘A’.

6.13 Mitigation to achieve acceptable noise levels at Kneps (40m away) would also ensure that acceptable noise limits are achieved at Flints Caravan Site.

6.14 The predicted noise levels at Flints Caravan Site (330m from the construction activities) are provided in the table below.

<table>
<thead>
<tr>
<th>Flints Caravan Site</th>
<th>Predicted Levels dB(A)</th>
<th>Noise</th>
</tr>
</thead>
</table>

...
<table>
<thead>
<tr>
<th>Flints Caravan Site</th>
<th>Predicted Levels dB(A)</th>
<th>Noise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drilling Rig</td>
<td>32.5</td>
<td></td>
</tr>
<tr>
<td>Power Pack</td>
<td>34.5</td>
<td></td>
</tr>
<tr>
<td>Recycling Plant</td>
<td>34.5</td>
<td></td>
</tr>
<tr>
<td>BBA Pump</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>Mud Pumps</td>
<td>27.6</td>
<td></td>
</tr>
<tr>
<td>Generator</td>
<td>19.9</td>
<td></td>
</tr>
<tr>
<td>Workshop</td>
<td>28.8</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39.9</strong></td>
<td></td>
</tr>
</tbody>
</table>

6.15 The predicted noise level of 39.9dB(A) is worst case, assuming free-field for propagation of noise from source, across hard ground.

6.16 In reality structures and caravans on Kneps Site will offer some screening.

Berwin Leighton Paisner LLP

14 August 2012
Appendix I

25th September 2012

PWG response to Halite answers to the EA second round of questions and to PWG response to those questions.

1 Q4

1.1 The details of E1 as given in the BGS Memoir (Wilson and Evans 1990) indentify a layer of marl, grey and rock salt 0.15m in thickness in the Thornton Mudstone, 26.52m beneath the bottom of the halite bed.

Halite (5.9 p4) refers to “a series of red and grey marls (with or without gypsum)” and not rock salt.

1.2 Paragraph 5.10 (p5) shows that the present 3-D model dismisses the evidence from the E1 Bore Hole in favour of an “interpretation of salt thickness and the location of the Burn Naze Fault”.

1.3 Halite refers to descriptions “core worn away” or “core lost” recorded within the overburden mudstones and halite beds of the first drilling phase (5.8). It does not explain the recording of 5.49m of no core at the top of the Preesall Salt.

1.4 Halite does not answer the point made by PWG that the BGS Memoir identifies 5 marl bands in the halite indicating that this is the full sequence of the halite bed. At the base of the halite the bore penetrates the Thornton Mudstones which would disprove any theory that E1 is intersected by the Burn Naze Fault.

1.5 Halite makes the assumption that E1 is intersected by the Burn Naze Fault and therefore the thickness of the halite bed can be interpreted as c200m. Halite adds that if this is not the case, the Burn Naze Fault must lie further to the west under the estuary which would not pose any safety risk to the caverns 1 and 3.

1.6 However, given the limited thickness of the halite bed (perhaps as little as 81m), the height of caverns 1 to 6 would need to be reduced to between 30 and 50m depending on the cavern radius. Such a cavern becomes not only non-viable but potentially unsafe.

1.7 Drawing ending 0001 (GSR) shows that E1 lies 160m north of the section line 6 and close to the supposed position of the Burn Naze Fault. Looking at Drawing 0004 (GSR) if can be seen that if this is the Burn Naze Fault than the bottom of the E1 Bore Hole would encounter either the Sherwood sandstone of the bottom beds of the Lower Mudstone, which it does not.

2 Q5

2.1 The answers to Q5 from Halite are confusing. In 5.12 it states “the line (GC81-336) had not previously been interpreted and any information from it is not therefore, incorporated in the geological model”. (PWG italics)

2.2 In 5.14 (2) it states that the objective of drilling the Burrows Marsh Bore Hole (BMBH) under Barnaby’s Sands was to tie in the seismic line in that area and immediately to the east of the large omission zone related to the estuary. It should be noted that BW 123 is closer to GC81-336 than the BMBH (PWG italics).
Appendix I

2.3 PWG’s assumption from these statements is that the data from GC81-336 is of such poor quality that it was not used to establish the depth and thickness of the halite west of BMBH, which remains an area of considerable uncertainty.

2.4 However, Halite in its answers to PWG (28th May 2012) states “The primary evidence for the faulting shown on the model, assisted by data from boreholes and brinewells, is seismic lines GC81-336 to the south and IELP 99-25 to the north”. Thus Halite is relying on evidence for the geology on a seismic line which Halite (and the BGS) admits to be of poor quality and unusable.

2.5 When asked about confidence intervals and degrees of confidence for the depth and thickness of salt in cavern 17, Halite stated “the location is intersected by seismic line GC81-336 which helps inform Section 2-2’ appended to the GSR, so the overall geological structure is fairly well defined at this cavern”. And yet seismic line GC81-336 is of poor quality and unusable.

2.6 It should be noted that the Cote Walls Farm Bore Hole (CWFBH) lies 400m north east of the sea wall at Barnaby’s Sands. The East Barnaby’s Sands Fault runs north-south just west of the sea wall. To suggest (5.16) that the “dips of the surfaces are also proved by the dips of strata obtained in the boreholes notably the BGS drilled and fully logged CWFBH” is not justified.

3 Q7

3.1 It is noted that when Halite was asked to produce a diagram of the East Barnaby’s Sands Fault and to explain the effect the fault has on the halite bed, Halite produced a section that was clearly inaccurate. “It was intended to assist PWG with the interpretation of the plan position of the Burrows Marsh BH with respect to the East Barnaby’s Sands Fault and the deviated borehole trajectory”. So Halite “assisted” PWG by providing a section that was incorrect.

3.2 In answer to the Inspector’s questions, instead of producing an accurate version of what is required, Halite reproduces the section from the BMBH Report of the BGS.

4 Q13

4.1 Halite states that the Technical Assessor’s comments at the 2005/6 Public Inquiry, were in relation to a larger and less well defined scheme. PWG has already pointed out that the Canatxx application refused by the Inquiry, was initially for 24 caverns. This was reduced to 20 during the course of the Inquiry. This compares with a maximum of 19 caverns operational caverns for the present proposal.

4.2 The total volume of gas which it was proposed to store was 1700 mcm, but this figure was calculated by using the height and radius of each cavern to determine volume (i.e. using the volume of a complete cylinder). It did not take into account as the present proposal does, the doming of the roof, the spacing between the cavern and the top and bottom of the salt bed and the amount of insolubles left in the cavern. Taking this into account the total amount of gas which would have been stored was shown to be 577 mcm, i.e. only two thirds of the present proposal.

4.3 Figure 1.2 in the GSR purports to show a comparison of the current application against the previous application. But this was not the application which was examined by the Public Inquiry and to which the Technical Assessor’s comments apply. It is entirely misleading for Halite to claim that
Appendix I

its scheme has been substantially reduced when compared to the number of caverns and amount of gas storage proposed at the Inquiry.

4.4 PWG believes it has clearly demonstrated in the documents and responses it has produced that the geological data are not sufficient. Halite is now (evidence given to EA 17th September 2012) admitting that further seismic surveys will be needed following consent before the designing of the caverns can proceed. Information was given that these surveys would take about two months to complete although permission to go across an SSSI might take longer. Why, therefore, were these surveys not carried out before the application was submitted? It would appear that Halite is at long last admitting the inadequacy of its geological information.
Panel’s findings and conclusions and recommendation in respect of an application for a Development Consent Order for an underground gas storage facility including associated development that comprises a brine pipeline and gas interconnector pipeline in Preesall, Lancashire

Date: 21 January 2013
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Preesall Underground Gas Storage Facility

- The application, dated 30 November 2011, was made under s37 of the Planning Act 2008 (as amended)
- The Applicant is Halite Energy Group Limited
- The application was accepted for examination on 23 December 2011
- The examination of the application began on 24 April 2012 and was completed on 24 October 2012
- The development proposed is the creation of underground gas storage (UGS) caverns by solution mining of the Preesall Halite deposit in Lancashire to provide a working capacity of up to 600 million cubic metres at standard temperature and pressure (Mcm) together with associated development including wellhead compound areas, a gas compressor compound (GCC), a booster pump station, a seawater pump station, a brine outfall pipeline, a gas pipeline connecting to the national gas grid, pipelines and other elements.

Summary of Recommendation: the Panel recommends that the Order be made, subject to modifications.
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1 INTRODUCTION

1.1 On 19 March 2012 a Panel of three Commissioners was appointed by the then chair of the Infrastructure Planning Commission (IPC) to handle the application dated 30 November 2011 for development consent for an underground gas storage (UGS) facility at Preesall, Lancashire. The Panel comprised:

- Paul Hudson – lead member of the Panel
- Libby Gawith – member of the Panel
- Emrys Parry – member of the Panel.

1.2 At the Panel’s request, as provided for under s100 of the Planning Act 2008 (PA 2008) and Rule 11 of the Examination Procedure Rules 20101, the chair of the IPC appointed Dr Ramues Gallois to act as an assessor to assist the Panel about geology and geotechnical matters in the examination of the application.

1.3 The IPC was abolished on 30 March 2012 and its functions transferred to the Planning Inspectorate. The members of the Panel are now termed Examining Inspectors and collectively constitute the Examining authority (ExA) for this application.

1.4 This report sets out in accordance with s74 of the PA 2008 the Panel’s findings and conclusions in respect of the application, and reasons for our recommendation to the Secretary of State to make an Order subject to modifications, granting development consent for the proposal under s114 of the PA 2008.

1.5 The proposed development for which consent is required under s31 of the PA 2008 comprises an UGS facility with a working capacity of up to 600 Mcm at standard temperature and pressure. It is far above the threshold of at least 43 Mcm specified in s17 of the PA 2008 and is within England. The proposed development comprises a nationally significant infrastructure project (NSIP) as defined by s14 and s17 of the PA 2008, and associated development as defined in s115 of PA the 2008.

1.6 The draft Order seeks powers of compulsory acquisition of land and rights and includes a deemed marine licence as provided for in s149A of the PA 2008.

1.7 The application is EIA development as defined by the Regulations2. It was accompanied by an environmental statement (ES) which in our view meets the definition given in Regulation 2(1). Supplementary environmental information was supplied during the course of the examination. In reaching our recommendation, we have taken all the environmental information into consideration in accordance with Regulation 3(2).

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1 The Infrastructure Planning (Examination Procedure) Rules 2010
2 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009
1.8 A preliminary meeting was held on 24 April 2012 at which the Applicant and all interested parties (IPs) were able to make representations to the Panel about how the application should be examined. Our assessor attended that meeting. The ExA’s procedural decision was issued on 2 May 2012 (PD3), and the examination proceeded in line with this.

1.9 In addition to the consent required under the PA 2008, the proposal is subject to various environmental permits from the Environment Agency (EA) under the Environmental Permitting regime, and licences from Natural England (NE) in connection with European protected species. At the time the examination closed on 25 October 2012, none of the required licences had been issued, but letters of comfort dated 18 October 2012 from NE were sent to the Applicant in respect of great crested newts and bats such that no outstanding issues remain which would prevent the licences from NE being granted (REP281, Appendices 18 and 19).

1.10 A brine discharge consent under the Water Resources Act 1991 was granted by the EA in 2007 in connection with a previous planning application for UGS at Preesall (see Chapter 4 below). The EA reissued this consent in 2011 to take effect from the beginning of 2014 in connection with the Order if made (APP18, Appendix 2.1). A Water Abstraction Licence for up to 80,000m³ of water per day from the Fleetwood Fish Dock was granted by the EA in June 2012 (REP198, Appendix 3).

1.11 The certificates required from the Secretary of State in relation to compulsory acquisition of land and rights are dealt with in Chapter 8 below.

1.12 A separate parallel application was submitted for a deemed hazardous substances consent (HSC), and this has been progressed in order to enable the Secretary of State to make a direction under s12 of the Planning (Hazardous Substances) Act 1990 as amended by Schedule 2, paragraphs 42 to 47 of the PA 2008.

1.13 Subsequent to the Order being made, a range of other consents would be required. Approvals to satisfy the Control of Major Accident Hazards Regulations (COMAH) 1999 would be needed from the Competent Authority which is the Environment Agency (EA) and Health and Safety Executive (HSE) acting jointly.

**UNDERTAKINGS**

1.14 During the course of the examination, a s106 agreement under the Town and Country Planning Act 1990 (TCPA) was concluded between the Applicant, Preesall Energy Services Ltd, Wyre Borough

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3 Environmental Permitting (England and Wales) Regulations 2010.
4 Conservation of Habitats and Species Regulations 2010
Council (WBC) and others. This has been executed and dated 18 October 2012 (REP281, Appendix 24). It provides particularly for the Applicant’s obligations to WBC concerning the discharge of requirements, decommissioning of the site and monitoring of the existing brinewells, together with maintaining the established community liaison panel and the routeing of HGV traffic during construction.

1.15 An agreement dated 18 October 2012 in favour of the EA was also entered into by the Applicant (REP281, Appendix 26). It commits the Applicant to meeting the costs of restoring the existing flood protection to the current standard if the proposed works create an increased flood risk.

1.16 An option agreement dated 22 October 2012 was entered into between the Applicant and Blackpool Borough Council concerning an easement to enable a brine discharge pipeline to be constructed beneath the Blackpool to Fleetwood Tramway (REP308).

1.17 An undertaking dated 22 October 2012 in favour of Knott End Golf Club was issued by the Applicant limiting the exercise of compulsory acquisition rights and powers over the surface of the Golf Club’s land for purposes related to subsidence monitoring equipment only (REP281, Appendix 7). This was not agreed by the Golf Club (REP281, Appendix 8).

1.18 The content of these undertakings is set out in more detail in Appendix A, and we took these into account in our findings and conclusions, and recommendation.

**STRUCTURE OF THE REPORT**

1.19 Chapter 2 summarises the main procedural steps taken during the examination. Chapter 3 sets out the main features of the proposed development. Chapter 4 summarises the policy context applicable to it. In Chapters 5, 6 and 7, the Panel’s findings and our conclusions in respect of each of the main considerations and on the development merits are set out. Chapter 8 deals with compulsory acquisition matters. Chapter 9 considers the proposed Order, the changes which were made to it during the course of the examination, and further modifications we feel are necessary to make the proposed development acceptable. In the light of that, Chapter 10 sets out our overall recommendation that the Order should be made.

1.20 Appendix A summarises the contents of the obligations referred to in paragraphs 1.14 to 1.17 above. The main ‘events’ occurring during the examination and the main procedural decisions taken by the ExA are listed in Appendix B. Appendix C lists the documents submitted by the Applicant and others in connection with the examination, with the references used in this report. It also contains a list of those parties making written and oral
representations to the Panel. All representations properly made were duly considered and taken into account by the Panel before coming to our conclusions and recommendation.

1.21 Appendix D contains the final version of the Development Consent Order (DCO) submitted by the Applicant at the conclusion of the examination with the further modifications we propose. Finally, Appendix E contains a list of the main abbreviations used in this report.
2 PROCEDURAL DECISIONS

2.1 This chapter provides an overview of the main procedural decisions made by the ExA during the examination of the application. It also includes information on the participation of the public in the examination. In all cases the lead member of the Panel wrote as appropriate on behalf of the ExA. A full chronological breakdown of the examination process is set out in Appendix B.

2.2 As Appendix C illustrates, we received just under 200 relevant and written representations concerning the proposal. This is not a large number compared with other controversial development proposals, but needs to be seen in the context of:

- three previous planning applications for similar UGS proposals in the area
- the coordination role performed by the Protect Wyre Group (PWG).

2.3 PWG’s role is set out in the organisation’s written representations (REP170). PWG has been closely involved in organising opposition to previous proposals, and consequently to this application for development consent. PWG in turn organised pro forma responses from over 10,800 residents inviting respondents to agree with 10 major points of objection put forward by PWG as well as enabling individuals to set out specific matters of concern to them. PWG analysed this response as part of their representation (REP170). These pro forma responses are not themselves individual representations, a point we discussed with PWG at the preliminary meeting held in Fleetwood on 24 April 2012.

2.4 The representation submitted by Paul Maynard MP also contained 496 pro forma responses expressing opposition to this application (REP160).

2.5 Perhaps not surprisingly, many representations repeated points made in opposition to earlier planning applications for UGS and indeed re-presented material submitted to the public inquiry held in 2007. Although it is important to recognise the history of previous proposals for UGS in this locality, we were concerned from the outset to treat the application for development consent as a fresh proposal.

2.6 Following the preliminary meeting held on 24 April 2012, the lead member of the Panel wrote to all IPs on 2 May 2012 setting out the ExA’s procedural decision (PD3). This established the timetable for the examination, including the deadlines for submitting written representations, Local Impact Reports (LIRs), Statements of Common Ground (SoCGs) and responses to our first round of questions contained in an Annex to the letter.

2.7 These questions covered a wide range of matters concerning:
• geology
• the assessment of significant effects on the Morecambe Bay SPA and Ramsar site
• the impact of brine discharge to the Irish Sea
• noise and landscape impacts
• disposal of waste arisings from cavern formation
• access
• the interconnector gas pipeline
• storage of hazardous substances
• compulsory acquisition
• corporate structure.

2.8 Following the receipt on 6 June 2012 and 4 July 2012 of written representations, the LIRs, responses to the first round of questions and subsequent comments on these documents, and a large number of SoCGs, the lead member of the Panel wrote to all IPs on 18 July 2012 setting out the Panel’s further written questions.

2.9 An issue specific (IS) hearing was held on 24 July 2012 to consider the drafting aspects of the draft Order including the draft deemed marine licence and the requirements, and the proposed agreement between the Applicant and the local planning authorities under s106 of the TCPA. In the light of discussion at the hearing, the Panel decided to cancel the second IS hearing concerning the draft Order provisionally arranged for 22 August 2012. This was to allow the Applicant and other organisations involved in drafting sufficient time to prepare a further submission, which was received as set out in the timetable on 31 August 2012.

2.10 On 23 August 2012, the lead member of the Panel confirmed that additional IS hearings would be held on the following matters:

• 18 September: drafting aspects of the draft Order and requirements, the draft marine licence and the proposed s106 agreement
• 19 September: the relationship between the development proposed to be granted by the Order and the subsequent detailed approvals to be obtained from the Competent Authority (HSE and EA) within the COMAH Regulations.

2.11 Following the receipt of several requests from affected persons (APs) wishing to be heard at a compulsory acquisition (CA) hearing, the lead member of the Panel confirmed in his letter of 31 August 2012 that such a hearing would be held to consider the compulsory acquisition of land and interests starting on 9 October 2012. Similarly, following the receipt of requests from three IPs he confirmed in the same letter that an open floor (OF) hearing would take place consisting of six sessions on 17 and 18 October 2012.
2.12 During the later stages of the examination, the Panel issued several requests for information under Rule 175. These covered matters such as:

- the implications of The Conservation of Habitats and Species (Amendment) Regulations 2012
- the position of statutory undertakers and Crown land in relation to compulsory acquisition powers
- the framing of requirements within the Order
- the hazardous substances consent.

2.13 We held accompanied site visits at the beginning of the examination on 3 May 2012 and again at the end on 19 October 2012, and the examination closed on 24 October 2012.

2.14 We are satisfied that all those making written representations had a full opportunity to participate in the examination, through the submissions made and at the hearings.

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5Infrastructure Planning (Examination Procedure) Rules 2010
3 THE APPLICATION

3.1 The proposed UGS facility is shown on the plans submitted as part of the application (principally the ES, APP17-19 and APP5-9). The master plans in Part 3 of APP9, and repeated in several documents such as the Project Overview (APP30), provide an overall view of what is proposed.

THE SITE AND ITS SURROUNDINGS

Eastern side of the Estuary

3.2 The main part of the proposed development at Preesall, including the surface wellheads to the UGS caverns, the booster pump station and the gas compressor compound (GCC), would cover an extensive irregularly shaped area comprising the Wyre Estuary, open agricultural land with associated hedged field boundaries and salt marsh to the east of the Wyre Estuary. To the north is Hackensall Sewage Treatment Works (STW), Cote Walls Farm and Knott End golf course, beyond which is the settlement of Knott End; to the north east is Preesall, to the east Stalmine, and to the south Staynall with Hambleton beyond.

3.3 There are several scattered farmsteads in the area, comprising old houses and a mixture of traditional and modern agricultural buildings and hard standings. There are two recreational static caravan parks at The Heads, one of which is within the control of the Applicant; the other is in private ownership. The area is accessed by a number of single track roads, agricultural access tracks and a number of public footpaths including the Wyre Way long-distance path which runs up the eastern side of the Wyre Estuary on the flood protection embankment.

3.4 The land is generally flat but undulating in parts. There is extensive evidence of former salt workings in the form of brine abstraction wellheads throughout the area, water filled depressions to the east and north east of the application site some of which are deep and security fenced. These are a result of either catastrophic cavern collapse of former brine wells or areas associated with a former ‘dry’ mine to the east of Cote Walls Farm, the surface development of which has since been removed and the former workings are now flooded.

3.5 The area of Arm Hill and all the salt marshes fall within the Morecambe Bay Special Protection Area (SPA) and Ramsar site, and the Wyre Estuary Site of Special Scientific Interest (SSSI).

Western side of the Estuary

3.6 The western side of the Estuary is fronted from north to south by Fleetwood Docks, the former Fleetwood Power Station site which has been reclaimed for ecological and recreational purposes, Jameson Road landfill/raise site, and land associated with the
former ICI works at Hillhead. The main surface development proposed on the Fleetwood side of the Estuary is the seawater pump station in the Fish Dock.

**Pipelines**

3.7 A corridor of some 20m beneath the Estuary would be required to accommodate the communications, seawater and brine discharge pipelines to run from the proposed booster pump station on the eastern side of the Estuary to the seawater pump station in Fleetwood Fish Dock. The discharge pipeline would run from the seawater pump station on a course parallel to the rear of the Jameson Road waste water treatment works and a holiday caravan park, along Jameson Road over the disused railway before crossing the A585(T), and running through the grounds south of the Nautical College of Fleetwood. It would then run to the rear of residential properties on South Strand, parallel to West Way and past Rossall Hospital to the coast. The discharge pipeline would then cross the sea wall before extending some 2.3km into the Irish Sea. The corridor crosses an area of mixed uses including areas of vacant and open land and playing fields and is in close proximity to a number of Biological Heritage Sites, one of which is crossed at Rossall.

3.8 A smaller southern pipeline corridor is proposed similarly beneath the Estuary to accommodate an electricity supply between from a substation at Stanah Switchyard south of Hillhouse and Staynall on the eastern side of the Estuary. The electrical cables would then run underground northwards through agricultural fields to the GCC in the main development site at Preesall.

3.9 The proposed interconnecting gas pipeline would run westwards from the GCC to the national gas transmission pipeline system (NTS) at Nateby, crossing agricultural land. A proposed gas metering station would be located on agricultural land adjacent to the pipeline and accessed via a private farm track.

**THE PROPOSAL**

3.10 The application proposes the construction and operation of an UGS facility at Preesall, Lancashire. The purpose of the application is to inject gas into, store gas in, and extract gas from underground caverns with a total storage capacity of up to 900 Mcm and a working capacity of up to 600 Mcm, at standard temperature and pressure. The underground caverns are proposed to be constructed on the east side of the Wyre Estuary, and elements of surface infrastructure are proposed on both the east and west sides of the Estuary.

3.11 Up to 19 operational underground caverns are proposed to be constructed formed by solution mining of the Preesall Halite
deposit. These caverns constitute the NSIP. The application also includes a number of other elements as associated development:

- 7 multiple wellhead compounds (all but one of the compounds serve several caverns) from where the underground salt caverns would be created and, once operational, to connect the gas manifolds
- a gas compressor compound (GCC) comprising a range of plant and equipment to dry, compress, heat and cool gas, above ground high-pressure pipelines, utility systems and buildings
- a seawater pump station and associated infrastructure
- a booster pump station and associated infrastructure
- gas manifold and distribution infrastructure
- a seawater pipeline from the Fleetwood Fish Dock to the Preesall site
- a brine discharge pipeline from the Preesall site to a point in the Irish Sea approximately 2.3km offshore terminating in a two port diffuser
- power, communication and control cable routes from the Fleetwood Fish Dock to the Preesall site
- power cable routes from the Stanah Switchyard to the GCC
- temporary drilling compounds at the Fleetwood Fish Dock and near the Stanah Switchyard
- modifications to the sea wall at West Way to accommodate the brine outfall and a new observation platform
- an interconnector pipeline to the metering station and the NTS at Nateby
- a new access road from the A588 and new and upgraded internal access tracks within the Preesall site
- refurbishment of Higher Lickow Farm.

We are satisfied that proposed authorised development in Schedule 1 of the Order comprising the NSIP (Work No 1A) and the various elements of associated development (Works Nos 1B, 2-21) are capable of being granted development consent under s115 of the PA 2008.

**CHANGES TO THE APPLICATION DURING THE EXAMINATION**

3.12 The Applicant submitted a request on 15 August 2012 to amend the application plans relating to the brine discharge outfall (PD17). This was to correct the alignment of the limits of deviation of the brine discharge outfall as shown on the work plans, land plans and certain other plans so that they accord with the discharge consent issued by the EA (APP18, Appendix 2.1).

3.13 We sought confirmation that the proposed amendments raised no issues with relevant consultees.\(^6\) We concluded that the proposed

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\(^6\) the Marine Management Organisation (MMO), Crown Estate, Duchy of Lancaster and WBC.
amendments were not material, no IP had been disadvantaged and that the application as so amended could still be examined. Accordingly, we accepted the proposed amendments on 2 October 2012 (PD14) and requested a complete set of revised application drawings to substitute for the incorrect ones. These were supplied on 4 October 2012 (REP315).
4 POLICY CONTEXT

4.1 The application documents (principally the Planning and Sustainability Statement, APP28) contain a detailed description of the legislative and policy framework that the Applicant considers relevant to the proposal, and an analysis of how the application meets the assessment principles of relevant National Policy Statements. Several representations, for example, the Local Impact Reports (LIRs) submitted by Lancashire County Council (LCC) (REP193) and Wyre Borough Council (WBC) (REP194), also contain views about the appropriate policy context for handling the application. Statements of Common Ground between the Applicant, WBC and LCC covering development planning policy and the relevant planning history were provided (SoCGs 16 -19).

4.2 Our conclusions on the appropriate policy context for this application are set out below. In addition, because this application for development consent follows previous proposals which have been refused planning permission, we set out the planning history of relevance to the site.

NATIONAL POLICY STATEMENTS

4.3 PA 2008 (as amended) states that in deciding the application, the Secretary of State must have regard to any national policy statement (NPS) which has effect in relation to development of the description to which the application relates, and that, with exceptions including whether the development would result in adverse impacts outweighing the benefits, the Secretary of State must decide the application in accordance with any relevant NPS (s104).

4.4 The NPSs most relevant to this application are EN-1 and EN-4 which were designated by the Secretary of State for Energy and Climate Change on 19 July 2011 in accordance with s5 of the PA 2008. They therefore provide the primary basis for reaching decisions in this case (NPS EN-1, paragraph 1.1.1).

Overarching National Policy Statement for Energy (EN-1)

4.5 This NPS sets out national policy for energy infrastructure and the particular role of gas infrastructure, including increased gas storage capacity (section 3.8). Part 4 sets out the principles to be applied in considering applications for development consent, and that the starting point is a presumption in favour of granting consent to applications for energy NSIPs. A general point concerns the role of Development Plan Documents (DPD) or other documents in the Local Development Framework (LDF). Paragraph 4.1.5 advises that in the event of a conflict between these or any other documents and an NPS, the NPS prevails for the purposes of decision-making given the national significance of the infrastructure.
4.6 Of the 14 assessment principles set out in Part 4, those which we regard as particularly important in relation to this application are:

- Habitats and Species Regulations - the examination must consider whether the project may have a significant effect on a European site, or on any site to which these same protections are applied as a matter of policy, either alone or in combination with other plans and projects such that an appropriate assessment is required (section 4.3)
- alternatives - from a policy perspective, there is no general requirement to consider alternatives or to establish whether the proposed project represents the best option (section 4.4)
- design - good design for energy infrastructure is encouraged but equally important is functionality, including fitness for purpose and sustainability; it is acknowledged that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area (section 4.5)
- pollution control - the planning, pollution control and other environmental regulatory regimes are separate, but complementary; the examination of an application for development consent should focus on whether the development itself is an acceptable use of the land, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves; the working assumption is that the relevant environmental regulatory regimes will be properly applied and enforced by the appropriate regulator (section 4.10)
- safety - the use of salt caverns or UGS is regulated by specific health and safety legislation; the project would be subject to the COMAH Regulations 1999 enforced by the Competent Authority comprising HSE and the EA acting jointly
- hazardous substances - gas storage requires a HSC.

4.7 Finally, the NPS sets out the range of generic impacts which are anticipated to arise most frequently in the assessment of energy infrastructure development proposals, for example biodiversity, historic environment, landscape, noise and traffic.

National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines (EN-4)

4.8 This NPS sets out additional policy specific to underground natural gas storage facilities and gas pipelines. Detailed assessment principles relevant to UGS in salt caverns include:

- site selection - a detailed geological assessment is required to demonstrate the suitability of the geology at the site of the type of UGS proposed
  - when considering storage in a salt cavity, the geological assessment should include depth below surface, salt
thickness, salt purity and presence of shale bands which could affect cavern design

- in addition, a study of the geological integrity of the overlying strata and potential for collapse, taking account of the proposed minimum and maximum working pressures, will need to be undertaken
- the assessments should include the construction, operational and decommissioning phases and should cover the long-term integrity of the affected strata after decommissioning or closure of the storage facility (paragraph 2.8.9)

- noise and vibration - during construction arising from the drilling of boreholes and potentially during operation (section 2.9)
- water quality and resources - in this case the main consideration is the abstraction of water requiring a licence from the EA (section 2.10)
- disposal of brine - in this case the discharge of brine would be to sea, requiring a consent from the EA and approval of construction proposals by the MMO through a marine licence included as part of the DCO (section 2.11).

THE DEVELOPMENT PLAN

4.9 Although the designated NPSs provide the policy framework for examination of this application for development consent, we give a brief consideration in this section as to what constitutes the development plan. It draws particularly on the Planning and Sustainability Statement submitted as part of the application for the DCO (APP28), and the SoCGs dealing with development planning policy (SoCG18 and SoCG19).

4.10 For the purposes of this application the development plan comprises the:

- Regional Spatial Strategy for the North West (2008)
- ‘saved’ policies of the Lancashire Minerals and Waste Local Plan (2001)
- ‘saved’ policies of the Wyre Borough Local Plan (1999)

The Regional Spatial Strategy for the North West (RSS13)

4.11 This was published in March 2003 and approved as the “The North West of England Plan, Regional Spatial Strategy to 2021” in 2008.

4.12 The Applicant, LCC and WBC consider RSS policies DP 1 to 4, 7 and 9, RDF 1 to 3, EM 1, 6, 7, 15 and 16 are relevant to this application (SoCG18 and SoCG19). The RSS remains part of the
development plan but only until it is formally abolished as a consequence of the provisions of the Localism Act 2012.

**Lancashire Minerals and Waste Local Plan**

4.13 The Lancashire Minerals and Waste Local Plan 2006 was adopted in 2001. A number of policies from this plan have been ‘saved’ until such time as the new complete Local Development Framework for Minerals and Waste is in place.

4.14 The Plan deals with the Preesall Salt Field and sets out the history of mining in the area (paragraph 10.25). This has led to the creation of large underground voids which are filled with saturated brine. Although most of the caverns are unlikely to collapse, the Plan adopts a precautionary approach when it comes to permitting surface development in the areas of these cavities (paragraph 10.28).

4.15 Policy 71 seeks to protect the surface of the former Preesall Salt Field from development and states:-

> 'The surface of the Preesall Salt Field shown on Insert Map 8 will be protected from development which may be adversely affected by land instability due to the existence of underground cavities.'

4.16 Policy 72 dealing with salt provision, states:-

> 'Proposals for the extraction of salt or brine will be permitted, provided that:-
> a) it is demonstrated that the need for the development overrides any adverse impact which it may have on people and the environment; and
> b) the proposal makes adequate provision for the protection of existing development in or adjacent to the development area; and
> c) the provisions made for the long term safety of cavities are adequate.'

**Lancashire Minerals and Waste Development Framework (Core Strategy)**

4.17 The Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD was adopted in 2009. There are no policies or proposals within the adopted Core Strategy that deal directly with salt extraction or brine disposal.

**Wyre Borough Local Plan**

4.18 The Wyre Borough Local Plan was adopted in 1999. A number of the Local Plan polices have been ‘saved’ until such time as a new LDF is in place. The application site includes land designated as
Countryside Area (Policy SP13) and defined Open Coastline (Policy ENV2).

**Fleetwood – Thornton Area Action Plan (AAP)**

4.19 The Fleetwood-Thornton Area Action Plan was adopted in 2009. The Plan covers the west side of the Wyre Estuary and includes the site of the proposed seawater pump station as being in the Fleetwood Docks Mixed Use Development Area.

**Emerging Plans**

4.20 Emerging plans that are not yet part of the Development Plan comprise:

*Lancashire Minerals and Waste Development Framework (Site Allocations and Development Control Policies)*

4.21 The Joint Authorities have prepared a detailed Site Allocations and Development Control Policies DPD which was subject to a public examination in autumn 2011. Major changes to the DPD were proposed and these were subject to a public consultation in early 2012.

*Wyre Borough Local Development Framework*

4.22 WBC is preparing a comprehensive LDF and hopes to have the Core Strategy DPD adopted by October 2013 and the Site Allocations DPD adopted towards the end of 2014.

**The Panel’s Conclusions about the Development Plan**

4.23 Our conclusions about the development plan are that the clear intention of the Localism Act 2011 is abolition of the RSS in due course, and for this reason we accord its policies little weight in the examination of this application. The Lancashire Minerals and Waste Development Framework is at a relatively early stage of preparation, and consequently little weight can be attached to it. In this situation, saved policies 71 and 72 from the Lancashire Minerals and Waste Local Plan 2006 are relevant to this application. At the local level, the Wyre Borough LDF is at an early stage of preparation and little weight can be attached to it. In the meantime, saved policies from the Wyre Borough Local Plan and the much more recent Fleetwood -Thornton AAP are relevant to the application.

*National Planning Policy Framework*

4.24 Because the development plan is incomplete and not up-to-date, the National Planning Policy Framework published in March 2012 is an important and relevant consideration.
4.25 The Framework supersedes the advice set out in those PPGs and PPSs which are now cancelled. At the heart of the Framework is a presumption in favour of sustainable development. Paragraph 147 encourages UGS and associated infrastructure if local geological circumstances indicate its feasibility, subject to considerations set out in paragraph 148 which include maintenance of gas pressure and prevention of gas leakage.

PLANNING HISTORY

4.26 This section provides a summary of the planning history of proposals for UGS facilities at Preesall. Over the past decade, a number of planning applications and applications for HSC have been submitted to LCC by Canatxx Gas Storage Limited (CGS). These applications have been subject to a significant number of objections concerning in particular, the adequacy of the geology for development of UGS facilities, landscape and visual impact, risk and fear. In all cases, LCC resolved to refuse permission whether in circumstances of non-determination, or in issuing a decision.

4.27 CGS appealed against a refusal of a planning application submitted in November 2004 (ref 02/04/1415), and an application for HSC submitted in April 2005 (ref HSC/05/01). The appeal was recovered for determination by the Secretary of State, and following a public inquiry was dismissed in April 2007.

4.28 The Secretary of State did not object to the principle of the underground gas storage proposals per se and, indeed, accepted that there was a need for facilities of this type within the UK. For the most part, the reasons for the Secretary of State’s dismissal of the appeal related to lack of information and matters of detailed design:

- the information provided on the geological, hydrological and mining setting was insufficient to enable a decision to be made on the feasibility of the principle of the proposals and proposed land use
- the potential impact of subsidence on the proposed pipework or other infrastructure had not been addressed
- planning permission should not be granted in advance of design details supported by robust and reliable geological modelling to confirm that there would be no possibility of cavern roof failure affecting Hackensall STW
- whilst the Secretary of State considered that the residents’ fears in themselves did not constitute a significant planning objection, the failure to provide an adequate risk assessment was such an objection
- the visual harm of the proposed gas compressor station and the booster pump station would be contrary to the development plan
crown holes resulting from cavern roof collapse would present a seriously detrimental impact on the appearance of the salt marsh which was a significant visual amenity in its own right whilst the proposed additional salt marsh would provide adequate compensation for general subsidence, there was an element of uncertainty and crown subsidence would be irreversible if it did occur

proposals for a mini roundabout at the junction of the A588 and Cemetery Lane/B5377 were unacceptable but some form of link road for the duration of the scheme may be acceptable

any failure of a proposed cavern in the vicinity of the Wyre Way could result in the severing of this important coastal path, severely restricting public access to and enjoyment of the Estuary

the level of night time disturbance for the Sportsmans Caravan Park would be unacceptable

it was not possible to state that gas dryer noise would not exceed background noise levels, nor have a detrimental impact on night time residential amenity in Staynall

there was uncertainty in respect to noise associated with pipeline venting and potential noise affects arising from decommissioning

the proposal would be likely to result in a marginal positive benefit assuming no wider economic loss discouraging tourists staying elsewhere in Wyre Borough.

In 2009, CGS submitted a fresh planning application for a UGS facility at Preesall of similar scale with similar buildings and infrastructure (application ref 02/09/0159) and an application for HSC (ref HSC/09/01), which sought to overcome the Secretary of State’s concerns as summarised above.

In order to assist in the determination of the planning application, LCC appointed consultants (Atkins) to assess the geological information provided. The planning application was refused by LCC in January 2010 for the following reasons:

- the application contains insufficient information to:
  - properly assess and ensure the geology of the area is capable of accommodating the proposed development
  - demonstrate its relationship to former solution mining activities or surface development
  - establish there is no opportunity for migrating gas through the geology or via former mining activities

- the proposed development to the east of the Estuary would result in the introduction of an industrial development which by reason of its scale, design and location would be detrimental to the quality of the open character of the countryside, coastal plain, estuary landscape and the Wyre Way

- failure to demonstrate that the development would not present an unacceptable risk of gas migration given the:
relationship of the proposal to former operations
- its proximity to residential areas on the east side of the Estuary
- proximity to the more densely populated Fleetwood peninsula throughout its operation, decommissioning and long term aftercare management
- failure to provide an adequate risk assessment for the proposal would result in considerable and understandable fear and distress within the local communities attributable to the nature of the proposal and the potential consequences of any accident occurring.

4.31 The application for HSC was also refused by LCC on the basis it contained insufficient information to properly assess the geology of the area and its relationship to former workings. It would represent an unacceptable risk of gas migration, would result in fear and distress, and be contrary to the SEVESO II Directive in that it would not maintain appropriate distances between the storage areas and the Wyre Way which would have to be closed.

4.32 An application for an interconnecting gas pipeline to the NTS at Nateby was submitted to WBC and whilst the Borough Council resolved to grant planning permission subject to further details, no decision notice has been issued.

**The Relevance of Previous Proposals to the Application for Development Consent**

4.33 Previous planning applications have involved the creation of up to 36 caverns over an area of nearly 500ha with a capacity to store in excess of 1200 Mcm of gas. The application for development consent envisages the creation of up to 19 caverns with a working capacity of up to 600 Mcm of gas. The caverns are proposed to be created in two polygonal areas which comprise 75ha.

4.34 The application for development consent retains those parts of the previous CGS proposals which were found to be acceptable to the local planning authorities:

- that part of the project which would be sited on the west bank of the Wyre Estuary (the seawater pump station, the brine pipeline route and the works to the sea wall)
- the general route of the gas interconnector to the NTS at Nateby
- buildings on the Preesall site on the east bank of the Wyre Estuary have been located at the northern part of the site and the buildings have been redesigned to reflect the character of the area; alternative sites on the west bank of the Wyre Estuary have been assessed particularly for the siting of the GCC, but these have been rejected for health and safety reasons.
4.35 Clearly, there is a substantial history of previous planning applications submitted under the TCPA for similar proposals for UGS at Preesall which provides an important context for examining the application for development consent, not least for many of the representations which have been submitted. However, it is also important to recognise that the application before us is different from previous proposals in terms of both geography and scale. We have therefore sought to examine the proposal on its own merits.
5 FINDINGS AND CONCLUSIONS: GEOLOGY

5.1 In accordance with s88 of the PA 2008 we carried out an initial assessment of the principal issues and published this as part of a letter dated 19 March 2012 to all IPs (PD2). There was limited discussion about the principal issues at the preliminary meeting held on 24 April 2012, and we confirmed our procedural decisions in a letter dated 2 May 2012 (PD3).

5.2 Having regard to the various representations made during the examination, the legal obligations on us as the ExA, the policy context set by the NPSs, the LIRs, and all other relevant and important matters referred to, our findings and conclusions on the main matters raised are as set out below.

5.3 The order in which matters are considered in this and the next chapter is not intended to reflect the relative importance attributed to them by the Panel in reaching our overall conclusion:

- geology, including the feasibility, suitability and safety of the proposal, and the risk of gas migration
- landscape, particularly impacts of the GCC
- effects on Morecambe Bay SPA, Ramsar site, and the SSSIs
- impact of brine discharges to the Irish Sea on commercial fish stocks, and marine habitats and fauna
- noise impacts on new residential development at Harbour village, Rossall Hospital and caravan parks near Stanah Switchyard
- access arrangements, including justification for a new haul road from the A588
- other matters.

5.4 The rest of this chapter covers matters relating to geology and the assessment of risks concerning UGS. All other findings and conclusions are covered in the following chapter.

GEOLOGY AND ASSESSMENT OF UGS RISKS

5.5 There have been three previous planning applications for UGS at the Preesall site, all of which were refused. One of the key reasons for refusal on each occasion was insufficient information on the geology of the site. In view of this and the considerable number of representations about the project in terms of the basic geological circumstances and safety, we consider that geology and the risks require detailed assessment in this report.

5.6 NPS EN-4 requires the Applicant to undertake and supply a detailed geological assessment which demonstrates the suitability of the geology at the site for UGS (see paragraph 4.8 of this report).

5.7 This chapter considers the geological assessment presented by the Applicant and falls into two parts. The first is whether the UGS storage volumes proposed in the Order are reasonably achievable.
The chapter then addresses the key risks associated with geology, project infrastructure, residential areas and local amenities which might affect site selection. LCC and WBC have identified risks that they wished us to take into consideration as part of the examination (REP193 and REP194).

**ASSESSMENT OF GEOLOGICAL DATA**

**Location of UGS Caverns**

5.8 The Applicant proposes to constrain the UGS to two potential cavern development areas which are referred to as the northern polygon and the southern polygon. The northern polygon is located on the eastern side of the Wyre Estuary, beneath Knott End Golf Club, Cote Walls Farm and adjoining the Hackensall STW. The southern polygon lies beneath the salt marshes on the eastern side of the Wyre Estuary SSSI, west of the flood defences. These locations are shown on drawing number MMD-277663-0027 (REP207, Appendix 1 and APP20, figure 9.1).

5.9 The two polygon areas are defined by the Applicant as areas that avoid known hazard zones of faults, boreholes and wet rock head and the mining hazards of solution brinewells and dry mining. This is the essential conundrum: these two areas do indeed avoid all known constraints, but are also areas where there is little hard geological data.

**Sources of Geological Data**

5.10 The geological data is summarised in the Geological Summary Report (GSR) (APP37) which contains a comprehensive list of the detailed technical reports provided in support of the application. Additional data, comprising a large number of original geological survey reports referred to in the GSR, has been supplied in response to our written questions. The accuracy of the geological data and its suitability for UGS is a key aspect of debate in the written representations and has consequently been considered by us in some detail.

5.11 The geology of the Preesall Halite given in the GSR (APP37) is presented as a graben, a down-faulted area in which salt accumulated during the Triassic period. This interpretation of the Preesall Halite as a graben is fairly recent however, dating from the late 1990’s (REP203, Appendix 15). Hitherto, the geological structure was presented as a syncline. The revised interpretation of the geology for this application uses the same data on which former applications were based:

- records of the former salt workings

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Hackensall STW, located on the east bank of the Wyre Estuary, is also referred to in correspondence with UU as Preesall WwTW.
• British Geological Survey (BGS) geological mapping
• four partially cored boreholes commissioned by Canatxx for earlier applications (Arm Hill and The Heads, 2003, and Hay Nook and Burrows Marsh (middle deviated), 2008/09)
• older boreholes (Hackensall Hall E1, 1940, which has been reinterpreted, and Cote Walls Farm, 1974)
• two seismic-reflection lines (made for hydrocarbon-exploration) have been reinterpreted, IELP-99-25 (crosses southern part of northern polygon), and GC86-81-336 (crosses the southern polygon, but has an omission zone in the polygon itself)
• three seismic lines (Canatxx D, F, and G, 1997) commissioned for an earlier application, which lie south of the southern polygon
• an additional seismic line, (made for hydrocarbon exploration), GC86-DU371, lies south of the site and the other Canatxx lines, and has also been used to predict the geology of the southern polygon.

A summary of the key geological data is given in Tables 1 and 2 at the end of this chapter.

5.12 Additional geological data was obtained by the Applicant after the December 2009 application. This has been detailed in the Applicant’s answers to our written questions (REP203, responses to Q1/5, Q1/6 and Q1/7 and REP207, responses to Q1 and Q2) and is summarised below:

• new seismic reflection data over the dry mine and adjacent areas to show salt rockhead and to investigate the south-western boundary of the mine (Fugro seismic survey 2010)
• reassessment of the data from Hay Nook and Burrows Marsh borehole in BGS Reports (REP203, Appendices 3, 8 and 9); these reports provide down-hole geophysics data, core fracture and core photographs
• caliper logging and in-situ gas permeability testing carried out in the Hay Nook Borehole at selected horizons to represent the overburden mudstone, the halite and the mudstone interbeds within the halite
• three boreholes drilled along Monks Lane to investigate the thickness of the Drift Deposits\(^8\); these did not penetrate the halite
• shallow boreholes, drilled by Fugro as part of a site investigation for the infrastructure and foundation design for project infrastructure; these did not penetrate the halite.

5.13 We have also taken note of the comprehensive representations concerning the geological data provided by PWG (REP170, REP197, REP206 and REP266). These have been collated from the data

\(^8\) Drift Deposits is a collective term for sediments of Pleistocene and Holocene age. In the Preesall area, they are mostly weakly consolidated glacial and estuarine sediments.
provided for previous planning applications and the Public Inquiry in 2007.

5.14  SoCG1 on geology, which has been signed with LCC and endorsed by WBC, concludes that:

- the GSR presents an adequate representation of the geology which is sufficiently well defined to establish areas in which caverns can be constructed by solution mining
- an indicative layout of caverns within two polygon areas has been prepared to fit within the defined areas
- the geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed and surface subsidence to be calculated subject to confirmation by further drilling as the development proceeds
- the risk of seismic activity has been assessed as negligible
- the risks from historic salt abstraction have been assessed and will not impact on the proposed project
- an indicative cavern layout has been defined within the two polygon areas which have a working gas capacity of 600 Mcm.

5.15  However, both LCC and WBC in their LIRs also requested that:

'\textit{the Examining Authority is satisfied that the applicant has demonstrated that the geology is present in a form that is capable of safely accommodating the proposed caverns and that the proposed standoffs between the caverns and existing caverns as part of previous solution mining operations are sufficient to ensure the integrity of the proposed caverns in a way that would be safe and not give rise to the migration of gas through the geology of the area or be at risk from seismic movement}'

(REP193, paragraph 11.5 and REP194, paragraph 11.5).

5.16  We recognised this issue and asked 38 questions about the geological data in our first round of questions to obtain a better understanding of the geology with regard to site selection. This was followed by another 20 questions in our further round of questions. The Applicant provided additional information and BGS papers in response to our questions but was not able to provide more geological data from within the polygons themselves.

5.17  The Applicant provided BGS reports to substantiate their view that more geological data has been collected for the Preesall application than has been collected for any other proposed UGS in the UK at planning stage (REP203, Appendices 2 and 14). However, we consider that this application should be assessed on its own merits, because the extensive salt extraction over many years makes this site a complex one, and in the light of the planning history.

5.18  Our assessment is that the geological data provided is unevenly distributed. In the area between the flood defences and the former
salt mine, where data is available from boreholes drilled by ICI, the thickness of the halite and the depth to its upper surface is accurately known (mostly to within ± 5m). In contrast, the geological data is less well known north of the former salt mine (where there is little reliable borehole data and wild brine pumping is known to have been practised), and west of the flood defences. These are the areas within which the two polygons are located.

3D Geological Model

5.19 The case for whether the halite is thick enough to allow the safe construction of caverns of the sizes, shapes and locations of those proposed in the application is based largely on the 3D geological model which was prepared for Canatxx by BGS in 2005 (REP203, Appendix 15), and modified by Dr Rutherford Jnr in December 2010 for the Applicant. The 3D model is based on geophysical seismic–reflection surveys, boreholes and historic drilling and mining records.

5.20 The 3D model shows hazard buffer zones (within which the Applicant stipulates that caverns should not be constructed), which were developed from the assessment of the basic geology and historic mining conditions, in accordance with project design rules. Plans and sections have been given in the GSR to simplify the presentation particularly with respect to the definition of the two polygon areas where caverns are proposed (APP37).

5.21 The definition of the proposed polygon areas therefore relies heavily on the 3D model which includes various types of data derived from sources of different quality with respect to reliability and accuracy. The principal types of data sources can be categorised as follows:

- factual data (for example, boreholes giving the top and the bottom of the halite)
- interpreted data (for example, seismic lines which enable interpretation of the top and bottom of the halite but can have significant errors)
- inferred data (for example, the position of faults from the seismic lines)
- postulated data (for example, presumed extension and termination of faults in areas where there is no seismic or borehole information, and dip of the halite).

The model does not differentiate between different types of data nor does it make allowances for the variations in the accuracy of each type.

5.22 The 3D model of the development areas for UGS caverns has been created principally by extrapolation and interpretation from well documented data points outside the polygon areas. In contrast,
there is little reliable or observed geological information from within the polygons themselves.

5.23 Some of the data is also open to different interpretations and can be used to support mutually exclusive conclusions. PWG dispute the data used to model the northern polygon (REP170, paragraphs 5.62 to 5.71). The Hackensall Hall E1 Borehole, drilled in 1940, indicated a thickness of 81m of faulted halite. In the 2005 model, the depth of halite was therefore assumed to be 81m. In the 2010 model, this has been altered to infer that the borehole crossed the Burn Naze Fault and the thickness of halite predicted by the model was over 220m (taken from drawing no MMD-277663-0031 (REP207, Appendix 4)). PWG argue that the five mudstone interbeds identified in the borehole logs support their case that the borehole did not pass through the Burn Naze Fault, as five interbeds are also identified in other boreholes on the site (REP170, paragraph 5.64 and REP206, page 3).

5.24 The Applicant’s view is that they have adopted a conservative interpretation of the presence of the Burn Naze Fault, and if in fact the fault lies farther west then it has a greater separation from the western-most caverns. They do not consider therefore this situation is a major concern (REP198, paragraph 3.135).

5.25 The Applicant did not produce any factual evidence to substantiate the revised interpretation of Hackensall Hall E1 Borehole, and our assessment is that the location of the Burn Naze Fault is still not accurately known. Our view is that if the revised interpretation is incorrect, the model may overestimate the thickness of halite available for UGS in the northern polygon by up to 120m. The consequence of this would mean that the Applicant would not be able to construct caverns in this location of the height, volumes, or the maximum working pressure indicated in the GSR (APP37, table 6.3).

5.26 We questioned the Applicant about the data used to achieve the apparent improvement in accuracy of the 2010 3D model which shows 20m contours compared to 100m contours in the previous 2005 and 2009 versions. The Applicant answered that:

‘no additional data has been obtained. The refinements in the geological model were based on additional analyses of the top and base salt surfaces and the latest plots are purely to aid visual assessment and no increase in accuracy is implied’

(REP203, response to Q1/8a).

5.27 We further questioned the Applicant on the data used in the model. The Applicant responded:

‘The BGS 2005 model included the actual thickness of the salt deposit as encountered within the borehole without reference for geological interpretation. The 2010 model took into
consideration the surrounding information and the interpretation of salt thickness and the location of the Burn Naze Fault. The later BGS models interpreted that the Burn Naze Fault passed through the Borehole E1, consequently the model was updated to show a greater thickness of salt to the east of the fault’

(REP207, paragraph 5.10).

5.28 The Applicant considers the interpretation that faults do not penetrate the halite within the polygons to be robust based on assumptions regarding fault length and displacement ratios. They consider that the fault positions in the 3D model are sufficiently accurate to support the proposed cavern designs and locations at this planning stage (REP203, response to Q1/10). However, no factual evidence was presented to us to support this.

5.29 SoCG1 states that the GSR presents an adequate representation of the geology which is sufficiently well defined to establish areas in which caverns can be constructed by solution mining. SoCG1 also states that risks from gas migration and surface subsidence are to be subject to confirmation by further drilling as the development proceeds. This is confirmed by the Applicant in responding to PWG’s written representation that the model would be refined as additional data was obtained to obtain approval to operate under the COMAH legislation as the project proceeded (REP198, paragraph 3.113).

5.30 A crucial aspect of the accuracy of the 3D model is whether the data is sufficient to justify approval at this stage of the planning process, which we return to at paragraph 5.60 below. Having reviewed the data used for the 3D model, we consider that the model will need to be refined for three principal reasons:

- the thickness variations in the halite are too poorly known in the southern polygon and are disputed on the basis of the interpretation of a single borehole in the northern polygon
- it is not possible to define safe distances for cavern development from the faults when the positions of the faults are not known with sufficient accuracy
- if the Applicant’s 3D model is inaccurate, it may not be possible to construct 19 caverns of the capacity proposed.

**Depth to Top of Halite in the Polygons**

5.31 The depth to the top of the halite in the two polygons is given by the Applicant in the diagrams in the GSR (APP37) and summarised on drawing number MMD-277663-0029 (REP207, Appendix 2) in answer to our further written questions. The depth to the top of the halite in the northern polygon is shown as between 260m and 340m below ground level (subject to the accuracy of the 3D model). The Applicant states that this has been validated using
data from the Arm Hill Borehole (west of the northern polygon), Cote Walls Farm Borehole (south east of the northern polygon), Hackensall Hall E1 Borehole (north of the northern polygon), and seismic line IELP-99-25 (crossing the southern part of the polygon).

5.32 PWG dispute the depth to the top of the halite in the areas of proposed caverns 8, 10 and 11 in the northern polygon. They consider that the 3D model has overestimated the depth to the top of the salt. The Cote Walls Farm Borehole gave the top of the salt at 281m, yet the GSR indicates the top of the salt as 322m at cavern 8, 306m at cavern 10 and 325m at cavern 11 (REP170, paragraphs 5.54 to 5.57). The Applicant has not responded directly to this point in PWG’s written representation, but acknowledged that the more northerly area of caverns has less available information (REP198, paragraph 3.115).

5.33 The depth to the top of the halite in the southern polygon (subject to the accuracy of the 3D model) is shown on the drawings to be between 300m and 460m below ground level. This is less well validated and relies on data from the Burrows Marsh Borehole to the east of the polygon, and an assumed projection of seismic line IELP-99-25. We note that there is no factual geological data available within the southern polygon itself.

Thickness of Halite in the Polygons

5.34 The thickness of the halite is well documented in the areas of the former brine field for which there are reliable borehole records and seismic surveys. However, the presumed thickness variations of the halite in the two polygons are dependent on the projection of data from the adjacent areas. The boundaries of the polygons have been defined by drawing exclusion zones around the known boreholes and faults, and the former salt workings (both brinewells and the salt mine). There is, therefore, no direct evidence of the thickness of the halite within the proposed areas for cavern development themselves.

5.35 Obviously, to have sufficient data on the thickness of the halite in the two polygons, the base of the halite has to be well understood. We sought clarification in our written questions on the top, bottom and thickness of the halite bed. In response, the Applicant provided us with a drawing giving the output of the 3D model on thickness (REP207, Appendix 4, drawing number MMD-277663-0031). We have used this presentation of the data in our assessment.

5.36 The 3D model predicts that the halite thickens westward beneath the Wyre Estuary. We consider that this is a reasonable conclusion based on the westerly thickening of the halite proved in the former salt workings and observed in the seismic profiles.
5.37 The thickness of the halite in the northern polygon is based on the revised interpretation of seismic line IELP 99-25 and borehole data. The 3D model gives the thickness in the northern polygon as between 140m and 260m. However, as discussed in paragraph 5.23 of this report, PWG dispute the data used for the thickness of halite in the north-east of the northern polygon.

5.38 The estimated thickness of the halite in the southern polygon is based on the data from only one borehole (Burrows Marsh deviated), which is close to the eastern margin of the polygon. However, as noted in the BGS report, seismic line GC81-336 has a large omission zone under the Wyre Estuary at the level of the halite (REP203, Appendix 15, figure 18) and therefore it provides no data for the halite thickness or position in the southern polygon. The 3D model gives the thickness in the southern polygon as between 240m and 400m, but there is no borehole or seismic data to support the higher values for this thickness range.

**Location of Faults**

5.39 Identification of the location of any faults is a critical element of understanding the suitability of the Preesall Halite for UGS. Faulting impacts on the integrity of the halite and overlying strata to retain the stored gas as faults can provide gas migration pathways. The location of faults needs to be identified, with confidence, so that the design can ensure that the caverns are constructed at a safe distance from them (see paragraph 5.69 below).

5.40 The Applicant has provided drawings in the GSR to show their interpretation of the positions of faults (APP37, figures 3.8a and 3.8b). The location of the polygons with respect to these assumed positions is then shown in the GSR (APP37, Appendix B, drawing number MMD-277663-0002 (2 sheets)). We note from these drawings that there are no faults shown within the polygons – indeed this is the point: the polygons are defined as areas which avoid all known hazards (APP37, paragraph 6.1.3).

5.41 The location of faults within the Preesall Graben has been subject to detailed representations from PWG and other IPs (for example, REP170 and REP176). This is particularly with regard to the location of the Burn Naze Fault, other intra-grabenal faults, and the possibility of undetected west-east fracture zones which may affect the integrity of the proposed caverns.

5.42 The western and eastern limits of the Preesall Halite deposit are marked by the Burn Naze and Preesall Faults. The Preesall Fault is well-defined and its location is not disputed. However, the position of the Burn Naze Fault beneath the Wyre Estuary is poorly constrained and has been reasonably accurately located at only one point, but to the south of the application site on seismic line GC86-DU371.
5.43 The BGS paper on faulting at Preesall (REP218, Appendix 1) reviews the evidence for the location of the Burn Naze Fault. It notes that the fault encountered in the Hackensall Hall Borehole E1 could either be the Burn Naze Fault, a smaller parallel subsidiary fault or an extension of the Arm Hill Fault. The implications of these options for the integrity of the assumptions about the position and thickness of the halite in the northern polygon are not discussed by the Applicant. However, the Applicant has assumed that the Burn Naze Fault passes through Hackensall Hall E1 Borehole, which is deemed to be a conservative assumption for planning separation distances (paragraphs 5.23 and 5.24 above).

5.44 The positions of several faults with relatively small (<20m) displacements were recorded in the former brine field (REP203, Appendix 13 drawing number MMD-277663-0019), based mostly on borehole data. Similar small faults might be present in both polygons, but there is no evidence to confirm or disprove this.

5.45 Up to six larger faults with displacements of tens of metres to over 100m have been recorded in the seismic sections west of the flood protection embankment, and therefore outside the application area (Canatxx G and F seismic sections on drawing number MMD-277663-0027 (REP207, Appendix 1)). Three of these faults are predicted by the 3D model to intersect the halite west of the southern polygon, one intersects the halite east of the southern polygon, and two are presumed to die out northwards before they reach the southern polygon.

5.46 We consider that the exact positions of the faults in the area west of the embankment vary from poorly defined to speculative. There is no evidence to confirm the presence or absence of faults in the southern polygon, as there is no seismic line across the southern polygon that images these features at the level of the halite.

5.47 SoCG1 states that the two potential cavern development areas have been identified to avoid the hazard zones relative to the known geological hazards of faults, wet rock head and the mining hazards of solution brinewells and dry mining (SoCG1, paragraph 2.7.2). However, we note that although the polygons are located in areas which avoid known faults, at this stage in the development process there is no certainty that there are no faults within the polygons.

5.48 We have considered the evidence and taken the SoCG1 into consideration, and it is our opinion that:

- the Applicant’s assumption about the location of the Burn Naze Fault is conservative for the purpose of spatial planning of the westerly caverns (with regard to the separation distance from the Fault, see paragraph 5.69 below)
- there is insufficient data to confirm that there are no faults within the polygon areas
additional survey work will be required to confirm or disprove the presence of faults within the polygons.

**Salt Purity and Interbeds**

5.49 NPS EN-4 states that salt purity and the possible presence of shale bands must be considered by the Applicant with regard to cavern design. The Applicant has assessed the quality of the halite from samples and tests undertaken on cores recovered from the boreholes and through interpretation of the geophysical logs (APP37, section 4). The Preesall Halite is typically viewed in terms of two member bodies: the upper halite body which analyses show has an insoluble content range from 2.5 to 8.2%, and the lower halite body which analyses indicate is purer with insoluble percentages of <1% (APP37, paragraph 4.1.4 and figure 4.1).

5.50 The GSR presents the Preesall Halite as containing discrete mudstone interbeds ranging from a few mm to several metres thick. The Hay Nook Borehole data clearly shows at least 5 mudstone interbeds (APP37, section 4 and tables 4.4 and 4.5).

5.51 The Applicant states that mudstone interbeds within halite deposits are not unusual within the UK and have not been the cause of significant problems in existing UGS caverns (REP207, paragraph 5.41). The caverns in Cheshire are given as an example and also Kiel in Germany where salt caverns have been operational since early 1970 (REP203, Appendix 5).

5.52 At the detailed design stage, the Applicant would need to analyse the actual insoluble content of the halite and mudstone interbeds encountered at each cavern position. We consider that it is not unreasonable to assume that analyses undertaken of halite immediately outside the polygons would be indicative of the within them. We agree therefore that the purity of the halite and mudstone interbeds do not present an issue with regard to cavern design, and therefore the application before us.

**Relationship between the Order and the COMAH Regulations**

5.53 The Order would provide permission to construct up to 19 caverns with a working volume of up to 600 Mcm of gas, with the supporting infrastructure. The positions of the caverns are indicative within the “area for cavern development” i.e. the two polygons (Schedule 9, Requirement 6). Subsequent to the authority being granted by the Order, detailed approval for cavern design and operation would be needed from the Competent Authority under the COMAH Regulations. This detailed approval is principally to ensure the safe operation of the hazardous elements of the project (caverns, GCC and wellheads) and includes a review of the geology, design and operation of each cavern.

5.54 The COMAH process is not a filling out of the principles of development authorised by the Order but is a separate regulatory
process. We note that it is not for the Competent Authority to assess whether the two polygons would be capable of storing the total volume of gas which would be granted by the Order. We also note that the Order would enable the Applicant to begin construction of the supporting infrastructure for cavern washing (sea outfall, seawater pump station, booster pump station, river crossings etc), before the ability of the caverns to contain gas safely has been fully established and approved by the Competent Authority.

5.55 The relationship between the development to be consented by the Order and the detailed approvals given under COMAH Regulations has been a matter of concern to us, particularly as the Applicant lays great stress on the integrity of the COMAH process in satisfying outstanding information and data needed to confirm the salt thickness and safety.

5.56 We held an IS hearing on 19 September 2012 to question the Competent Authority and the Applicant on these matters. Unfortunately, the HSE were not able to attend, but submitted a written statement which answered some of our questions (REP242 and REP244). The Applicant submitted four detailed papers on the COMAH process (REP243) which confirmed our understanding that approval of the pre-construction safety report would include detailed design of the caverns. This would take into account the geology of the caverns on a cavern by cavern basis.

5.57 The Applicant’s view is that the data available regarding geology is suitable at this stage to enable development consent to be granted, and that further refinement of the geological model would be undertaken during the COMAH process (REP202, response to Q1/7(m)). At the IS hearing, the Applicant confirmed that additional geological investigations would be undertaken, which might include surface seismic surveys, prior to detailed design. These surveys might be undertaken on a cavern by cavern basis and the 3D model would be validated as the development progressed. Cavern development would start at the better geologically understood locations and proposals would be submitted for these to the Competent Authority for approval while the remaining caverns were being designed.

5.58 At the IS hearing, the Applicant also stated the intention to construct the outfall and the cavern washing facilities before starting construction of the caverns themselves. The decommissioning fund provided for in the s106 agreement is there to protect WBC in case the operator went into liquidation during construction. This reinforced the concern we have that the Applicant could construct the cavern washing infrastructure, brine outfall, etc, before the ability of the polygons to sustain the size of cavern development included in the Order is fully demonstrated.
5.59 We accept that there must be no duplication of the safety aspects which require approval under the COMAH Regulations. However, we consider that it is for us to determine, within the PA 2008, if there is a reasonable prospect on the basis of the data submitted that caverns could be constructed in the two polygons to retain the consented volume of gas, before the Competent Authority considers the safety issues.

**Sufficiency of Geological Data for Decision?**

5.60 NPS EN-4 requires that a detailed geological assessment is provided to demonstrate the suitability of the geology at the site (EN-4, paragraph 2.8.9). The British Standard on Functional Recommendations for Storage in Solution–Mined Salt Cavities (BS EN 1918-3, section 4.2) also recommends that:

> ‘available geological and geophysical data should be gathered in a pre-feasibility study before deciding on the exploration of a saline site. Additional geological or geophysical surveys may have to be carried out if existing data are not sufficient. The geometry of the saline mass should be investigated by seismic survey if seismic data are not available. ….This summary should also be used to define the most favourable zones for location cavities, taking into account the depth and thickness of the saline layer, the distribution of insolubles and the proximity of possible tectonic zones’.

We have considered therefore whether the data provided is sufficient to define adequately the favourable zones for cavern development at this stage such that the Order could be confirmed.

5.61 It is clear that whereas the data from the former brine field has been used to create a digital model validated by factual data, in the area west of the flood protection embankment the presumed extensions of faults and steep dips have been added to produce a composite model that includes manual reinterpretation of data.

5.62 Where detailed geological information is available, the Applicant has decided that the halite is too faulted or too close to existing workings to be suitable for safe construction and operation of UGS. However, by the very nature of defining the two proposed cavern development areas by avoiding known hazards, the polygons have been located in areas in which there is little geological data. The assumption that the polygon areas are therefore suitable for the cavern construction is based on extrapolation of data in the 3D model, and that the faulting does not extend into these areas. This may be entirely plausible, but in our view will only be confirmed beyond reasonable doubt as further detailed geological surveys are carried out.

5.63 The question of whether or not salt caverns could be constructed in the Preesall Halite is not disputed. The evidence collected to date
indicates that the halite is a continuous, relatively thick, albeit faulted, bed that thickens westwards across the former brine field from mostly >100m to >200m thick. World wide there are examples of gas-storage caverns in halites <50m thick. However, as stated earlier (paragraph 5.17), we consider that this site cannot be compared with others and must be considered on its own merits.

5.64 The availability of geological data is nonetheless an improvement on that presented in the last planning application in 2009 when it was concluded that there was insufficient information to ensure that the geology of the area could safely accommodate the proposed caverns (see paragraph 4.30 of this report). The improvement arises from the presentation of some additional geological data which has been generated since that time, and the earlier data has been brought together in a comprehensive review in the GSR.

5.65 However, the relatively small amount of additional geological data consists largely of the reinterpretation of Burrows Marsh and Hay Nook Boreholes, reinterpretation of the seismic-reflection lines and alterations to the digital geological model. We consider that the geological analysis submitted as part of the application falls short of that required by NPS EN-4 to prove beyond reasonable doubt that the geological structure, thickness and faulting of the halite are suitable for the construction of caverns of the particular sizes and shapes within the specified areas in order to support the volume of gas storage proposed in the application.

5.66 PWG and other IPs noted that the technical assessor for the 2007 Public Inquiry recommended that at least two more seismic lines be undertaken and drilling and geophysical logging of boreholes on these lines to prove ground truth (REP170, paragraphs 5.13 and 5.14, REP166, paragraph 3.1.5). In view of this, and the subsequent failed planning application in January 2010, we are surprised that no seismic surveys were undertaken across the polygon areas to support this application. We consider that it is necessary to obtain more detailed geological data within the polygon areas to demonstrate that a significant proportion of the 600 Mcm working gas storage volume being sought by this application can be achieved and in turn that the requirements for surface infrastructure can be validated. This step is necessary before work commences on constructing surface infrastructure, and is a matter we return to in Chapters 7 and 9.

**Design of Caverns**

5.67 SoCG1 between the Applicant, LCC and WBC agrees that an indicative cavern layout has been defined within the two polygon areas which has a working gas capacity of 600 Mcm. An indicative design of 19 caverns is shown on drawing numbers MMD-277663-0002 (APP37, Appendix B) and MMD-277663-0027 (REP207,
Appendix 1) within the two polygons. Possible diameters, depths and capacities are shown in the GSR table 6.3, to achieve a working gas volume of 558 Mcm (at 50% probability).

5.68 We have reviewed the indicative design and agree that, subject to the accuracy of the 3D model and the adoption of the design recommendations, the indicative design of 19 caverns is feasible. The probability of the achievement of the gas volumes is discussed further below in paragraphs 5.74 et seq.

Cavern Design Recommendations

5.69 The design recommendations for the project are given in the GSR (APP37, table 6.1) and would be secured by Requirement 6 of the Order. An additional parameter giving a separation distance from caverns and brinewells of unknown shape was added in answer to our further written questions. The recommendations give the following minimum separation distances or salt pillar widths (where R is the radius of the cavern):

- 3R from Burn Naze fault and other intra-grabenal faults
- 4R from existing caverns or mine workings
- 2R from existing boreholes
- 4R from mapped wet rockhead areas
- 3R halite pillar width between caverns
- 1R halite cavern roof thickness
- 0.2R cavern base from the base of halite body
- 5R from a former brine cavern of unknown shape and any brine run that may be connected to it (new clause added REP207, paragraph 5.47).

5.70 We asked the Applicant for evidence of which international geological bodies have endorsed the recommendations intended for cavern design and examples where they have been applied to UGS. The Applicant has not provided any examples and responded that there are no international or national standards for the design of caverns, and that the design recommendations were developed by Professor Rokahr based on his 30 years experience of cavern design in salt (REP207, paragraph 5.38).

5.71 The Applicant states that these design recommendations are conservative at the planning stage. A margin for error would not be added because the design recommendations are not minimum safe distances (REP207, paragraph 5.53). Should the Order be granted, the actual layout and design of the caverns would be determined by the COMAH process, on the basis of detailed individual cavern analysis rather than simply relying on the design recommendations (REP207, paragraph 5.42). Requirement 6 of the Order would allow for such changes, provided that no more than 19 operational caverns are created within the two identified polygons and no more than 600 Mcm working capacity of gas is created.
5.72 In view of the detailed involvement of the Competent Authority in the structural design of the caverns as part of the COMAH process, we consider that the design recommendations and the indicative layout provided are acceptable for planning purposes at this stage, but with the important proviso that the layout is subject to the validation of the 3D model.

**Operating Pressures**

5.73 The safe allowable range of gas operating pressures in the caverns will be dependant on the overburden pressure and therefore the depth of each individual cavern. Maximum and minimum gas pressures of 83% and 30% of the vertical overburden pressure have been proposed by the Applicant (APP37, section 6.2.1) and would require review by the Competent Authority. This working range, applied to the indicative design (APP37, table 6.3), gives maximum and minimum operating pressures at the casing shoe of 92 bar and 22 bar respectively. A maximum pressure of 95 bar has been included in the application for HSC (APP15).

**Cavern and Gas Volumes**

5.74 The Applicant has provided a statement from their consultant Professor Rokahr that:

> ‘on the strength of my 30 years experience in salt mechanics and salt cavern construction, I can confirm that stable, gas tight salt caverns can be constructed in the Preesall salt formation for the storage of natural gas’

(APP37, Appendix D, page 151).

As stated, this is accepted by us, but we note that he gives no assurance about the specific volume or number of caverns that can be created in the two polygons proposed in the application.

5.75 The design example given in the GSR (APP37, table 6.3) gives a gross cavern volume of 16.5 Mcm, storage of gas volumes of 832 Mcm, with working volume of up to 558 Mcm at standard temperature and pressure. However, we note that this indicative design in the GSR is given as 50% probability, with the maximum volume in the Order of 600 Mcm being achievable at only 30% probability (APP37, paragraph 6.2.1.1). The Applicant’s Monte Carlo probability analysis has been based on the assumption that the 3D model of the polygons with regard to the top and bottom of the halite and lack of faults is accurate. The variables tested in the probability analysis were cavern shape and aspects of insoluble content of the halite (APP37, table 6.2).

5.76 As stated in paragraph 5.25 above, our view is that if the interpretation of Hackensall Hall E1 Borehole is incorrect, then the 3D model may overestimate the thickness of halite available for UGS in the northern polygon by up to 120m. The consequence of
this would mean that the Applicant would not be able to construct caverns of the height, volumes, or the maximum working pressure indicated in the GSR (APP37, section 6). Our own rough order of magnitude calculations show that a reduction in cavern height of caverns 1 to 6 could reduce the working volume of these six caverns by up to 60%. However, these caverns only provide 26% of the total working volume, and therefore this reduction would reduce the total working volume by only 15%. We consider that even in this event, such a reduction would be consistent with the maximum volume indicated in the application.

5.77 PWG dispute the depths to the top of the halite in the areas of proposed caverns 8, 10 and 11 in the northern polygon (REP170, page 35). If their interpretation happens to be correct and the halite deposit is shallower than the model predicts, then the maximum operating pressure of the caverns will be lower than that designed and the available working volume will be reduced by approx 1%. We do not consider that this would represent a material variation.

5.78 However, if any of the faults shown in Canatxx Seismic Line G (see paragraph 5.45 above) extend into the southern polygon, one or more of the caverns may have to be excluded. This polygon would hold the largest of the proposed caverns and therefore the inability to construct a number of these caverns safely would materially impact on the total working gas volume achievable. For example, the loss of four of the largest caverns (15, 17, 18 and 19) which are in alignment with potential fault extensions would reduce the total working capacity by 35% (see APP37, table 6.3 for indicative cavern volumes). If in extreme circumstances all three scenarios occurred together, the total capacity could be reduced by over 50%. We consider that this would be a material variation in what the application is seeking, and we return to this matter in Chapter 9.

5.79 The GSR presents a geology review process leading from identification of salt presence, through scoping placement of caverns to scoping front end design (APP37, figure 1.1). The Applicant confirmed that they consider that they are now in the final stage of scoping front-end design, and that the process is used to provide a realistic assessment of the location and sizes of the probable caverns and associated infrastructure in support of the application for development consent (REP203, response to Q1/1).

5.80 We agree that the design is feasible, but consider that the risks associated with the project require a more realistic assessment of the location and sizes of probable caverns. The Applicant has put only a 30% probability of the design achieving the working gas volumes included in the Order even if the 3D model is proven accurate (as discussed in paragraph 5.75). Therefore if the 3D model is incorrect, the probability of achieving the working gas
volumes included in the Order may be even less than 30%. We conclude therefore that more geological data from within the polygons is needed to validate the model and so improve the probability of the design.

**ASSESSMENT OF RISKS RELATED TO GAS STORAGE**

5.81 In the second part of this chapter we turn to the key risks which may affect the suitability of the site: geological risks, risks associated with the gas infrastructure at the site, and risks that impact on the community and local amenities.

**Risks Associated with Geology**

5.82 As stated earlier, the Applicant is required by NPS EN-4 to provide a study of the geological integrity of the overlying strata and potential for collapse, with consideration for the long term integrity of the affected strata. Other risks we have considered are the permeability of the rocks in the Preesall Graben, shallow depth of the caverns, proximity of the caverns to the historic brinewells and salt mine, and risk of seismic activity. These matters are of particular concern to LCC and WBC in their LIRs (see paragraph 5.15 above), and many IPs in their written representations, especially PWG.

**Subsidence, Crown Hole Collapse and Decommissioning**

5.83 The risk of subsidence is a subject of concern to many IPs, because of the clear visual evidence of subsidence and crown hole collapse in the areas where historic brinewells and the salt mine operated (REP166, section 4.4, REP170, REP256).

5.84 Subsidence is a recognised risk with regard to UGS as discussed in NPS EN-4. Moreover, the Competent Authority requires that details of design with regard to subsidence are included in the COMAH pre-construction safety report (HSE SPC/Enforcement/185 Guidance for Inspectors, section 6).

5.85 SoCG1 agreed with LCC and WBC states that the geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed and surface subsidence to be calculated, subject to confirmation by further drilling as the development proceeds. We have considered the support to the caverns from the overlying strata, and the two different types of subsidence: general ground subsidence and the more catastrophic crown hole collapse. We then assess the Applicant’s proposals for long term decommissioning of the site.

**Overlying Strata**

5.86 The Applicant describes the overlying strata, Breckells Mudstone and Cote Walls Mudstone, as dominantly structureless mudstones (APP37, table 4.1). Data from the BGS report on the Hay Nook
Borehole confirms the Breckells Mudstone (from 27m to 180m depth) contains occasional siltstones, rare sandstone and gypsum/anhydrite. The Cote Walls Mudstone (from 180m to 304m depth), overlies the Preesall Halite and contains siltstone beds 2m to 6m thick (REP203, Appendix 8).

5.87 Problems have arisen in the past when the halite roof of brinewells has either collapsed or been dissolved and the base of the mudstone is then left unsupported. Evidence from the existing site shows that the overlying mudstone can support the brinewells, as long as the cavern roof does not break through into the mudstone (APP36, section 3.1). If the caverns are designed and built correctly with a sufficiently thick halite roof, settlement should not be large enough for the overburden mudstones to be adversely affected. We consider therefore that provided the design considerations contained in Requirement 6 are followed, there would be little risk to the integrity of the caverns proposed in the two polygon areas.

General Ground Subsidence

5.88 General ground subsidence will occur with any excavation underground in rock. However, it is the gradient of the subsidence that can cause a problem rather than the amount of subsidence as long as it is spread over a wide area (HSE Research Report RR605, An appraisal of UGS technologies and incidents; for the development of risk assessment methodology, see page 89). We note also that the subsidence effect from shallow caverns is more obvious than with deep caverns, as the amount of subsidence is inversely related to depth (HSE RR605, page 98).

5.89 The Applicant has presented an assessment of the forecast ground subsidence, using software Salt SubSid 3D\(^9\), which predicts a maximum total subsidence of the order of 50mm with an initial high subsidence rate immediately after construction. The maximum subsidence of 50mm would be in the area of the two polygons, with an area of influence extending approximately 1km from the site in each direction. The Applicant states that existing and proposed surface infrastructure (UGS storage infrastructure and Hackensall STW) may be expected to incur ongoing settlement of <1mm/year after the initial settlement and neighbouring residential properties will be unaffected (APP37, paragraph 5.7.2.1.2 and figure 5.15).

5.90 We were concerned about the potential impact of 50mm settlement on Hackensall STW as SoCG44 did not include an agreement on settlement although United Utilities (UU) had stated their concern to the Applicant (letter dated 24 June 2011 appended to SoCG44). As a result of our questions, protective provisions were included in

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\(^9\) Salt SubSid 3D software: no validation requested as this is industry standard software.
the Order at Schedule 8. These provide for UU infrastructure with regard to the impact of settlement on Hackensall STW. The impact of settlement on the flood defences has been provided for in a separate agreement with the EA (REP281, Appendix 26). We are satisfied that these risks are adequately covered.

5.91 As six of the UGS caverns would be directly beneath the Knott End golf course, the maximum subsidence of 50mm would apply here, but as this would be a gradual gradient and a general lowering of ground level, we do not consider that it will be a significant issue.

5.92 In answer to our written questions, the Applicant presented a drawing of the subsidence contours (REP203, Appendix 2, drawing number MMD-277663-0028), which shows settlement extending to the north of the site. This would affect Hackensall Hall (a grade 2 listed building) by approximately 20mm, Cote Walls Farm by approximately 35mm, Hays Farm by approximately 15mm and the two caravan parks (on The Heads to the south of the site) by approximately 10mm. If the rate of general subsidence from this development is limited to <1mm/year, we agree that the impact on properties will be minor. Any impacts of other settlement on the residential properties would need to be pursued as a separate matter.

5.93 The subsidence contour drawing referred to above shows that settlement in the area of the existing mines will be limited to a maximum of 23mm above BW123 and 7mm above the “at risk” BWs 44 and 50. We consider that this will have a small to negligible impact on the rate of collapse of these brinewells.

5.94 The Order requires that a ground subsidence monitoring scheme is developed by the Applicant (Requirement 35), details of which are to be agreed with WBC. If subsidence is identified then mitigation measures are also required to be submitted to WBC for approval. The inclusion of monitoring points on the surface of Knott End golf course is part of the unilateral undertaking offered by the Applicant to the Club. In view of the proposed monitoring scheme, we consider the risk from general subsidence is acceptable.

Crown Hole Collapse

5.95 Evidence was provided by the Jackson family in their written representation (REP166) of the local experience of extensive crown hole collapse in the historic brinewells with particular emphasis on two events. The first was the unexpected collapse of BW88 in 1994, where photographs were taken of the development of the crown hole over a period of 4 months. The second was the crown hole at Agglebys (near Higher Lickow Farm), which collapsed in

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10 The “at risk” BW 97 is outside the zone of subsidence. See paragraphs 5.119 and 5.163
1974 and is still expanding. Cllr Jackson gave evidence at the OF hearing of the unsuccessful attempts to stop the progression of the crown holes. While all the crown hole collapses given in the Jackson representation are outside the Order area, they do illustrate the high impact of a cavern failure and how this concern of the local residents about the behaviour of historic brinewells is transferred to this application.

5.96 The Applicant has undertaken a review of the legacy brinewells (APP36). The unstable caverns are shown to be where excessive salt leaching has eroded the salt roof of the caverns into the overlying marl, which is slowly collapsing into the cavern. However, the Applicant proposes that the caverns to be created by solution mining for gas storage will have a substantial section of roof salt upon completion of the cavern washing process (APP37, paragraph 5.7.1.4).

5.97 Knott End Golf Club stated its fear of the effects of subsidence, as proposed caverns would be under 40% of the golf course. If any subsidence occurs during construction or during operation, the Club considers that the business will be ruined (REP256). We agree that if there were to be a catastrophic crown hole collapse of the new UGS caverns under the golf course area, this would have a detrimental effect on the long term viability of the club. However, with the COMAH controls in place to be met before cavern construction starts, we consider that such collapse is very unlikely.

5.98 The Order provides for the minimum design parameter of a distance equivalent to the cavern radius (1R) between the cavern roof and the top of the halite bed (Requirement 6). This will be subject to Competent Authority review in the COMAH process. The monitoring scheme proposed for general ground subsidence would also identify any developing crown holes. In the light of the combination of the design parameters, the COMAH approval of design and construction, and the ground monitoring proposals, we consider the risk from crown hole subsidence from the new caverns is low.

Decommissioning of Caverns

5.99 NPS EN-4 requires the Applicant to consider the long term integrity of the site after decommissioning or closure. A number IPs stated their concerns that the caverns must be adequately maintained in the very long term after the life of the project. PWG for example stated in their written representation that:

‘when gas storage caverns are abandoned they will have to last forever without collapsing which is something that any programme of maintenance would not be able to guarantee’

(REP170, paragraph 5.139).
The local experience is that of the legacy brinewells which, despite being filled with brine and being capped off, continue to show signs of subsidence and on occasions blow outs (for example BW45 in June 2011).

5.100 The Applicant states that after cavern construction, measures will be put in place to monitor cavern “health” and to track subsidence through time (APP37, paragraph 5.7.1.2). Processes and guidelines are specifically tailored to provide cavern integrity, so they should not experience the same problems as the legacy brinewells (APP37, paragraph 5.7.1.4). After the life of the project, if there are no alternative uses for the caverns, they would be emptied of gas, filled with brine and sealed, with an ongoing programme for monitoring and maintenance of the wellheads (APP30, paragraph 8.4).

5.101 The Order provides that a decommissioning, restoration and aftercare plan must be approved by WBC before any stage of the construction commences. The funding of the decommissioning work is subject to a s106 agreement between the Applicant and WBC as set out in Appendix A. We consider therefore that decommissioning of the caverns and other project infrastructure has been adequately provided for.

*Permeability of the Halite, Mud Interbeds and Faults*

5.102 The permeability of the halite with its interbeds and faults is of concern to many IPs because of the risk of gas migration. Both LCC and WBC comment in their LiRs that:

> ‘the Applicant’s proposed cavern creation techniques (bottom up) are designed to enable minerals other than salt (insolubles such as mudstone inclusion and discrete beds) to fall to the base of the cavern. However the geological occurrence of such minerals creates the potential to allow gas migration through the surrounding rock strata. Any such migration could present very significant public dangers dependant upon where and in what concentrations the gas emerges or is able to collect. The integrity of local geology is considered to be very important in determining the acceptability of any particular proposal’

(REP193, paragraph 12.18 and REP194, paragraph 12.17).

5.103 We have reviewed the evidence provided in relation to the permeability of the mudstone interbeds in the halite, the nature of the overburden rock, the possible effects of faulting on the permeability and the permeability tests undertaken by the Applicant.
**Mudstone Interbeds**

5.104 As set out in paragraphs 5.50 and 5.51 above, the Preesall Halite contains discrete mudstone interbeds ranging from a few mm to several metres thick. The Applicant states that mudstone interbeds within halite deposits are not unusual within the UK and have not been the cause of significant problems in existing caverns (REP207, paragraph 5.41). We have reviewed the data and accept that the mudstone interbeds as illustrated in the GSR are unlikely to cause a risk.

**Faults**

5.105 The locations of the faults in the Preesall Graben are discussed in paragraphs 5.39 to 5.48 of this report. They are a matter of concern for several IPs because if present in a significant degree they would provide possible gas migration pathways (for example REP170, pages 46 to 49).

5.106 We have reviewed the particular concerns expressed by PWG about potential gas migration across the Burn Naze Fault into the sewers on the Flyde Peninsula, Fylde Interceptor Tunnel and Fleetwood WwTW\(^{11}\) (REP170, pages 92 to 98 and REP206, page 18/19). The potential impacts of gas accumulation in the Flyde Interceptor Tunnel include fears of explosions in the Fleetwood and Blackpool areas as well as environmental impact from failure of the wastewater treatment facilities.

5.107 We note that UU has agreed a SoCG which states that the UU infrastructure is not at risk from the project and that there appears to be a low risk of gas migration (SoCG44, paragraph 3.32). We understand that PWG’s concern relates to the proximity of the Burn Naze Fault to the closest caverns. We consider that the location assumed for the Burn Naze Fault by the Applicant (by Hackensall Hall E1 Borehole) is a conservative estimate, insofar as they have assumed it is farther east and nearer to the polygons than alternative interpretations might suggest. For this reason, we accept the assurances given by the Applicant to UU that the risks of gas migration are negligible.

5.108 However, as set out in the paragraphs above dealing with the adequacy of geological data, in the absence of site investigation data in the area of the two polygons, we consider that there could be faults within the polygons that have not been identified to date.

**Permeability Tests**

5.109 The Applicant has carried out laboratory and in situ permeability tests on a small number of samples in the Arm Hill Borehole and

\(^{11}\) Fleetwood Waste Water Treatment Works is located on the western side of the Wyre Estuary serving Fleetwood and Blackpool.
Hay Nook Borehole (APP37, section 4.4.1). Results of these tests have been analysed by their industry experts, with the Applicant’s consultant Professor Rokahr making the following statements:

‘To construct safe gas caverns in salt formations it is essential that the salt rock surrounding the cavern is of adequate strength, and that the permeability of the salt is so low that the rock is effectively gas tight. The laboratory tests conducted to date on the rock samples from the Preesall salt formation, and the additional tests in two boreholes, show without any doubt that the salt rock is adequately strong, and that the Preesall salt formation can be classified as gas tight’ and “for the formation of a cavern field, it is necessary that the mechanical and thermal parameters of the local salt formation at each separate cavern location are determined on the basis of laboratory tests’

(APP37, Appendix D, page 151).

5.110 SoCG1 agrees that the geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed, that the risk of gas migration has been considered in a source-pathway-reception analysis, and the conclusion is that the risk has been assessed as negligible.

5.111 We concur that, subject to a site investigation identifying the location of any faults within the polygons and any faults just outside the polygons which would influence the integrity of a cavern, the risks are acceptable.

**Depth of Caverns**

5.112 The Order requires that all caverns have to be constructed below 220m below ground surface level and confined to within the Preesall Halite (Schedule 1, Work No. 1A). If the 3D model is correct, the minimum depth to the top of the halite in the polygons is in the northern polygon at approx 260m near Cote Walls Farm (see REP207, Appendix 2 drawing number MMD-277663-0029). With a one radius cavern separation to the top of the halite, the shallowest cavern roof level would be cavern 3 at 314m (APP37, as shown in the indicative design table 6.3). The Applicant does not explain why the figure of 220m is included in the Order, given that the 3D model predicts a minimum depth of 260m. We consider that this is an indication of the degree of uncertainty of the accuracy of the 3D model, and the Applicant is allowing for the actual top of the halite body to be shallower than currently indicated.

5.113 It has been asserted by several IPs that the halite deposits at Preesall are too shallow for safe storage of gas (for example REP160). If the Order is granted, some UGS caverns would be
amongst the shallowest in the UK, but we do not consider that this necessarily means that they would be unsafe.

5.114 HSE Report RR605 states that worldwide, caverns are found at depths ranging from 700 to 1700m (HSE RR605, section 2.2.7.3.2). The Preesall caverns (in the indicative design) would be located between 314m and 745m (APP37, section 6.2.1). The overburden is an important factor in the design of the caverns; it is part of the structural support for the cavern (HSE SPC/Enforcement/185: Guidance to Inspectors) and determines the operating pressure in the caverns. We note that whilst some of the caverns would be shallower than other examples in the UK, they would be operated at a pressure which is determined by their depth i.e. shallower caverns would be operated at lower pressures. This is an aspect of the structural design of the caverns which would be assessed in detail by the Competent Authority as part of the COMAH process.

5.115 In view of this, we consider that the depth proposed for development of caverns in the Order is acceptable.

**Proximity of UGS Caverns to Historic Brinewells and the Salt Mine**

5.116 The proposed cavern development polygons would be adjacent to the historic Preesall Salt Field where brine abstraction and salt mining have been undertaken since the 1870’s. There are 122 abandoned brinewells, flooded crown holes and a flooded salt mine. The polygons have been selected by the Applicant to avoid all known hazards. We consider therefore that an understanding of the historic brinewells and salt mines is important to our assessment of whether they pose a risk to the integrity of the proposed caverns for UGS.

5.117 In addition, LCC and WBC have asked that the ExA should be satisfied that the former caverns are stable and do not pose any risk to above and below ground infrastructure (REP193, paragraphs 11.3 and 11.5, REP194, paragraphs 11.3 and 11.5). We have considered the risk to the new proposed caverns separately to any risks to the remaining above and below ground infrastructure, which are discussed later.

5.118 The written representations from IPs, particularly the Jackson family (REP166) have evidenced the subsidence of land and the collapse of the historic brinewells and damage to property. Surface evidence is clear at the relevant sites, for example BW88 crown hole collapse near Height O’th Hill, BW52 crown hole collapse near Higher Lickow Farm and BW45 blow-out failure.

5.119 The Applicant has undertaken an Impact Assessment of the legacy brinewells within the influencing distance of the proposed scheme (APP36). 18 brinewells were assessed which were within influence
distances from UGS infrastructure of 120m for crown hole collapse and 100m for blow-out failures. The Impact Assessment identifies three brinewells (BW44, BW50 and BW97) which could pose a significant risk in relation to crown hole development. However, these three old brinewell caverns are over 400m from the nearest polygon area. As set out in the section on design parameters (paragraph 5.69 above) the Applicant proposes a minimum separation distance of 4R (4 x cavern radius) from any existing caverns or mine workings.

5.120 From the drawings (REP207, Appendix 1 drawing number MMD-277663-0027), we estimate that the distance between the northern polygon and the lower mine working is a minimum of 140m. The exact location of the boundary of the lower mine is not known accurately, but the depth is given as 274m, with the depth of the upper mine at 143m (APP37, paragraph 5.1.1). The proposed cavern closest to the mine would be at a minimum depth of 350m and therefore deeper than the old mine workings; it is shown on the drawings as being over 250m from the closest plotted lower mine location. This is in excess of 4R for the largest cavern of 50m radius, and we consider therefore that this would allow an adequate factor of safety for the unknown element of the lower mine position.

5.121 The Applicant has agreed to undertake a monitoring and maintenance programme covering the legacy brinewells. This commitment has been included in the s106 agreement with WBC. SoCG1 agrees that the risk from historic salt abstraction has been assessed and will not impact on the proposed project. We conclude that the risk from historic mining and solution cavern workings should not impact on the cavern development.

**Wet Rockhead Pathways and Wild Brine Runs**

5.122 The issue of wet rockhead is important at Preesall because of the history of wild-brine pumping in the area. This was an unstructured method of brine extraction undertaken in the early 20th century in which water was pumped into one area of the brine field and abstracted from another without any real understanding of how the brine moved between them. Wild brine runs are the route the brine took from the source of water to the extraction point of the brine. Wet rockhead may also be a natural phenomenon if there is ground water movement as the top surface of the halite dissolves in the ground water, creating voids. The water may remain saturated with brine if there is no flow, or it may continue the dissolution process if the brine is flowing.

5.123 The problems wet rockhead can present for UGS include stability, increased movement of brine (which itself has damaging effects on borehole materials) and the likelihood of further salt removal that could lead to potentially damaging ground subsidence. The issue of an UGS cavern hitting a wild brine run would be one of
permeability as the wild brine run could provide a gas pathway. If a brine run is encountered during cavern construction, the expectation is that the cavern would not pass its gas tightness test as part of the COMAH process and would need to be abandoned.

5.124 The Applicant has investigated the extent of the natural wet rockhead in the Preesall area, which lies predominately east of the application site, and outside the two polygon areas (APP37, section 5.5.1 and figure 5.7). Without re-establishment for positive flow away from the salt field, natural or anthropogenic wet rockhead cannot migrate (APP37, paragraph 5.5.5.1). This is explained in more detail in the Applicant’s answers to our written questions (REP203, response to Q1/19).

5.125 The greatest risk of encountering unrecorded wild brine runs and wet rockhead would be in the northern polygon which is closest to the area where wild-brine pumping is known to have been practised. The exact location of wild brine runs is largely unknown and cannot easily be identified in seismic surveys. They are also difficult to pinpoint in boreholes. Design rules have been proposed by the Applicant for new caverns to be at least 4R from mapped wet rockhead areas and 5R from former brine caverns of unknown shape and any brine run that may be connected to it (REP207, paragraph 5.47).

5.126 The southern polygon has lower risk from brine runs as the nearest salt workings are the old ICI caverns which have been shown by sonar surveys to be little changed from their design shape (APP37, figure 5.3, page 43).

5.127 SoCG1 states that the risks from historic salt abstraction have been assessed and will not impact on the proposed project. We agree that, in view of the separation distances of 4R and 5R proposed, the risk from wet rockhead pathways and wild brine runs would be low, provided that the positions of the wild brine runs are determined with sufficient accuracy at the site investigation stage for the safe separation distances to be applied. This is a matter that would need to be considered at the detailed design stage and in the COMAH process.

**Risk of Seismic Activity**

5.128 There is considerable anxiety from many IPs about seismic activity in the Blackpool area and the effect that this might have on allowing underground stored gas at Preesall to escape and migrate. PWG questioned whether the Applicant has addressed the design issues sufficiently and the approach of safety zones from faults given the uncertainty of the location and size of faults in the model (REP170, paragraphs 5.148 to 5.155).

5.129 The Applicant has submitted a Seismic Desk Study which shows that the Preesall UGS facility would be located in an area of low
seismic activity (APP42). Furthermore, due to the depth of the UGS facilities they would not be subject to large forces during a seismic event. A greater risk may apply to subsurface pipelines particularly near surface liquefiable deposits and the possible failure of the wells connecting the storage caverns to the surface (APP42, paragraphs S2 and S3). The seismic hazard is low given the proposed location of the storage caverns (i.e. away from known active faults) and the low level of earthquake activity in the surrounding region (APP42, paragraph S2).

5.130 However, the GSR does state that site specific seismic risk is concluded to be of concern only in relation to construction through near surface alluvial deposits (APP37, paragraph 7.5). Further to this, the Seismic Desk Study makes design recommendations (APP42, paragraph 4.5) which will need to be considered at the detailed design stage and in the submissions as part of the COMAH process.

5.131 We have considered HSE report RR671 (Failure rates for underground gas storage) which summarises the known historical failures of UGS facilities. No failure of such a facility has been reported due directly to seismic activity. However, the HSE report highlights that the main risk to underground gas storage caverns is the failure of the well connecting the cavern to the surface. We note that drawing MMD-277663-00027 (REP207, Appendix 1) shows that the diagonal type casings to caverns 16 to 19 will need to cross a fault to connect to wellhead 7. We also consider that there may be as yet undetected faults through which the casings will have to pass.

5.132 In consideration of this, we asked a question on the risks associated with the casing passing through faults. The Applicant in answer stated that:

- the fault rupture hazard is low and any fault reactivation in the future would be at depth and very unlikely to cause rupture within the caverns or at shallower depths
- the well design has been undertaken to take account of stresses during installation and operation. As a consequence the casing thickness is greater than would normally be the case for vertical wells
- the properties of the well casing have been chosen to be ductile rather than brittle (REP207, paragraphs 5.80 and 5.81).

5.133 The Applicant has also stated that in the event of a seismic event, it would be possible to monitor parameters such as gas pressure, flow rate, fluid pressure in the annulus and gas composition to assess casing integrity. Pipeline design, with the capacity to accommodate some ground displacement, and a monitoring regime to detect leakage would be developed as part of the technical
justification within the COMAH process (REP207, paragraphs 5.84 and 5.85).

5.134 SoCG1 states that the risk of seismic activity to the development of UGS at Preesall is low. We agree with this conclusion.

*Risk from Hydrofracturing*

5.135 Concerns have also been raised by a number of IPs, including PWG, about the impact of hydrofracturing (commonly referred to as “fracking”) in the area, and how this might allow stored gas to escape and migrate (REP170, paragraphs 5.156 to 5.158).

5.136 There were two minor earthquakes on 1 April and 27 May 2011 caused by hydrofracturing 8 km and 9km from the Preesall site, which were reported as 2.3 M_L and 1.5 M_L magnitude respectively (APP42, paragraph 2.4.1.2). The Applicant considered the impact of induced earthquakes in the Seismic Desk Study (APP42, section 2.5.1), and concluded that such small magnitude earthquakes near Blackpool would pose very little hazard to the gas storage project. Preesall is located in an area of low seismic activity and the earthquakes said to be due to fracking are well within the range common in the UK. Further, the induced seismicity from fracking is not anticipated to have any impact on the proposed caverns (REP203, response to Q1/34).

5.137 The Royal Society/Royal Academy of Engineering review of hydraulic fracturing (Shale Gas Extraction in the UK: a review of hydraulic fracturing, June 2012), refers to concerns raised by seismicity induced by hydraulic fracturing but does not recommend specific maximum seismic levels. The report states that there is an emerging consensus that the magnitude of seismicity induced by hydraulic fracturing would be no greater than 3M_L (felt by few people and resulting in negligible, if any, surface impacts). The risk of seismicity induced by hydraulic fracturing can be reduced by traffic-light monitoring systems that use real-time seismic monitoring so that operators can respond promptly (summary of RS/RAE Report, recommendation 3).

5.138 Moreover, we note that if the application for UGS development at Preesall is approved then Cuadrilla’s\(^{12}\) field licence application will need to take the presence of the UGS caverns into account, particularly with regards to the site specific surveys that would be required to identify local stresses and faults (summary RS/RAE Report, recommendation 3).

5.139 SoCG1 does not refer to the risks from hydrofracturing. We consider that the risks from hydrofracturing would not materially change the risks from seismic events as long as the operator of the hydrofracturing process takes the presence of the caverns into account.

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\(^{12}\) Cuadrilla is the Company that is exploring hydrofracturing in the region.
account in its risk assessment and adopts safe operating practices. We do not consider therefore that there is reason to refuse the Order on account of any proposals being developed for hydrofracturing in the area.

Risks Associated with UGS Project Infrastructure

5.140 Unsurprisingly, most of the representations dwelt on the general concern of safety and the risks of gas explosion from the development. Out of the 10,852 residents that responded to PWG’s survey, 10,234 on both sides of the river expressed concerns about the risk of wellhead explosions and 10,266 expressed concerns about gas migration risk (REP170, paragraph 12.31). Similarly, LCC and WBC state in their LIRs that they remain concerned about the proximity of a facility of this nature to residential properties and the recreational users of the area (REP193, paragraph 12.25 and REP194, paragraph 12.23).

5.141 In this section we consider the risk assessment and impact of a gas explosion associated with the UGS infrastructure assets. In the final section we assess the impact on residential properties and the health impact on the local community.

Gas Leakage from Below Ground Infrastructure

5.142 Natural gas is an extremely flammable substance and its storage is subject to strict regulations. It is non-toxic although it can act as an asphyxiant in sufficient concentrations. The major risks to the public are therefore due to fires and explosions of the gas from sudden releases and by asphyxiation from slow continual release (APP43, paragraph S4).

5.143 The risk of gas migration has been considered by the Applicant in a source–pathway–receptors analysis (utilising and developing methodologies and leak scenarios developed by HSE) and considering actual site data (APP43). Pathways included fractured mudstone interbeds, fault planes, existing underground working, wet rockhead, or matrix flow through pores. Receptors included occupied properties, project infrastructure, users of public rights of way and open land. The highest risk was shown to be to an individual within a public right of way from accidental breaching of an operational cavern by a new or existing unknown borehole. The highest risk to residential property was concluded to be from a fracture in a pipeline in the superficial soils. The likelihood of occurrence of the highest ranking scenario is calculated to be less than 1 in 10 million, which CIRIA\(^3\) ranks as of no concern in their Report 152, 1995 “Risk assessment for methane and other gases from the ground” (APP43, paragraphs S6 to S10).

\(^{13}\) Construction Industry Research and Information Association
5.144 A serious risk that was not assessed according to one representation is the slow leakage of small amounts of gas behind or through a poor joint in the casing. This could then find its way into one of the more permeable beds in the overburden mudstones, work its way eastwards in the up direction and accumulate in a basement or old mine workings. Slow leaking gas is very hard to identify in a rapid response UGS facility of this nature (REP176). However, we consider that this risk is largely dependant on the quality of the design and operation and would be subject to COMAH control processes.

5.145 We note that the Applicant’s quantification of risk is considered to be unrealistic by Atkins, geological advisors to LCC. However, Atkins is satisfied that it has been done on a conservative basis and that even if the figures do not accurately represent the true risk, the risks are nevertheless extremely low (REP204, page 2).

5.146 The Applicant’s risk assessment accords with HSE publication RR671, which reviews reported problems in salt caverns and gives failure rates. Of the 66 worldwide salt cavern facilities, there have been 27 reported problems, mostly in the US. There have been a total of 8 fatalities in the US and 6,700 people have been evacuated. HSE RR671 also stated that in the vast majority of cases, the incidents were not the result of a failure related to a geological event. There were two exceptions to this:

- a case where a well appears to have been crushed due to faulting (in a seismically active area, with little similarity to the UK environment)
- connection in caverns in Mineola USA where human error was ultimately to blame.

5.147 Early salt cavern storage in the US was done in brinewells that had been solution mined without consideration for subsequent storage of gas in the depleted caverns. This has sometimes resulted in later problems for retrofitted brine caverns. Because of this it would be expected that new purpose built salt caverns would be less likely to fail (HSE RR671, section 2.4 and 5).

5.148 The HSE also states that the incidents most relevant to the UGS developments in the UK have resulted from a failure of either the man-made infrastructure (well casings, cement, pipes, valves, flanges, compressors etc) or human error (which has included overfilling of caverns and inadvertent intrusion). Problems have also arisen from extreme natural events (seismic activity). The causes, scale, and severity of the accidents are also extremely variable and have in some cases been the result of a combination of factors (HSE RR671, section 2.4).

5.149 We have reviewed these cases and note that in the UK, salt caverns are built and operated under stringent safety controls under the COMAH Regulations. Further, we are reassured by the
HSE statement that UGS has an excellent safety record (HSE RR605 page 131). We note that from the reports on worldwide incidents a key risk to the underground infrastructure is from leakage into old mine workings and faults (HSE RR605). For this reason, the separation distances given in paragraph 5.69 of this report have been included as Requirement 6 in the Order for the planning of the cavern layouts.

5.150 HSE has reviewed the Applicant’s risk assessment (APP43) and the application for a deemed HSC (APP15). HSE has assessed the risks from the maximum quantities of hazardous substances identified in the proposed project and are satisfied that the deemed HSC can be granted (SoCG8).

5.151 LCC and WBC have agreed that the geology has been sufficiently defined for an analysis of the risks from gas migration to be assessed and surface subsidence to be calculated subject to confirmation to further drilling as the development proceeds (SoCG1).

5.152 This site would be covered by strict monitoring and regulation by the Competent Authority as part of the COMAH process. Our conclusion therefore is that, subject to the location of faults and possible wild brine runs that might act as escape routes for the gas being identified in advance of the cavern design stage by a suitable site investigation, the risk of gas leakage from below ground infrastructure is acceptable.

Gas Leakage from Above Ground Infrastructure

5.153 The Applicant’s risk assessment also considers risks to the surface facilities (including the wellheads, on-site pipework, GCC, the vent stack, brine system, methanol and glycol facilities), from external hazards such as aircraft impact, seismic event, vandalism, vehicle collision, flooding and off-site fires or explosion (APP43, section 4).

5.154 The risks are considered by the Applicant to be generally low to extremely low. It is deemed credible that vandals could damage small bore piping and instrumentation leading to a minor release and potentially local fires, but in this event multiple isolation systems would enable the wellheads to be remotely isolated from the UGS network (APP43, paragraph 4.2.3.1).

5.155 In particular an incident at or a gas leak from wellhead 1 (WH1) could damage Hackensall STW (adjacent to WH1) and could result in an environmental pollution incident. We accept that this is a low risk, but the consequence of the discharge of sewage from Knott End and Preesall into the river would have a significant, albeit temporary, impact on the SSSI. However, UU has agreed a SoCG with the Applicant and is satisfied that there appears to be a low risk to their assets (SoCG44, paragraph 4.3.1).
5.156 The Applicant's risk assessment did not cover terrorism in detail and the safety report to be produced under COMAH Regulations would not cover terrorist activity; the HSE will be advised by the Security Services and Home Office on this issue. The Applicant states that they will respond to any reasonable requests from the Competent Authority for additional safety measures (APP43, paragraph 4.2.5.1).

5.157 PWG expressed concerns about the low standard of fire safety equipment provided, the lack of high pressure water distribution pumps and mains, fire curtains at the wellheads and sprinkler system at the GCC (REP170, section 6). They are concerned that the equipment would be inadequate to provide protection to employees, visitors or members of the public from massive radiated heat caused by a jet fire situation (REP170, section 6 and REP264). The Applicant has commented that details of the fire water distribution system will be developed as design progresses and will be to the appropriate national standards. The Competent Authority will review the fire safety provisions as part of the review of the COMAH safety reports. The Applicant is not aware of any gas storage facilities that use water curtains at the wellheads; the Competent Authority may or may not require that they are installed (REP198, paragraphs 3.151 and 3.152, and REP276).

5.158 SoCG15, concerning the safety of above ground facilities, agrees that the risks to occupiers of Cote Walls Farm and the Hackensall STW have been estimated together with the risks to users of the Wyre Way footpath, Knott End golf course and anglers at a local fishing pond. In all cases, the risk assessment shows that risks are very much lower than those that the HSE would normally consider acceptable in accordance with their PADHI land use planning risk assessment method.

5.159 We note that the fire safety equipment is an aspect of the design that will be addressed as part of the Competent Authority review of the COMAH safety reports. We agree therefore that the risks from the above ground infrastructure are acceptable for the purposes of considering whether the Order should be made.

Risks from Historic Salt Workings on Project Infrastructure

5.160 The proposed new access road to the main site, the interconnector gas pipeline and the electrical control cables all enter the site along a corridor that weaves through the historic brinewell field and mine workings. The detailed route is shown on drawing number MMD-277663-0007 (APP38, Appendix A). Our concern is that this route could create a vulnerability to the project as future subsidence might damage project infrastructure and isolate the site.

5.161 LCC and WBC have also specifically requested that the ExA should be satisfied that the former caverns are stable (see paragraph 5.117 above). Although the local authorities’ concern is about the
stability of the caverns as a whole, we are concerned only about the risks from those that are related or in proximity to the application.

5.162 The Applicant has recognised this area of concern and undertaken a number of studies:

- Legacy Brinewell Impact Assessment of the brinewells within influencing distance of the proposed scheme (APP36)
- Pipeline Subsidence Assessment Report which provides projections on life times of “at risk” brinewells and possible mitigation measures (APP38)
- Assessment of BW45 Incident (Subsurface Aspects ) (APP39)
- Gas Interconnector Pipeline to the NTS (APP41), which summarises the findings of the Pipeline Subsidence Report and considers alternative routes.

Are the existing mine workings stable?

5.163 The assessments identified three brinewells (BW44, BW50 and BW97) which could pose a significant risk in relation to crown hole development. BW44 and 50 are close to Higher Lickow Farm and the cavern roofs are actively migrating; BW97 is near Height O’th Hill. Key roof migration data for these three “at risk” brinewells show that:

- BW44: roof migration projected to reach critical collapse depth in the early 2050s; crown hole predicted within the life of the project (APP38, figure 4.2b)
- BW50: roof migration to reach critical collapse depth within 10 to 20 years; crown hole predicted within the life of the project (APP38, figure 4.2b)
- BW97: roof migration to reach critical collapse depth towards the end of the life of this project (our interpretation from graph of BW97, APP36, Appendix C).

5.164 The blow-out (of brine and air) of BW45 in June 2011 near the entrance to the site has been referred to in the written representations and is used to highlight the concerns with regard to safety (REP170, section 7 and REP166, page 34). The Applicant’s report showed that the blow out was explained as a mechanical failure of the casing just above the brine/air interface and did not involve the cavern structure (APP39, paragraph S13). The brinewell is not one of the “at risk” brinewells, and the Applicant has not needed to make any changes to the project design as a result of the blow-out (APP39, paragraph S13). We accept that BW45 does not pose an increased risk to the project as a result of the blow-out.

Do the existing mine workings pose a risk?

5.165 NPS EN-4 requires that the Applicant should undertake desk top surveys to identify historic or current mine workings when
assessing routes for a pipeline (NPS EN-4, paragraph 2.19.10). The Applicant has provided a plan of the hazard zones along the proposed pipeline corridor which show the pinch points along the route between the projected crown holes of BW44 and BW50 and the outer edge of the upper mine (APP41, figure 24). The minimum pipeline corridor is approx 40m wide with 100mm ground settlement projected (APP41, figure 25). The infrastructure to the site would pass through this pinch point.

5.166 The gas interconnector pipeline has been designed to pass 32m from the predicted long-term drawdown of the crown hole collapse of BW50, and theoretically it should not be affected (APP41). Nonetheless, we are concerned that should the crown hole be larger than forecast, this could pose a serious risk to the integrity of the pipeline. The consequences of such failure are similar to any breach along the pipeline to Nateby, as there will be sub-surface isolating valves that will isolate the caverns in the event of a breach.

5.167 However, we consider that the speed and security of repair would be more complex and the amount of gas lost from the 12km long pipeline could cause a hazard. The Applicant plans to implement a monitoring programme and has proposed mitigation measures if monitoring provides early warning of ground deformation impacting on the pipeline (APP38, section 6.3 and figure 5.1). We note that the pipeline route and design will be subject to the Pipeline Safety Regulations 1996 (APP30, paragraph 9.5) which will ensure that the gas interconnector pipeline is designed, constructed and operated safely. HSE will be notified of the route prior to construction under Regulation 20.

5.168 We consider that the gas pipeline is uncomfortably close to brinewells at risk of collapse, and the proposed route is a high risk during the life of the project. However, as the safety of the pipeline would be governed by the Pipeline Safety Regulations 1996, the ground will be monitored and mitigation measures are possible, we do not consider that this risk is sufficient reason not to confirm the Order.

5.169 The proposed new access road onto the site follows a similar route to the pipeline. A catastrophic failure of BW50 into a large crown hole collapse would also impact on the access road. However, there is an alternative emergency route onto the site (Acres Lane) which could be used temporarily while an alternative access is constructed in the event of access road subsidence, so we agree that the risk of road failure is adequately provided for.

5.170 The 132kv electricity supply cables follow the same route as the pipeline within the site, so the same risks and mitigation measures would apply. Outside the application site the cables also pass close to BW97 which is an “at risk” brinewell cavern (APP36, drawing number MMD-277663-0027, APP5 part 1 drawing number A-9100-
010 and REP207, Appendix 1). Two cables are proposed on separate circuits, so that in the event of failure in one supply the second cable could be used (APP33, paragraph 2.48). The Applicant further suggests that coiled cables could be used to mitigate the effects of potential subsidence (APP36, paragraph 5.1.3). As both supply cables to the site would be adjacent to BW97 and within the influence of a BW50 collapse, we consider that the Applicant could route at least one of the electricity supply cables away from BW97 and BW50, or provide standby generation for safety critical equipment. This is properly a matter for consideration by the Competent Authority under the COMAH Regulations and not to take into account in deciding whether or not to confirm the Order.

5.171 Higher Lickow Farm would house the administrative offices and the security gatehouse. It is close to the “at risk” BW 50 (APP38, Appendix A, drawing number MMD-277663-0007). However, we consider that consequences of future settlement on the above ground infrastructure at the gatehouse and farm buildings would be manageable as the facilities could be moved elsewhere.

5.172 The other above ground infrastructure proposed would be more distant from the existing mine workings and we consider therefore that they would not be at risk.

5.173 The Applicant proposes to monitor the “at risk” brinewells and other brinewells that pose a potential influence on the proposed UGS infrastructure (APP36, table 3.1). The s106 agreement with WBC provides for a brinewell monitoring and maintenance scheme, to be approved by WBC. We accept that this scheme would enable the Applicant, the Competent Authority and WBC to keep track of developing risks from the existing and proposed caverns.

**Risks to the Community and Amenities**

5.174 Many IPs expressed concern about the safety of the UGS proposal so close to residential properties and amenities. Although we appreciate that the safety aspects of the development would be checked, reviewed and monitored by the Competent Authority under the COMAH Regulations, at no part of the COMAH process is there any consultation with the public. This application for development consent is the only opportunity that the public have had to express their concerns. Moreover, NPS EN-1 section 4.13 requires us to assess any adverse health impacts of the development.

5.175 LCC and WBC state in their LIRs that they remain concerned about the proximity of a facility of this nature to residential properties and recreational users of the area. They acknowledge the SoCG with HSE, however they have requested that the ExA is satisfied that the risk to the nearest residential properties and recreational users of the area is acceptable before the HSC is issued for the
development (REP193, paragraph 12.25 and REP194, paragraph 12.23).

**Distance from Residential Properties**

5.176 If the caverns are correctly constructed, operated and maintained there should be no risk and the distance from residential properties would be unimportant. However, there have been several well publicised gas leaks from storage caverns and oil wells, some of which have resulted in deaths and the evacuation of large numbers of residents. Following a fatal leak at Hutchinson, Kansas in 2001, where gas travelled 11km (7 miles) from the cavern via fractured strata and abandoned brinewells, Kansas State subsequently introduced a law that prohibits the construction of gas storage caverns within three miles of a city boundary, within five miles of abandoned or active mine shafts, and within two miles of solution mining operations. All the more serious gas leakages worldwide have resulted from either an incomplete understanding of the geology or an inadequately constructed/maintained infrastructure, mostly borehole casing failures (HSE RR671, paragraph 151).

5.177 In the UK, there are no minimum separation distances from residential properties or amenities prescribed by legislation, and sites are assessed on a case by case basis by the Competent Authority. The Applicant has undertaken a risk assessment which assessed the consequences of major accident scenarios for different types of failures (APP43, section 4).

5.178 The area of effect of these accident scenarios is summarised in the Health Impact Assessment (HIA) (APP34). Preparation of the HIA was overseen by a Steering Group which advised on the approach and on the final recommendations (SoCG25). The HIA illustrates an envelope of maximum area of effect (APP34, figure 8.6). The worst case distances are 844m from the GCC for flash fires and 581m from any wellhead for jet fires. People within this area would be at risk of major injury or death if a major leak or explosion occurred (APP34, section 8.4). The maximum effect area surrounds the GCC with a small extension to the north west, which covers the following houses, facilities and amenities:

- onsite work force
- residents at Cote Walls Farm
- residents at Park Cottage Farm and Park Cottage
- walkers on the Wyre Way
- work force at Hackensall STW (usually unoccupied)
- golfers on the southern end of Knott End golf course
- people around water bodies used by Alkali Angling

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14 HIA Steering Group comprised representatives from NHS North Lancashire, Health Protection Agency, Cumbria and Lancashire Health Protection Unit and the Applicant. WBC were invited but did not participate.
boat/recreational users on the Wyre River within the effect distance from wellhead 1 (not mentioned in HIA).

5.179 The HIA states that other than the operational workforce (a maximum of 35 people), the number of people who may be within the maximum area of effect is estimated to be less than 50 at any time (APP34, paragraph 8.4.14). The Applicant’s risk assessment states that the probability of a major accident or explosion occurring is extremely low and comparable to risks with which we live everyday. Cote Walls Farm is the occupied building most at risk, for which the risk of a fatality has been assessed as approx 1 in 100 million years, significantly less than the risk of being killed by a lightning strike (APP43, paragraph S15).

5.180 The draft deemed HSC direction supplied by the Applicant (REP322) includes a HSE Consultation Zone map which is mostly similar to the envelope plan in the HIA except that the outer consultation zone excludes Park Cottage Farm and Park Cottage. We consider that the extent of the proposed consultation zone map should be reviewed by HSE, with regard to consistency with the risk assessment envelope (APP34, figure 8.6).

5.181 SoCG15 concludes that an adequate assessment of the risks to the public from the above ground facilities and pipelines of the proposed gas storage facility has been provided. Risks from the above ground facilities are very much lower than those normally considered tolerable by the HSE’s land use planning assessment methodology.

5.182 HSE have also agreed in SoCG8 that they have assessed the risks from the maximum quantities of hazardous substances identified in the proposed Project and are satisfied that the deemed HSC can be granted.

5.183 In view of the SoCGs signed between the LCC, WBC and HSE, and the risk assessment undertaken by the Applicant, we consider that risk to local residential properties would be low. A comprehensive risk assessment would need to be done at the cavern design stage to satisfy the COMAH requirements.

**Fear of Gas Explosion by Local Community**

5.184 The historic mine workings, cavern failures and subsidence have left a legacy of mistrust and fear in many IPs as to the integrity of the salt body and suitability for UGS. Local memories of the Abbeystead disaster, in which 16 people were killed in 1984, have further heightened concerns about the implications of gas explosions.

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15 Abbeystead disaster: Explosion of a water pumping station caused by the accumulation of naturally occurring methane in a water transfer tunnel
5.185 The HIA report states that although the risk of an emergency scenario is low, the fear of such a scenario is likely to have a more widespread effect on the population than the actual event itself (APP34, paragraph 1.4.2). Perceptions of safety are complex and their capacity to cause stress, anxiety or depression is not limited geographically to the actual areas of risk. The responses to the consultation (APP10 and APP11) and the PWG written representation (REP170) provide a good indication that there are strong and widespread views about the safety of the proposed development that go beyond both levels and areas of risk identified in the project’s quantitative risk assessment.

5.186 The HIA report recommends that the Applicant attempts to reduce the perceived safety fears by being open about their liaison with safety regulators and emergency planners and provide public information bulletins about safety audits and exercises as they occur (APP34, section 8.14). We note that the Applicant has stated that details of safety audits and exercises will be made available through the forum of the Community Liaison Panel (SoCG25, page 6).

5.187 There is no statutory requirement for public consultation under the COMAH Regulations, but under Regulation 14 the operator is required to provide to the public, and any establishments liable to be affected by a major accident, specified information concerning the major accident hazards and the safety measures that are in place. The area is determined by the Competent Authority and is called the Public Information Zone (PIZ). Operators must be proactive in providing the information, and must consider everyone who could be in the PIZ when a major accident occurs. This will include people passing through the area, for example vehicles and therefore also golfers, walkers on the Wyre Way, anglers and perhaps users of the Wyre Estuary.

5.188 The Applicant has dismissed failures in the historic brinewells and the salt mine as resulting from poor design, poor construction and lack of maintenance (REP198, paragraph 3.714). We consider that although safety details are a matter for the COMAH Regulations, the Applicant could have addressed safety considerations and procedures in more depth at this application stage. This development will require the public to have faith in the operating procedures with detailed contingency plans for the worst possible event.

5.189 LCC and WBC state in their LIRs that:

‘the HSE has previously concluded that risks to the surrounding population arising from the proposed operation(s) are small and that there are no significant reasons, on safety grounds, to refuse HSC. The current project is smaller and a SoCG has been agreed with HSE’
We consider that fear is a real and major issue for the community, whether statistically justified or not. The extensive level of communication required under Regulation 14 of the COMAH Regulations is reassuring, and should help local confidence develop in the Operator if undertaken correctly. However, if the development proceeds, we ask HSE to ensure the PIZ is set beyond the boundaries given in the Applicant’s letter (REP322) and ensure that it covers at least the full locality on the east bank of the Wyre River (from Knott End, Preesall, Stalmine to Hambleton).

**Distance from Local Amenities**

There are a number of amenities which are located within the consultation zones presented in the Applicant’s draft HSC direction (REP322):

- Knott End golf course – the southern end of course is within the inner zone; the nearest golf course green and tee are approximately 100m and 80m from WH1
- Wyre Way (footpath 42) passes through the inner zone, between WH1 and 3 and adjacent to WH5 and 7; the minimum distance to the WH5 and 7 boundaries is approximately 25m (scaled off figures 1.30 and 1.32, APP19)
- Anglers generally using fishing lakes to the north-east of the site would be within the outer zone; the distance from the GCC is over 300m (from the nearest lake)
- Leisure craft on the River Wyre close to WH1 would be in the outer zone
- Footpaths FP45, FP61 and FP 43 are all within the inner zone and would pass close to WH 4 and 5 and the GCC.

Knott End Golf Club is very concerned about the proximity of parts of the golf course to WH1. The Club requested that WH1 be moved farther to the south to improve the minimum separation distance (REP260).

The Wyre Way is part of the Lancashire Coastal Way path. Therefore, users may not be locals and well briefed about the implications of the site in an emergency. The Applicant has stated that the Wyre Way does not pass though a prospective COMAH site because the wellhead compounds and the GCC will not constitute an open continuous COMAH site. LCC and the emergency services will be consulted by the Applicant as to what warning signs and other measures should be employed to warn the public (REP276).

Not withstanding the above, we note that the Wyre Way passes within the inner consultation zone, and not the middle risk zone as stated in the risk assessment (APP43, paragraph S16). We are concerned about the proximity of the Wyre Way to the wellheads (see paragraph 5.191) as long distance walkers will not be aware
of the risks. However, we also accept that the risk to walkers is low, and consider that the alternative of closing the Wyre Way is not desirable.

5.195 Local anglers use the ponds to the northeast of the site, by Acres Lane. However, these are in the outer zone, and at a lower risk. Occasional users of the river, which could fall within the outer risk zone, are unlikely to be informed of the risk. However, we consider that the risks are also low, as they could only approach at high water and WH1 is in an elevated position.

5.196 SoCG15 on safety of above ground facilities agrees that risks to users of Wyre Way footpath, Knott End golf course and anglers at a local fishing pond are much lower than those that HSE would normally consider acceptable in accordance with their PADHI land use risk assessment method (SoCG15, paragraph 2.4.1).

5.197 The Applicant’s letter to landowners states that:

‘HSE land use planning advice approach is risk based. HSE’s PADHI methodology accords outdoor sports facilities a level 2 sensitivity and therefore HSE would not advise against a COMAH site development unless it placed the golf course in the inner risk zone’

(APP15, Appendix F, section 9).

As an observation, the Applicant needs to clarify whether HSE are referring to a golf course or golf club facilities, as parts of the Knott End golf course will be within the inner zone.

5.198 We consider that the risk to amenities is low, but we remain concerned that future changes in applied safety distances for top tier COMAH sites or advice from the Home Office regarding terrorism could result in the enclosure of the wellheads and GCC into one secure site. This would result in both closure of the Wyre Way and have a negative impact on Knott End Golf Club. We note that the Applicant has stated that it is not their intention to close the Wyre Way (REP198, paragraph 3.22) and we consider that possible future changes in legislation and safety practices do not provide reasons to refuse the Order in this regard.

Response to Emergencies

5.199 There is a high level of concern from IPs about the inability to evacuate a large number of people from the area in the event of an emergency (for example REP170 and REP176). This concern is attributed to the inadequacy of the road network from the peninsula and the high number of elderly residents in the area. Of the 10,852 residents that responded to PWG’s survey, 10,007 on both sides of the Estuary expressed concerns about the adequacy of evacuation procedures should a major incident occur.
5.200 We have noted the potentially congested nature of the road network and particularly the difficulties that might be encountered on the A588 if emergency services were trying to access the Preesall site while residents were leaving the area either towards Poulton-le-Fylde or Lancaster.

5.201 The Applicant has not provided any preliminary assessment of how large an area might need to be evacuated, either in the event of a real incident or as a contingency precaution, or how an evacuation might be managed. This is because the evacuation plan will be part of the off-site emergency plan which is generated as part of the COMAH approval for the site (COMAH Regulation 10). The preparation of the plan is triggered by the Competent Authority, and this will occur when the facility is close to being operational (REP198, paragraph 3.265). The responsibility for defining the off-site emergency plan lies with LCC who are required to communicate the necessary information to the public and to the emergency services and authorities concerned in the area.

5.202 We consider that an early assessment of the evacuation procedures might have allayed the fears of the community, and this could have been assessed as a possible risk as part of the risk assessment at this stage. However, in view of the fact that any emergency evacuation procedures will be assessed by LCC and the Competent Authority, and the risk assessment shows that the likelihood of a major emergency is very low, we conclude that the possible evacuation of the public is not a significant factor whether or not the Order should be made.

CONCLUSION

5.203 Paragraph 2.8.9 of NPS EN-4 requires a detailed geological assessment to demonstrate the suitability of the geology at the site for the type of underground gas storage proposed. The assessment should include depth below surface, salt thickness, salt purity and presence of shale bands which could affect cavern design, integrity of the overlying strata and potential for collapse, taking account of proposed minimum and maximum working pressures.

5.204 The Applicant has presented a comprehensive account of the known geology at Preesall in the GSR (APP 37). However, we note that much of the analysis has been based on reinterpretation of data that was provided for the previous unsuccessful planning applications.

5.205 Where there is plentiful data in the south and east of the application area, the geology is deemed to be unsuitable for cavern development because of the faulting and location of historic brinewells. The Applicant has identified two polygon areas as suitable for cavern development as they avoid all known hazards, whilst acknowledging that data in these areas is sparse. We consider that there is no direct evidence that the assumption in the
3D geological model that there are no faults in the polygons is correct. We note that no seismic surveys have been undertaken across the two polygons to confirm or disprove the presence of faults or confirm the thickness of the halite.

5.206 We consider that our uncertainty with regard to the accuracy of the 3D model in conjunction a probability of only 30% of achieving the Order storage capacity (APP37, paragraph 6.2.1.1) highlights the lack of confidence about the suitability of the geology to support the development proposed.

5.207 The issue therefore is whether sufficient geological information exists at this stage to enable the Order to be confirmed, granting development consent for up to 19 caverns to store up to 600 Mcm, leaving the detailed design to be progressed on the basis of further investigations to be supplied to the Competent Authority under the separate COMAH process. We fully acknowledge the need to avoid duplication of this regulatory regime (NPS EN-1, paragraph 4.10.3). Even though this arrangement has evidently worked elsewhere in the UK in handling UGS facilities as the Applicant points out (REP243), we remain of the view that the complex geology of the Preesall area requires a more robust understanding of the capacity of the halite to accommodate the volume of gas proposed to be stored.

5.208 This is because of our concern that if the Order is approved as it stands, the Applicant would need to construct the surface infrastructure i.e. the GCC, the cavern washing infrastructure, which includes the marine outfall, pumping stations, and river crossings etc, in parallel with seeking COMAH approval of the preconstruction safety reports for cavern construction. It is conceivable that the geology might not be able to support the proposed gas storage volumes, in which event the surface infrastructure would have been designed for greater capacity than is needed, or at worst would be redundant. This would have caused disruption to the community and the environment for little benefit.

5.209 The geological uncertainty could be settled by the Applicant undertaking a comprehensive survey to confirm the geology within the two polygons. If the Applicant is correct and the 3D geological model is validated, then construction of the surface infrastructure can proceed with confidence. If the model is not validated to demonstrate that the volumes of gas storage can be achieved at least substantially in line with that being requested for approval, then our conclusion is that the development should not proceed. Our recommendations as to how this next step should be provided for within the Order are set out in Chapters 7 and 9.

5.210 Our assessment of other matters regarding associated UGS risks at Preesall – geological risks, risks associated with the gas infrastructure at the site, and risks that impact on the community and local amenities – is that they are not sufficient to refuse the
Order. We understand and appreciate the public fear concerning safety. However, because detailed design of both the site subject to the COMAH Regulations and the interconnector pipeline will require consultation with HSE and EA, as the Competent Authority, we are confident that safe operating practices will be properly enforced.
### Tables of Key Geological Data

#### Table 1: List of Deep Boreholes (listed in north to south orientation)

<table>
<thead>
<tr>
<th>Borehole Name</th>
<th>Year</th>
<th>Depth to top halite</th>
<th>Depth to base halite</th>
<th>Thickness of halite</th>
<th>Comments/location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hackensall Hall E1 (ICI)</td>
<td>1940</td>
<td>317m</td>
<td>398m</td>
<td>81m faulted</td>
<td>70 m outside top north west edge of northern polygon. Depth of halite of over 220m used in 2010 3D model. No full log: source CR/05/183N table 3. This borehole data defines the north section of the model. Thickness and faulting is disputed.</td>
</tr>
<tr>
<td>Arm Hill (Canatxx)</td>
<td>2004</td>
<td>366m</td>
<td>607m</td>
<td>&gt;236m</td>
<td>Near booster pump station location. Ties to seismic line IELP. Source CR/05/183N table 3</td>
</tr>
<tr>
<td>Cote Walls Farm (BGS)</td>
<td>1974</td>
<td>281m</td>
<td>not reached</td>
<td>not reached</td>
<td>Ties to seismic line IELP.</td>
</tr>
<tr>
<td>Burrows Marsh (middle deviated) (Canatxx)</td>
<td>2008/09</td>
<td>388m</td>
<td>741m</td>
<td>320m</td>
<td>Located at Barnaby Sands between the 2 polygons. Between indicative caverns 11 and 16. Ties to the omission zone of seismic line GC81-336.</td>
</tr>
<tr>
<td>Hay Nook (Canatxx)</td>
<td>2009</td>
<td>301m</td>
<td>554m</td>
<td>253m</td>
<td>Approx 150m from cavern 19, south of southern polygon. Ties to seismic line Canatxx G. Additional tests post 2009 for this application.</td>
</tr>
<tr>
<td>The Heads (Canatxx)</td>
<td>2003</td>
<td>226m</td>
<td>430m</td>
<td>c 210m</td>
<td>Approx 650 m south of southern polygon. Thickness approx 210m. Source BGS CR/09/040 fig 5 and CR/05/183N table 3.</td>
</tr>
</tbody>
</table>

Sources:
1. GSR section 3.3 (APP37)
2. BGS Report CR/09/040 (REP203, Appendix 6)
3. BGS Report CR/05/183N (REP203, Appendix 15)
4. Drawing number MMD-277663-0027 (REP207, Appendix1)
<table>
<thead>
<tr>
<th>Seismic Line</th>
<th>date</th>
<th>Location</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC81-336 (Gas Council)</td>
<td>Oct 1981</td>
<td>East to west across the development site.</td>
<td>Omission zone across the Estuary and therefore data for the southern polygon is limited. (ref BGS report CR/05/183N)</td>
</tr>
<tr>
<td>GC86-DU371 (Gas Council)</td>
<td>1986</td>
<td>East to west and gives data across the river, but passes on the southern border of the DCO site.</td>
<td>Identifies location of Burn Naze Fault to south of site.</td>
</tr>
<tr>
<td>Canatxx D</td>
<td>1997</td>
<td>NE to SW in the area of The Heads. Approx south east of the south tip of the southern polygon.</td>
<td>Crosses Canatxx F.</td>
</tr>
<tr>
<td>Canatxx F</td>
<td>1997</td>
<td>East to west in the area of The Heads. Approx 550m south of southern polygon.</td>
<td></td>
</tr>
<tr>
<td>Canatxx G</td>
<td>1997</td>
<td>East to west in the area of the Heads. Approx 150m south of southern polygon.</td>
<td>Ties to Hay Nook Borehole.</td>
</tr>
<tr>
<td>IELP -99-25 (Independent Energy Lancashire Plains)</td>
<td>1999</td>
<td>NW to SW across the site. Clips the northern polygon area.</td>
<td></td>
</tr>
<tr>
<td>Fugro Aperio</td>
<td>2010</td>
<td>In vicinity of old mine workings to identify SW boundary of mine.</td>
<td>Not shown on drawings.</td>
</tr>
</tbody>
</table>

Sources
1. GSR table 3.3 (APP37)
2. Drawing number MMD-277663-0027 (REP203, Appendix 15)
3. BGS Report CR/05/183N (REP207, Appendix1)
FINDINGS AND CONCLUSIONS: OTHER MATTERS

LANDSCAPE, VISUAL IMPACTS AND DESIGN

6.1 The impact of the proposal on the landscape of Preesall to the east of the Wyre Estuary and the extent to which it would alter the visual appearance of the locality was the subject of several representations.

6.2 LCC and WBC maintain an objection to the proposal on the basis it would have an unacceptable impact on the visual amenities of the area. They consider that the negative effects of the proposal on the open countryside and rural environment strongly outweigh the positive influences on the coastal and urban environments. Mitigation measures would not be sufficient to reduce the overall harm of urban features in the rural environment and the project would cause a fundamental change to landscape character from the introduction of urban features (as seen to the west of the Estuary) further to the east (REP193, paragraph 17.5, REP194, paragraph 21.4).

6.3 SoCG20 between the Applicant and LCC, endorsed also by WBC, and SoCG21 between the Applicant and NE cover agreements about the methodology and baseline conditions only, which apart from some factual corrections are agreed.

6.4 The SoCG with NE agrees there would be no effects upon designated landscapes, the closest one of which to the application site is the Forest of Bowland AONB which lies within 5km of the NTS feeder near Garstang, the eastern most part of the application site (SoCG21).

6.5 The LIRs submitted by LCC and WBC (REP193 and REP194) set out the site description, history of salt extraction and current development proposals, and we used these as a context for considering the impact of the application on the landscape.

The Character of the Wyre Estuary

6.6 The analysis of landscape, together with seascape, townscape and visual amenity is set out in the ES (APP17, chapter 14 together with several Appendices). The present appearance of the Wyre Estuary in which the application proposals are set is broadly a contrast between the urban areas of Fleetwood and Thornton to the west of the Estuary, and the largely rural areas of Preesall to the east.

6.7 The Fleetwood side of the Estuary has experienced considerable change since the establishment of the town as an early planned coastal resort reinforced by the arrival of the railway in the 1840s. This was followed by the beginnings of the salt extraction industry and a major industrial plant operated by what became ICI, and then the development of Fleetwood as the third largest fishing port.
in the country and associated fish processing industries. More recently, Fleetwood was a ferry port with services to the Isle of Man and Ireland. Virtually all of these industries have now closed, with a small residual fish processing activity remaining at Fleetwood, and the former ICI plant at Thornton now being redeveloped as an industrial business park. New residential development is taking place adjacent to the former Fish Dock at Fleetwood, and some of the port area has been redeveloped for an edge of town retail scheme. There are large areas of the redundant ferry terminal awaiting new uses.

6.8 By contrast, the eastern side of the Estuary is rural, with small hamlets and villages, and in mainly agricultural use. It is characterised by two distinct landscape character tracts; the low-lying mudflats and salt marshes associated with the Wyre Estuary, and an established agricultural landscape of the coastal plain comprising medium-sized fields enclosed by hedges and scattered farmsteads.

6.9 However, this is the area where salt was extracted both through the construction of the mine and pumping brine. This has left a legacy in terms of the appearance of the landscape, through wellheads marking the position of redundant wells or caverns for brine extraction, and several small lakes and ponds where salt caverns have collapsed. In some cases, the process of collapse is still taking place, and areas of subsidence and surface lakes are fenced to prevent public access. When the Preesall Salt Field was in full production, the landscape was considerably different from its present open and rural appearance, with drilling rigs and substantial industrial plant (REP166). Though this has all but disappeared, the evidence of former salt extraction activity is easily seen through the range of surface features.

6.10 Little development is proposed in the development plan for the Preesall side of the Estuary, and the Estuary itself is a major nature conservation asset, designated SSSI and part of the Morecambe Bay Special Protection Area, discussed later in this chapter.

6.11 The landscape on the eastern side is unlikely to change much in the future therefore, as the area gradually recovers from its past. This is not an area subject to any formal landscape protection policies in the development plan. The overriding impression from vantage points looking across Wyre Estuary towards Preesall is currently one of openness and limited built development. Those new elements of infrastructure which have been constructed recently are not prominent features in the landscape, for example the Hackensall STW and several 33kv overhead power lines.

6.12 In our view, the eastern side of the Estuary where most of the elements of the application are proposed both above and below
ground is not now a scarred heavy industrial landscape into which major new built development can easily be inserted.

Visual impact

6.13 The size and scale of proposed development is therefore an important and relevant matter in assessing its acceptability. In this regard, the differences between the development proposed on each side of the Estuary are important. The seawater pump station in the Fleetwood Fish Dock would be 7m to ridge height and would be constructed of brick and timber cladding with a metal roof sheeting covering. It would echo the existing buildings in the Fish Dock along Herring Arm Road, and is acceptable to WBC.

6.14 Apart from the seawater pump station and the observation platform at Rossall, all the development proposed on the western side of the Estuary would be underground pipelines for seawater, brine and electrical circuits with no residual visual impact once construction is complete.

6.15 By contrast, most of the surface development proposed in the application would be located on the eastern side of the Estuary. The booster pump station is proposed to be located immediately to the east of the existing Hackensall STW, with wellhead 1 immediately to the north. The booster pump station would be a single-storey building 7m to ridge height containing pumping equipment, electrical controls, switchgear and standby generator. The building is proposed to be faced with brick with a slate roof, and designed to have the appearance of an agricultural building. Adjacent to the booster pump station would be a debrining facility (which is essentially a large square open settlement tank), and low level hydrocyclones and water pumps. The site covers an area of 0.5ha. The STW does not present a major intrusion in the local landscape, and there seems to be no reason why the booster pump station located adjacent to it should not be similarly contained.

6.16 At Higher Lickow Farm, the smaller of the existing barns would be demolished, and the larger one rebuilt on the existing footprint to provide staff facilities and a maintenance workshop. The existing farmhouse would be refurbished to provide health and safety training accommodation. A new single-storey gate house would be constructed immediately to the east of the farmhouse on Monks Lane. The new barn rebuild would be brick and slate pitched roof, similarly the gatehouse, and both would echo the style of the existing farmhouse.

6.17 In addition to the GCC, booster pump station and debrining facility, the other noticeable surface development would be the 7 wellhead compounds to provide the means of connecting the 19 caverns to the GCC. The application drawings show indicative designs for the wellheads only, as detailed design of the wellhead compounds
would require approval by WBC as the development proceeds within the terms of Requirement 4 of the Order.

6.18 The GCC would be the largest element of surface infrastructure required to operate the UGS facility and would be clearly visible from the west side of the Estuary. The compound covers an area of approximately 3ha, with two buildings and external industrial plant, contained by an earth bund and a security fenced area.

6.19 The two GCC buildings would house the compressor station, electrical equipment and utilities, and are similar in design being approximately 8.5m high and 7.0m high respectively, each with a gross floor area of approximately 350m². All other plant and processing equipment in the compound would be exposed, and not contained within buildings. This would be plant and equipment to condition the gas for entry to the caverns and return to the NTS, and would include compressors, dehydration units, air cooled heat exchangers, filters, separators, storage tanks, utilities and electrical equipment. According to the drawings, the two glycol towers would be approximately 12.5m high, 3m diameter. Included in the compound would be a 100m diameter pond for emergency firewater as well as handling surface water run-off, and a vent stack approximately 15m high (APP19, figures 1.39 to 1.44 and REP203, response to Q5/1).

6.20 The whole compound including the water pond would be enclosed by a 2.4m high security fence of dark green polyester coated mesh, and with CCTV cameras. The GCC would be lit by a low-level lighting scheme which will be developed during the detailed design stage. The lighting would be activated only where and when needed in a particular area of the compound during inspection by staff (REP203, response to Q5/2). It is not proposed there will be any permanently installed floodlighting. The GCC would not be manned as the UGS facility would be operated from a control room located at the booster pump station.

6.21 The existing ground contours around the GCC are proposed to be remodelled using spoil from construction activities elsewhere on the site. This would help screen the southern and western aspects of the GCC when viewed from the Wyre Way and the west side of the Estuary. The photomontages show the likely visual impact as seen from the east along the proposed private access track to the compound from Higher Lickow Farm, though this would not be a view many people would experience (REP203, Appendix 25). With planting on top of the bunds, all but the glycol dryers at 18.5m AOD, and the vent stack at 20m AOD in the middle of the firewater pond would be reasonably well screened.

6.22 Alternative locations were considered by the Applicant for the GCC, including land to the west of Burrows Hill, but were rejected due to the potential visual impact on the Wyre Estuary. Consideration was given also to locating the compound on the west bank of the Wyre
Estuary (APP28, Appendix 1). However, this was determined to be unacceptable on safety grounds of proximity to built development. The preferred location south of Cote Walls Farm would be close to the proposed main development area. There are no brinewells or other old workings in the vicinity and therefore the Applicant argues there should be minimal risk of subsidence in this area. Our conclusion is that the location proposed for the GCC is acceptable, in view of the absence of practical and suitable alternative locations.

6.23 Given that the size and scale of the proposed GCC development as a whole means that it would not be possible to screen it completely in the landscape, the issue is whether it has particular characteristics that are so damaging as to render it unacceptable as a matter of principle. We found the photomontages, and the indicative heights represented on the site on the day of our second site visit, particularly helpful in conveying the visual impact of the development in the locality. In our view, the earth mounding and landscaping has the promise of screening most of the lower elements of the GCC from nearly all directions and therefore substantially reducing its impact in the landscape. But its size and scale means it will be a large, permanent collection of industrial plant and equipment in what otherwise appears to be a largely undeveloped and rural landscape.

6.24 The gas metering station towards the end of the pipeline connection to the NTS at Nateby would be a small single-storey brick built building 5.5m to ridge height, in similar style to other new buildings intended as part of the project and is uncontroversial.

**Design**

6.25 Plainly, the design of the proposed development has a major bearing on how successfully it could be assimilated in the landscape, and the impacts mitigated. Noting the advice in paragraph 4.5.1 of NPS EN-1 that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area, we looked particularly carefully at the design solution adopted. Given the previous history of planning applications for similar proposals for gas storage in this locality, the basic elements of the buildings have been considered previously, and comments by WBC as the local planning authority taken into account in formulating this proposal. As a result, the design of the seawater pump station at Fleetwood and the booster pump station adjacent to the STW at Hackensall are acceptable to WBC in design terms.

6.26 During the examination, we considered the extent to which the GCC could be improved in terms of design of its components coupled with siting within the landscape to reduce its overall impact. The Applicant considered that the proposals as set out and explained in the Design and Access Statement (APP29) represent
the optimum and argued why no further improvements are feasible (REP207, response to Q28). In the light of this and from our own experience of visiting the site and the locality, we conclude that the scope to reduce further the landscape impact of the GCC is limited given that its design is a result of the function the development is intended to perform.

**Mitigation**

6.27 The extent to which the visual impact of the GCC in particular can be further mitigated beyond the landscaping proposals referred to in paragraph 6.23 above is therefore an important matter.

6.28 The Landscape and Ecological Management Strategy Plan (LEMSP) covers the east side of the Estuary, an area of approximately 93ha, and includes land functionally linked to the adjacent Wyre Estuary SSSI which is an integral part of the Morecambe Bay SPA. It seeks to minimise the effects of the project on landscape character and local views as set out in the ES and would be implemented over a phased programme during the construction phase i.e. years 1 to 3. The LEMSP is a working document produced in consultation with NE, EA, Lancashire Wildlife Trust, RSPB, LCC, WBC and tenant farmers. The version submitted as part of the application was revised in May 2012 (REP203, Appendix 25) and has been the subject of SoCGs agreed with all the bodies (SoCGs 4,5,35 to 38).

6.29 The construction phase (years 1 - 3) and the construction and operation combined phase (years 4 - 8) of the project would result in a significant effect on the character of this landscape. But over time we consider the mitigation proposals in the LEMSP would reduce these effects so that early in the operational phase (year 10) they would be considered not significant for most elements of surface infrastructure.

6.30 To our minds, the fencing around the wellhead compounds would appear to create an adverse visual intrusion, even after the completion of landscaping proposals. As the photomontages in the ES clearly show a simple concrete post and chain-link fence is not an attractive means of providing the necessary security in an otherwise rural area (APP20). However, we see this as a matter which could be looked at in detail by WBC when approving fencing and landscaping proposals within Requirements 4 and 9.

6.31 In terms of other proposed built development, the seawater pump station in Fleetwood Fish Dock, the booster pump station and the small gas metering station near Nateby buildings do not give rise to particular difficulties, and the proposals for Higher Lickow Farm would offer a positive benefit.

6.32 It is the GCC which would create the main landscape impacts. The landscape in the vicinity of the GCC is not covered by any formal or informal landscape designations. However, the landscape is
considered to have a high sensitivity because of its interrelationship with the adjacent Wyre Estuary and its natural habitat which are formally recognised through designation as being of national/international importance (APP17, Chapter 14). With regard to the nature of the project and the type of change envisaged (particularly during the construction phase), this landscape is also considered to have a low to medium capacity for change.

6.33 The mitigation proposed will go a long way to ameliorating these adverse effects, and whilst the GCC itself would be approved as part of the Order, Requirement 9 in Schedule 9 provides for the detailed landscaping proposals to be submitted to WBC for approval, giving effect to the LEMSP. But we remain of the view that as a consequence of its size and scale and components, and because it would have low level lighting, the visual likely impact of the GCC would be an overall serious disbenefit of the proposal.

FLOODING AND SURFACE WATER DRAINAGE

6.34 The application was accompanied by a Flood Risk Assessment (FRA) (APP18, Appendix 17.1) as required by NPS EN-1 paragraph 5.74. There were few comments from IPs on flooding and LCC and WBC did not make any comments on flooding or drainage in their LIRs (REP193 and REP194).

6.35 SoCG22 has been signed between the Applicant and the EA, which agrees the following:

- methodology used by the Applicant for the FRA
- information on sources of flooding
- findings on coastal flood risk
- development implications with regard to possible to the monitoring and repair of crest levels of the flood defences
- requirements and approach to obtaining flood defence consent.

Flooding

6.36 The Design and Access Statement states that:

‘due to its coastal location, flood risk is an issue for the Project. A comprehensive Flood Risk Assessment has been carried out and buildings have been sited to avoid flooding’

(APP29, paragraph 5.20).

6.37 The primary source of flood risk in the application area is coastal, arising from the Wyre Estuary (APP17, paragraph 17.4.30) with predicted flood levels in the application area of between 6.08m and 6.41m AOD (APP17, table 17-10). There are flood defences on the east side of the Estuary which protect the main Preesall site, with a crest height of approx 6.3m AOD. The EA report that the flood
defences should protect the land to a 1 in 200 year standard (APP17, paragraph 17.4.31).

6.38 The FRA (APP18, Appendix 17.1, section 8) notes that the following infrastructure assets will be located in Flood Zone 3 (high probability of flooding):

- wellheads and manifolds; however, they will be able to accommodate flooding and are located behind the existing flood defences (APP18, Appendix 17.1, paragraph 1.16)
- parts of the GCC; however, all assets that cannot accommodate flooding will be located at a minimum height of 7m AOD
- vent stack and firewater pond; although the infrastructure can accommodate flooding
- Stanah Switchyard; the level of protection offered by existing flood defences would be determined at the detailed design stage
- brine discharge pipeline at the sea wall crossing; however, the scheme design will maintain the existing standard of flood protection
- sections of the main access road; however, these will be at existing ground level, and will not prevent the safe operation of the proposed infrastructure (APP18, Appendix 17.1, paragraph 1.1.8).

6.39 The Sequential and Exception Tests required by EN-1 at section 5.7 have been applied for the critical infrastructure located in Flood Zone 3 (APP18, Appendix 17.1, paragraph 8.3.8 and 8.3.9). The critical assets which could not tolerate flooding would be located in Flood Zone 1 (low probability of flooding). We note from the application drawings that the finished floor levels of the buildings at the GCC, booster pump station and sea water pump station have been set at 7.0m AOD, which is above the 1 in 200 year flood level indicated by the EA (APP19, figures 1.41, 1.23 and 1.17). The security buildings at Higher Lickow Farm are set at 12m AOD (APP19, figure 1.37).

6.40 Proposed bunding around the GCC and booster pump station is to assist in mitigation of visual impact (APP29, paragraph 5.21), not for flood protection. However, the FRA states that work will be undertaken at the detailed design stage as to the whether additional flood storage is required to compensate for potential displacement of floodwater as a result of the visual bunds (APP18, Appendix 17.1, paragraph 1.17).

6.41 Although there is also a potential fluvial flood risk to the project, the mitigation of the coastal flooding, (which presents the worst case scenario), would ensure that the project is safe from fluvial sources of flooding and would not increase the flood risk elsewhere during the operational phase (APP18, Appendix 17.1, paragraph 6.3.6). The FRA also confirms that with appropriate groundwater
protection measures in place (for example vulnerable assets raised slightly above ground levels) the risk of groundwater flooding to key infrastructure is considered to be low (APP18, Appendix 17.1, paragraph 6.4.4).

6.42 We conclude that the Applicant has complied with the requirements of EN-1. Some infrastructure will be in Flood Zone 3, but we agree that this element of the infrastructure passes the Exception Test (EN-1, paragraph 5.7.17) and there will be no increase in flood risk elsewhere.

6.43 However, we also note that the flood defences are in an area of future settlement which would be caused by the proposed cavern development, as discussed in Chapter 5 of this report, and noted in SoCG22. Protective measures have been agreed with the EA with regards to liability for maintenance of the flood defences in the event of such settlement (see paragraph 5.90).

Drainage

6.44 The FRA states that with the implementation of a suitable surface water drainage strategy there should be no significant risk to proposed infrastructure from surface water flooding. It is proposed that the surface water drainage strategy is developed at the detailed design stage after the Order has been granted (APP18, Appendix 17.1, paragraph 1.1.10). We accept that the strategy would ensure that surface water runoff is effectively managed within the application boundary and that there would be no increase in third party risk.

6.45 We have reviewed the risks from flooding and are satisfied that the proposals for dealing with them are satisfactory for the purposes of considering whether the Order should be made.

PIPES

6.46 We have assessed the proposals for the gas interconnector pipeline to the NTS as well as the other key pipelines in the application (APP27). There were few representations from IPs about the pipeline routes except on CA matters (see Chapter 8). LCC and WBC in their LIRs note that construction of the pipelines will cause some disturbance across the Fleetwood Peninsula, but they accept that these will be temporary and reversible (APP193, paragraphs 9.3 and 9.8, APP194, paragraphs 9.3 and 9.8).

Gas Interconnector Pipeline to the NTS

6.47 NPS EN-4 applies to gas transport pipelines that are over 800mm in diameter and over 7 bar in pressure. It requires that when designing the route, the Applicant should consider relevant constraints such as proximity to residential properties, below surface usage, and environmentally sensitive areas.
6.48 The gas interconnector pipeline would be 12.4km long, 1200mm external diameter and would connect the GCC at Preesall to the NTS at Nateby (APP27, paragraph 1.2.3). We understand that it would operate at up to 95 bar to allow gas to free flow between the caverns and the NTS (APP30, paragraph 7.13).

6.49 The Applicant has presented a review of possible pipeline routes in the report Gas Interconnector Pipeline to the NTS (APP41). The proposed route is mainly cross country and crosses one main road (A588), six minor roads, nine tracks and four rivers or water courses (APP27, paragraph 1.6). The A588 and certain of the minor roads and rivers will be crossed by trenchless means. All other crossings will be open trenched with temporary access or diversions provided (APP27, paragraph 1.6).

6.50 We have reviewed the proposed route and note that it avoids residential properties (APP41, paragraph 6.9), does not pass through any National Parks, Areas of Outstanding Natural Beauty or statutory designated sites for nature conservation (APP20 figure 9.1). It does cross Pilling Moss Head Dyke and Pilling Moss Eagland Hill, non-statutory designated sites for nature conservation, both of which are agricultural land (APP20, figures 9.2 and 9.3). The pipeline would be laid underground by traditional open trench methods. We consider that the route selected is acceptable.

6.51 We questioned the Applicant on the impacts of the pipeline route on farming operations. The Applicant confirmed that the route is almost entirely agricultural land, a mixture of grassland for livestock production or ploughable land for arable enterprises (REP203, response to Q8/1). The pipeline would be laid mostly in open trench and the installation would cause short and medium term disruption to existing farming operations. There would be no permanent impact as the land will be reinstated and returned to agricultural production. Several IPs expressed concerns about the impact on the pipeline route on their farming practices; these are addressed in Chapter 8 below. We have reviewed the alternative routes across the agricultural land provided by the Applicant and agree that the proposed route is acceptable.

6.52 The section of the pipeline route as it enters the main Preesall site passes through an area of existing brinewells and subsidence. This has been considered in a separate report submitted by the Applicant: the Pipeline Subsidence Assessment Report (APP38). We have considered this section of the pipeline route in the previous Chapter of this report (paragraphs 5.166 and 5.167).

6.53 At the Nateby end of the pipeline, the application includes proposals for construction of a gas metering station. This would be on agricultural land adjacent to the existing NTS feeder Control Valve Station (APP19, figures 1.49 and 1.50) and accessed via a private farm track. We have received no representations
concerning its location. Our conclusion is that the location proposed is acceptable.

6.54 We have reviewed all aspects of the pipeline routes and conclude that the risks are acceptable for the purposes of considering whether the Order should be made. However, we note that, if the Order is confirmed, the gas interconnector pipeline will require approval from HSE under the Pipelines Safety Regulations 1996.

**Brine Discharge Pipeline**

6.55 The proposed brine discharge pipeline would be approximately 8.1km long, 900mm external diameter and would run between the booster pump station at Preesall and the discharge point into the sea 2.3km offshore at Rossall (APP27, paragraph 1.2.2).

6.56 The brine pipeline would require a crossing of the Wyre Estuary, two main roads (A585 and A587), one minor road (B5268), one minor estate road by Harbour Village and the crossing of the Blackpool-Fleetwood tramway (APP2, paragraph 1.6 and APP9 drawing number A-9000-001).

6.57 All road and tramway crossing construction would be by trenchless technology; however Blackpool Transport\(^{16}\) raised concerns about settlement and potential damage to the tramway (REP159). At the IS hearing on 9 October 2012 it was confirmed that Blackpool Borough Council as the tramway undertaker required protective provisions in the Order (REP261). These have been included in the Order (Schedule 8, Part 3) and we are satisfied that the consequences of any impacts from pipeline construction on the tramway are adequately provided for.

6.58 Construction of the marine outfall would require approval by the Marine Management Organisation (MMO) within the terms of the proposed deemed marine licence at Schedule 7 of the Order. The MMO have confirmed that the deemed version in the Order has been agreed (REP280, paragraph 3.2.4). We are satisfied therefore that the brine discharge pipeline proposal is adequate.

**Wash Water Pipeline**

6.59 The wash water pipeline would be 1.8km long, 900mm external diameter between the seawater pump station at the Fleetwood Fish Dock and the booster pump station (APP27, paragraph 1.2.1). It would require a crossing of the Wyre Estuary, one minor road (APP27, paragraph 1.6 and APP9, drawing number A-9000-001). There are no specific issues regarding the pipeline. The river crossing is discussed below.

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\(^{16}\) Blackpool Transport Services Ltd, is the operator of the Tramway as the Councils agents. Blackpool Council is the statutory undertaker.
**Wyre Estuary Crossings**

6.60 Both the brine pipeline and the wash water pipelines would cross beneath the Wyre Estuary at the north river crossing, along with two 11kv electrical cables. There would also be a southern river crossing to enable two 132kv electrical cables to cross from Stanah Switchyard to the GCC.

6.61 The construction methodology for both river crossings would be by using trenchless technology to ensure an environmentally acceptable means of crossing the Estuary (APP17, page 39). We were concerned that the draft Order (APP22, Schedule 1, Work No 12, 13 and 14) could have been interpreted to allow that the crossings could be undertaken either by trenchless or open trench methods. We also noted some inconsistencies regarding the proposed location of the drilling rig at the southern river crossing in the application drawings. The Applicant confirmed that the southern drilling rig would be on the west bank (REP203, response to Q4/1). The Order has been modified to ensure that only trenchless technology can be used (REP281, Schedule 1 Work No 12, 13 and14).

6.62 In conclusion, we are satisfied about the pipeline routes, and the methodology for pipeline construction provided for in the Order, subject to the discussion on noise from the drilling compounds discussed below (paragraphs 6.67 to 6.81). We see no reason therefore why the Order should not be made on account of these matters.

**BRINE DISCHARGES TO THE IRISH SEA**

6.63 Several local residents, fishermen and their representatives submitted representations regarding the proposals for discharging brine extracted from the caverns to the Irish Sea as part of the solution mining process. The application proposes a pipeline from Rossall extending to a point 2.3km westwards where brine would be discharged at the seabed through two diffusers. Concern was expressed about the potential for concentrations of brine to adversely impact on water quality and in turn the health of the local fish stocks. These issues are explored in the ES (APP17, Chapter 8) which concludes that any impact would be very small. We asked a question at the outset of the examination in order to explore this issue further (PD2).

6.64 The EA granted a consent in connection with the previous planning application in 2007 to permit the discharge of brine of up to 80,000m³ per day at this location in the Irish Sea, subject to conditions governing the quantity and content of the brine, including its salinity and presence of other elements. This was amended by the EA in 2011 to update the effective start date, and is therefore valid for this application for development consent (see paragraph 1.10 of this report). Representations were made
requesting that the Agency should reconsider the discharge consent, but the response to our question is that the Agency does not consider there have been any changes since the intention to grant the discharge consent to warrant a reassessment (REP177).

6.65 We understand and appreciate these concerns about the potential for threatening the integrity of fish stocks in the Irish Sea, and the small inshore shellfish industry, but we are satisfied there is no evidence to suggest that the impact of brine discharge will be perceptible beyond 50m of the end of the brine discharge pipeline.

6.66 Given this and the clear advice in NPS EN-1 at paragraph 4.10.13, we are satisfied that the measures necessary to ensure that the arrangements for brine discharge to the Irish Sea including the requirements for monitoring, are matters for the EA to consider and regulate through the discharge consent.

**NOISE**

6.67 The analysis in the Applicant’s ES of noise impacts arising from the UGS facility indicates that there would be some limited impact during construction and little effect during operation (APP17, Chapter 12).

6.68 The ES proposed fixed noise levels for construction activities. However, the draft Order submitted with the application (APP22) does not include these noise levels as the Applicant had subsequently agreed with WBC that:

‘the approach adopted would be to consider construction activities individually rather than adopting fixed noise limits. This would allow the specific nature of the activities and the environment of the site to be taken into account. The criteria would be based on BS5228, Code of Practice for Noise and Vibration Control on Construction and Open Sites (2008) and include the use of section 61 consents’

The Order provides for a written scheme for noise management to be approved by WBC for each stage of the works (Requirement 26).

6.69 SoCG7 covering noise and vibration and agreed between the Applicant and WBC states that the:

- methodology of the approach to noise and vibration assessment is considered appropriate and agreed
- baseline information is considered appropriate and agreed
- mitigation and enhancement measures are agreed (subject to the construction methods and mitigation measures taking into account particularly sensitive receptors including the new residential development at Harbour Village, Rossall Hospital and caravan parks along the Wyre Estuary)
assessment findings are agreed (potential effects as a result of the project without mitigation and enhancement measures) and residual effects (with proposed mitigation measures).

6.70 Few representations were made about noise concerns, and indeed WBC confirmed in its LIR that it was satisfied to leave the question of noise control to subsequent stages in the design and construction process (REP194, paragraph 13.12). However, WBC’s position became less certain when considering these requirements at the IS hearing on 18 September 2012.

6.71 We took the view that some matters needed clarification, particularly concerning the impact of construction noise on the residential development currently underway adjacent to the Fish Dock in Fleetwood (Harbour View) and the residential caravan parks adjacent to the Stanah Switchyard. Both of these locations would be affected by the construction of the pipelines and cables under the River Wyre.

6.72 In the first case, this would be to construct pipelines to carry seawater from the pump station in the Fleetwood Fish Dock under the Estuary to the booster pump station adjacent to Hackensall STW and brine in the return direction, together with two 11KV electrical cables. In the second, it would be to construct two pipelines under the Estuary to carry 132kv electrical cables from the Stanah Switchyard to the GCC. As detailed in the Applicant’s ES (APP17, Chapter 12), both Estuary crossings would require drilling compounds to be set up on the river banks, and would involve 24 hour working over extended periods (up to 12 weeks). These drilling compounds would be immediately adjacent to properties in Harbour Village and close to residential caravans.

6.73 We therefore asked a series of questions to understand the calculation of the construction noise effects at these two locations and the intended method of constructing the river crossings. This was to be sure about any night time construction intentions, the seasonal programme for the construction and the impacts on the residents of Harbour Village and the caravan parks near Stanah (Kneps Farm Holiday Park and Flints Caravan Park).

6.74 Despite the Applicant’s answers to our written questions and our questions raised at the IS hearings, we remain dissatisfied that the impacts of noise of 24 hour construction on residents (Harbour Village immediately adjacent to the northern River Wyre crossing and in the residential caravans adjacent to the southern River Wyre crossing) have been adequately addressed.

6.75 The draft Order had originally allowed for the operation of the drilling compounds at the north and south river crossings on a 24 hour basis (APP22). Subsequent to our questions, the Applicant revised the proposed working methodology to day-time working only in Order versions 2 to 4 (REP277, REP278 and REP279).
6.76 However, in the 5th version of the Order (REP280) the Applicant introduced noise limits under Requirement 26(6) and 26(7) for the nearest occupied residential property or caravans at Harbour Village, Kneps Farm Holiday Park and Flints Caravan Park:

- 60dB LAeq,1h; between 7am and 7pm
- 55dB LAeq,1h; between 7pm and 11pm
- 42dB LAeq,1h; between 11pm and 7am.

We questioned the reason for the apparent inconsistency as the requirement would now specifically provide for noise limits during night time drilling (PD26). We were advised that the revision is to provide for the reaming process, a particular engineering activity which enables the tubing to be pulled back through the pilot hole. The Applicant expects the reaming to be a 24 hour process for the river crossings, which will last for one night for each conduit, and therefore there would be a total of six nights working required (REP281, page 9 in covering note).

6.77 The Applicant also proposed new sub-clauses to Requirements 26(8) and 26(9), about which, in view of the late addition, we have not had the opportunity to question either WBC or the Applicant:

- Requirement 26(8a) allowing for the relaxation of the noise level at night, between 7pm and 7am, to 55dB LAeq,1h with the approval of WBC

We consider that this effectively negates the 42dB LAeq,1h noise level established in sub-clause 26(6c) and 26(7c)

- Requirement 26(8b) allowing for the relaxation of the noise limits to 70dB LAeq,1hr for a short duration, for construction or demolition activities, with the approval of WBC

No definitions for “short duration” or working hour limitations are given, so again we consider that this negates the noise levels given in Requirement 26(6c) and 26(7c)

- Requirement 26(9): in respect of requests to WBC for permission to extend the night time working noise level to 55dB LAeq,1h, it would not be reasonable for WBC to withhold its agreement if the Applicant has shown that the works would facilitate the effective and expeditious carrying out of the specified activities and that WBC may have regard to the number of times that the Applicant has requested the agreement and the duration of the works.

We do not consider that the frequency of asking for such a dispensation should have any bearing on whether it is granted.

6.78 Our conclusion on this matter is that these additional sub-clauses are unnecessary, given that the night time working is meant to be a one night only activity for the reaming of each river crossing (i.e.
a total of six nights) and the Applicant will have the ability to seek variations from WBC as the relevant planning authority as required in any event.

6.79 The Order also includes restrictions on scheduling with regards to the crossings under the Wyre Estuary, so that site compound creation may only take place from April to August and the excavation and drilling may only be undertaken from May to July (Requirement 37). These restrictions have been included for the protection of birds as described in paragraphs 6.106 et seq below; we consider that these are acceptable.

6.80 Rossall Hospital would be close to the construction activity for the brine pipeline and within 100m of the sea wall crossing. We are concerned about the impact of vibration from piling on the operational and care activities in the hospital. In answer to our question, the Applicant confirmed that Best Practicable Means (BPM) would be adopted and use of piling rigs that produce lower levels will be investigated (REP203, response to Q4/4). There would be no significant effect on operational and care activities in the hospital as a consequence. We consider that use of BPM in conjunction with the noise management approval process provided for in Requirement 26 is acceptable.

6.81 In conclusion, we consider that the mitigation of noise impacts is now adequately provided for in the Order, except that sub-clauses Requirement 26(8) and Requirement 26(9) should be deleted.

HABITATS REGULATION ASSESSMENT AND ECOLOGY

6.82 The matters addressed in this section are:

- the potential implications for sites designated under European directives
- the potential implications for Sites of Special Scientific Interest (SSSI)
- European Protected Species (EPS) licensing issues, and
- nationally protected species licensing issues.

Potential Implications for European Sites

6.83 Turning first to the European context, the UK is bound by the terms of the Habitats Directive, Birds Directive and the Ramsar Convention. The aim of the Habitats Directive is to conserve natural habitats and wild species across Europe by establishing a network known as Natura 2000 sites. These sites comprise Special Areas of Conservation (SACs), candidate SACs, (cSACs) and Special Protection Areas (SPAs). In addition, Government policy applies the same protection to internationally important wetlands (Ramsar sites) and to possible or proposed or SPAs and Ramsar sites for the purpose of considering development proposals which may affect them.
6.84 NPS EN-1 gives guidance on the matters concerning the Habitats Regulations\(^{17}\) which should be considered when examining an application. Regulation 61 states that if a proposed development is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans and projects), and is not directly connected with or necessary to the management of the site, then the competent authority (in this case the Secretary of State) must make an appropriate assessment of the implications for that site in view of its conservation objectives. The purpose of this section therefore is to provide advice to the Secretary of State about the information the Applicant has provided concerning Habitats Regulation Assessment (HRA) matters.

6.85 The Planning Inspectorate’s Advice Note 10\(^{18}\) summarises a four stage process of (HRA) which should be followed to ensure that sufficient information is available to support the competent authority in satisfying the Habitats Regulations. The first stage of the HRA process is screening to determine if significant effects, alone or in combination with other projects, are likely to occur. If no likely significant effects are identified, and the competent authority agrees that this is the case, then no further action is required and consent may be granted. However, the competent authority may decide appropriate assessment is required (stage 2). If this results in a negative assessment, consent will only be granted if there are no alternative solutions (stage 3) and there are Imperative Reasons of Overriding Public Interest (IROPI) for the development and compensatory measures have been secured (stage 4).

6.86 Amending Regulations\(^{19}\) came into force on 16 August 2012 which place new duties and obligations on the Secretary of State and the relevant conservation bodies to enhance the protection of habitats. We sought confirmation from the relevant IPs\(^{20}\) whether in their view, and if so how, these amendments to the Habitats Regulations affect the representations that they had previously made on this application (PD20).

6.87 The Applicant confirmed that the amendments did not have any effect on the documents submitted in support of the Application, or any representations made (REP313). NE (REP312) and the MMO (REP310) confirmed that they did not have any additional representations to make, whilst Lancashire Wildlife Trust deferred to the advice of NE (REP311).

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\(^{17}\) Conservation of Habitats and Species Regulations 2010 (SI 2010/490)
\(^{18}\) Advice Note Ten: Habitats Regulation Assessment relevant to nationally significant infrastructure projects October 2012
\(^{19}\) Conservation of Habitats and Species (Amendment) Regulations 2012 SI 2012 (No. 1927)
\(^{20}\) the Applicant, NE, MMO, EA, Lancashire Wildlife Trust, WBC, and LCC
**Screening undertaken by the Applicant**

6.88 The Applicant used a 10km radius to identify the European sites to be screened into the HRA assessment, which are:

- Liverpool Bay SPA; 1.1km from the nearest feature of the project, the diffuser outlet of the brine pipeline
- Morecambe Bay SAC; 2.7km from the diffuser outlet of the brine pipeline
- Shell Flat and Lune Deep cSAC; 2.5km from the diffuser outlet of the brine pipeline
- Morecambe Bay SPA; the pipes and cables would run under the Wyre Estuary, part of this SPA
- Morecambe Bay Ramsar; the pipes and cables would run under the Wyre Estuary, part of this Ramsar site.

6.89 The location of these European sites and the detailed analysis of the likely impact of the project on them are set out in two reports submitted as part of the application:

- Morecambe Bay SAC, Liverpool Bay SPA, Shell Flat and Lune Deep cSAC sites (APP12)
- Morecambe Bay SPA and Ramsar sites (APP13).

6.90 These reports conclude that the project, either alone or in combination with other plans or projects, would not result in likely significant effects on any of the European sites and therefore that an appropriate assessment is not required.

6.91 Subject to the finalisation of the LEMSP (see paragraphs 6.108 and 6.109 below) and the proposed Order requirements to ensure delivery of agreed avoidance and mitigation measures, NE has confirmed that they agree with the Applicant’s conclusion (SoCG2, paragraphs 3.1.21 and 4.1.37).

**The Applicant’s assessment of likely significant effects on the European sites**

**Liverpool Bay SPA**

6.92 Liverpool Bay SPA is an entirely marine site and has no component SSSIs. The site is designated for over wintering populations of red-throated diver and common scoter (APP17, Appendix 9.17).

6.93 The screening assessment has assumed that the installation of the brine outfall pipeline would be timed to be undertaken between the months of April to July during the period when red-throated divers and common scoters are highly unlikely to be present (APP12, paragraph 7.2.3).

6.94 However, NE considers that there is potential for these species to be disturbed by construction boat traffic arising from the installation of the brine pipeline. This could be adequately avoided
through measures to control vessel movements (SoCG2, paragraph 3.1.13). Schedule 7 of the draft DCO is the deemed marine licence (REP281) and contains a proposed condition 19 for the provision of an agreed vessel movement plan which would ensure this.

6.95 NE confirms that it agrees with the conclusion reached by the Applicant, that there are no significant effects on the features of Liverpool Bay SPA either alone or in combination with other plans or projects (SoCG2, paragraph 3.1.21). This is subject to the mitigation and monitoring outlined in Chapter 8 of APP12 and the water quality monitoring proposals that would be undertaken in accordance with the provisions of the brine discharge consent issued by the EA in 2007 (APP18, Appendix 2.1).

Morecambe Bay SAC

6.96 Morecambe Bay SAC forms the largest single area of continuous intertidal mudflats and sandflats in the UK. It is underpinned by five component SSSIs including the Wyre Estuary and Lune Estuary.

6.97 The Applicant has identified that the release of sediment during the installation of the pipeline would not be expected to adversely affect the habitats of Morecambe Bay SAC (APP12, paragraph 7.1.4). The release of brine solution into the Irish Sea is likely to have a localised effect on marine habitats and associated fauna, and lethal concentrations of saline for plankton (>40psu\textsuperscript{21}) are predicted to occur only within 50m of the discharge point. The Applicant anticipates therefore that just a very small proportion of plankton moving between the Liverpool and Morecambe Bays would pass through lethal concentrations of brine (APP12, paragraph 7.1.12).

6.98 The Applicant concludes that the proposed development would not have a significant effect on Morecambe Bay SAC either alone or in combination with other plans or projects (APP12, paragraph 7.1.13). NE agrees with this conclusion subject to the same provisions as set out in paragraph 6.95 above (SoCG2, paragraph 3.1.21).

Shell Flat and Lune Deep cSAC

6.99 Shell Flat is a large sandbank located at the mouth of Morecambe Bay, and Lune Deep is a reef habitat located within a deep water channel. The Applicant has identified that the release of brine solution into the Irish Sea from the discharge point is likely to have a localised effect on marine habitats and associated fauna. As Shell Flat and Lune Deep cSAC is located approximately 2.5km from the brine outfall discharge point and the brine plume modelling has

\textsuperscript{21} Practical salinity units. The ES states that a salinity level greater than 40psu is considered lethal to most marine organisms (APP17, Chapter 9, paragraph 9.3.33).
identified limited current flow to the west, the Applicant has determined that it would be extremely unlikely that the brine plume would reach Shell Flat and Lune Deep cSAC (APP12, paragraph 7.3.6). In addition, the modelling predicts that the dilution effects would reduce the salinity to 40psu, within 50m of the proposed brine diffusion outlet (APP12, paragraph 7.3.8 and APP17, paragraph 9.3.34).

6.100 The Applicant concludes that the proposed development would not have a significant effect on Shell Flat and Lune Deep cSAC either alone or in combination with other plans or projects (APP12, paragraph 7.3.11). NE agrees with this conclusion subject to the same provisions as set out in paragraph 6.95 above (SoCG2, paragraph 3.1.21).

Morecambe Bay SPA

6.101 Morecambe Bay is a wetland of international importance and qualifies as a SPA by supporting populations of:

- little tern and sandwich tern, herring gull and lesser black-backed gull during the breeding season
- ringed plover and sanderling on passage
- bar-tailed godwit, golden plover, curlew, dunlin, grey plover, knot, oystercatcher, pink-footed goose, pintail, redshank, shelduck, and turnstone over winter
- seabirds and waterfowl, including black-tailed godwit and teal.

It is underpinned by six SSSIs including the Wyre Estuary and Lune Estuary.

6.102 The location of the project in relation to Morecambe Bay SPA is shown on figures 1a and 1b in APP13. Whilst all of the above ground infrastructure would be located outside of the SPA, several of the UGS caverns would be created under the salt marsh habitats. The fields within agricultural use to the east of the salt marsh are also used by foraging and roosting bird species associated with the SPA, and these areas are referred to as functionally-linked land. In addition, pipe crossings would be installed under the Wyre Estuary, which forms part of Morecambe Bay SPA, in two separate locations as shown on Sheet 2 of figure 9.1, APP20.

6.103 NE identified that black-tailed godwit and teal had been missed from the Applicant’s screening assessment. In response, the Applicant provided additional mapped information on the location of roosting and feeding areas used by these qualifying bird species and NE has confirmed that it is satisfied with the information provided (SoCG2, paragraph 4.1.9). As the species black-tailed godwit and teal are also designated features of Wyre Estuary SSSI, further detail is provided in paragraph 6.118 below when considering the potential implications of the project on this site.
6.104 NE considered that the proposed pipelines and cabling routes lying underneath the Wyre Estuary have the potential to affect Morecambe Bay SPA (and Ramsar) sites. However, the proposed methods of working, including directional drilling, and location of drilling sites and construction activities would adequately avoid damage to designated habitats subject to these being secured in the Order requirements (SoCG2, paragraph 4.1.23).

6.105 The Applicant has identified that there would be no loss of designated habitats within Morecambe Bay SPA, nor significant effects on feeding pink-footed geese as a result of the permanent and temporary loss of functionally-linked farmland. This is because of the amount of alternative suitable habitat available (SoCG2, Appendix A, paragraph 11.1.6).

6.106 However, disturbance/displacement of a significant number of pink-footed geese using the functionally-linked land is anticipated due to the following construction works:

- construction of wellheads 2, 3, 4 and 6
- drilling caverns from the wellheads
- construction of the booster pump station, control centre and de-brining facility and associated infrastructure
- construction of the GCC and electrical sub-station and associated infrastructure (APP13, paragraph 9.3.2).

6.107 This disturbance/displacement is anticipated to last for the duration of the cavern creation (up to 8 years) and to extend to a distance of 500m from the works activities (APP13, paragraph 9.1.27). Up to 4,000 geese use the fields adjacent to and surrounding Morecambe Bay SPA between mid-September to late March/early April (APP13, paragraph 7.3.74). This represents a significant proportion of the site’s population of pink-footed geese and therefore without mitigation there is the potential for a significant effect (APP13, paragraph 9.1.29 and SoCG2, paragraph 4.1.19).

6.108 The mitigation measures proposed by the Applicant are described within the draft LEMSP and have been revised during the course of the examination (see paragraph 6.28 above). The LEMSP would ensure that sufficient replacement foraging areas are in place in advance of construction and operational works likely to cause disturbance/displacement to pink-footed geese and to provide compensation to tenant farmers, as necessary, for the loss of revenue associated with the loss of crops (SoCG2, Appendix A, paragraph 11.1.10).

6.109 NE agrees with the conclusion reached by the Applicant that there are no significant effects on the features of Morecambe Bay SPA either alone or in combination with other plans or projects, subject to the finalisation of the LEMSP and the proposed Order requirements (SoCG2, paragraph 4.1.37).
Morecambe Bay Ramsar site

6.110 Morecambe Bay is also designated as a Ramsar site which covers the same area as Morecambe Bay SPA. Concern raised by NE about the proposed pipelines and cabling routes lying underneath the Wyre Estuary potentially affecting the Ramsar site is discussed above in relation to Morecambe Bay SPA (paragraph 6.104).

6.111 The Applicant’s assessment of the potential significant effects on Morecambe Bay Ramsar site cover:

- temporary and permanent loss of foraging/roosting habitat within the functionally-linked land for over wintering pink-footed geese during construction and operation of the proposed development
- mitigation measures proposed in the form of the LEMSP.

These are considered above (paragraphs 6.106 to 6.109).

6.112 NE has confirmed that it agrees with the conclusion reached by the Applicant, that there are no significant effects on the features of Morecambe Bay Ramsar site either alone or in combination with other plans or projects, subject to the finalisation of the LEMSP and the proposed Order requirements, i.e. as in paragraph 6.109 above.

The Panel’s Assessment

6.113 We have considered carefully the information relating to the HRA provided by the Applicant and IPs. Taking account of the evidence in the ES, the Applicant’s reports APP12 and APP13 and the agreed SoCGs between the Applicant and the nature conservation bodies, particularly NE, we conclude that no likely significant effects will result from the project on the Morecambe Bay SAC, Liverpool Bay SPA, Shell Flat and Lune Deep cSAC, or Morecambe Bay SPA and Ramsar sites. Subject to the Secretary of State as the competent authority agreeing with this conclusion, there is therefore no need for an appropriate assessment.

6.114 In reaching this recommendation, we have taken into consideration the additional duties placed on the Secretary of State under Regulation 9 and 9A of the Habitats Regulations.

Potential Implications for SSSI

6.115 Section 28I of the Wildlife and Countryside Act 1981 (WCA)\(^{22}\) imposes procedural obligations requiring the relevant nature conservation body, in this case NE, to be notified before a decision is made if operations authorised by the grant of a consent are likely to damage the special interest features of a SSSI.

\(^{22}\) as amended by the Countryside and Rights of Way Act 2000 in relation to SSSI
The designated sites potentially affected by the proposed development are shown in the ES (APP20, figures 9.1 and 9.2):

- Wyre Estuary SSSI is an integral part of the Morecambe Bay complex of estuaries and shore which underpins the Morecambe Bay SAC, SPA and Ramsar sites; it is noted for wintering and passage black-tailed godwit, wintering turnstone and for wintering teal in times of hard weather
- Lune Estuary SSSI is notified for its extensive sand/silt flats together with saltmarsh in the form of a number of discontinuous saltings fringing the Estuary and wintering species assemblage; the site forms part of the Morecambe Bay intertidal system and underpins the Morecambe Bay SAC, SPA and Ramsar sites
- Winmarleigh Moss SSSI is the largest area of lowland raised mire remaining in Lancashire; the main vegetation types are heather and purple moor-grass dominated mire over deep peat, birch scrub and birch woodland, and the site also supports a number of rare insect species.

**Wyre Estuary SSSI**

6.117 In response to the Panel’s initial questions (PD2), NE confirmed that for the purposes of the WCA, the project is not likely to damage the interest features of the Wyre Estuary SSSI. NE is satisfied that there are no additional SSSI features which are separate from and different in nature to the SPA features that require additional mitigation measures (REP202).

6.118 NE identified that overwintering black-tailed godwit and teal may be potentially affected by disturbance caused during drilling of the caverns and construction of the booster pump station. Although the drilling would take place within 200m of areas known to be of value to roosting and feeding birds, mitigation is proposed at the wellhead compounds to screen all vehicle and site personnel movements. The assessment also concludes that these species would not be disturbed by the physical presence of plant and site personnel (SoCG2, Appendix A).

6.119 We are of the view that the mitigation measures agreed in the context of considering the Morecambe Bay SPA and Ramsar sites at paragraphs 6.109 and 6.112 would avoid the risk of disturbance to the designated features of Wyre Estuary SSSI. We conclude therefore that there would not be damage to the protected features of the Wyre Estuary SSSI and thus notification under the WCA is not required for this designated site.

**Lune Estuary and Winmarleigh Moss SSSIs**

6.120 No potential impacts on the Lune Estuary SSSI and the Winmarleigh Moss SSSI were identified in the ES as these sites are located over 750m from the application site boundary (APP17,
Table 9-8). NE confirmed that the Lune Estuary would not be affected by potential impacts arising within and adjacent to the Wyre Estuary as construction of the sea outfall and discharge of hyper-saline solution into Liverpool Bay is too distant to affect the Lune Estuary SSSI (REP202).

6.121 In relation to the Winmarleigh Moss SSSI, NE confirmed that there is no obvious mechanism whereby the project might cause any drainage effects that would damage the integrity of the site. NE considers that for the purposes of the WCA, the project would not damage the interest features of the Winmarleigh Moss SSSI (REP202).

6.122 We conclude therefore that there would not be damage to the protected features of the Lune Estuary and Winmarleigh Moss SSSIs and thus notifications under the WCA are not required for these designated sites.

**Protected Species Licensing Considerations**

**European Protected Species (EPS)**

6.123 The Applicant and the IPs, including the statutory nature conservation bodies, have not identified a need for an EPS with respect to marine mammals. EPS licences are required with respect to bats (for works affecting known roosts) and great crested newts (for works affecting their terrestrial habitat). Draft licence applications were submitted to NE but not granted by the close of the examination.

6.124 However, NE issued letters of comfort on 18 October 2012 in relation to both draft licence applications confirming that the derogation tests of no satisfactory alternative and IROPI would be met in both cases, subject to granting the Order (REP281, Appendices 18 and 19).

6.125 Given the available evidence, the Panel as the ExA therefore recommends that the Secretary of State may conclude that there is no reason why the Order should not be made in relation to EPS. In reaching this recommendation, we have taken into consideration the duties placed on the Secretary of State under Regulations 9 and 53 of the Habitats Regulations.

**Nationally Protected Species**

6.126 Cetaceans and barn owl are nationally and some internationally protected species which have been identified as key ecological receptors in the ES (APP17, Chapter 9). Disturbance from noise and indirect effects on food resources are potentially significant effects on cetaceans. The predicted loss of a barn owl nesting site has been identified as a potentially significant effect, and additionally foraging habitat may be lost during the construction
and the construction and operation combined phases of the project.

6.127 The ES determines that the effects of noise and the effects on cetacean food resources resulting from the project would not be significant. The loss of a known barn owl roosting site would be, at the worst-case, significant at the district/borough level. However, loss of foraging habitat is not significant. No specific concerns in relation to these receptors have been expressed by the relevant consultees, in particular NE or the MMO.

6.128 An outlying badger sett has been recorded during the ecological surveys. The ES states that measures will be taken to avoid disturbance to this sett. However, temporary disturbance to badgers occupying the sett may occur and would require mitigation (under licence from NE). Water vole are reported as being absent from the study area, however it is recognised in the ES that should this species re-colonise habitats within the vicinity of the development that mitigation will be required (APP17, Chapter 9). No specific concerns in relation to these receptors have been expressed by the relevant consultees, in particular NE.

6.129 Given the available evidence, the Panel as the ExA therefore recommends that the Secretary of State may conclude that there is no reason why the Order should not be made in relation to nationally protected species.

**DISPOSAL OF INSOLUBLE WASTES IN BW123**

6.130 In the HRA for Morecambe Bay SPA and Ramsar, the Applicant proposes the use of an existing underground cavern for the disposal of insolubles from the de-brining facility (APP13, paragraph 3.5.2). The Applicant’s Construction Report states that the intended brinewell to receive the insolubles is BW123 (APP33, paragraph 3.20).

6.131 However, BW123 is located immediately adjacent to the Wyre Way, and just outside the boundary of the Morecambe Bay SPA and Ramsar site, and the Wyre Estuary SSSI. Any spillages or brine overflows could have significant environmental effects. No details of the proposals were included in the application and no information was given concerning any application for a Waste Recovery Permit.

6.132 We raised the matter as an issue in our first round of written questions. The Applicant confirmed that the anticipated volume of waste to be disposed is 267,700m³, whereas BW123 (which is currently full of brine) has a volume of 278,500m³, i.e. just adequate for the anticipated waste volume (REP203, response to Q6/1). Slurry will be pumped from the debrining pond at the booster pump station to BW123 and the displaced brine from
BW123 will be returned for discharge to the sea outfall (REP203, response to Q6/1ii and Q6/1iv).

6.133 No details of the equipment needed are given in the application; however the Applicant confirmed at the IS hearing on 18 September 2012 that the authority to construct the slurry and brine return pipelines was contained in the pressure pipelines referred to in Work 21 of Schedule 1 of the Order. There would be isolation and bypass valves and instrumentation at the wellhead, but no pumps (REP207, paragraph 5.146); therefore, visual impact would be minimal.

6.134 The Applicant has written to the EA setting out the proposed permitting approach (REP203, response to Q6/2 and REP203, Appendix 36). The EA’s response confirms that they expect to receive a Waste Recovery Plan submitted with the permit application which will cover BW123 (REP203, Appendix 37).

6.135 We have considered the Applicant’s responses and the EA letter and are satisfied that the issues with regard to disposal of insoluble wastes in BW123 have been suitably addressed.

ACCESS

6.136 Traffic volumes during construction and particularly once operational would be very low, despite the representations suggesting that construction traffic would create a substantial adverse impact (REP203, answers to Q7/2, Q7/3 and Q7/4).

6.137 Access is required to a number of temporary construction compounds on both sides of the Estuary, for example to the sea wall construction site at Rossall, the seawater pump station in the Fish Dock, the GCC and to enable the construction of pipelines under roads. These are straightforward, and no representations have been received about them.

6.138 Gravel tracks are proposed between the wellheads and the GCC in order to provide for vehicular access needed to service the wellheads. There are no traffic issues arising from these, rather the impact is on the open countryside.

6.139 The main access proposal is construction of a permanent new access road from the A588 south of Cemetery Lane crossing Back Lane to the proposed service building at Higher Lickow Farm, and thence to the GCC. This would enable construction traffic to access the main area for cavern construction directly. It would replace an existing substandard and dangerous junction at Cemetery Lane and the A588. The intention is that this new access road would be maintained permanently during operation.

6.140 It is apparent that part of the justification for this new access road arises from consideration of previous proposals when LCC expressed concern about access arrangements (APP20, Appendix
16). Whilst a safe and secure means of accessing the main site during construction is accepted, we questioned whether such a new road needs to be kept permanently between the A588 Hall Gate Lane and Back Lane. It would be a new and raw intrusion in the existing rural landscape, and would have a direct impact in terms of land take on properties to the south of Cemetery Lane, particularly Fernacre and Park Cottage. It would also be provided with low level lighting to cater for emergency operation and would be fenced along its length to prevent livestock entry (APP29).

6.141 Although a private road, it does not appear to be the intention that it would be fenced at either end, and indeed the Order provides for LCC as highway authority to adopt this new road in due course if it so chooses. The section of the road from Back Lane to the GCC essentially replaces Monks Lane as a private secure road to service the new development exclusively.

6.142 However, the alignment of the proposed new access road is also that of the main gas interconnector pipeline from the GCC to the NTS at Nateby, so land rights are required in any event and arrangements will be necessary to access the pipelines for maintenance if necessary. In these circumstances, we conclude that the advantage of requiring the access road between Back Lane and the A588 to be removed once construction is complete would be limited. But this is provided it is adopted as public highway as provided for in the Order so that the existing difficult 4 way junction at Cemetery Lane/A558 can be properly improved. This is therefore the assumption upon which we have reached our conclusion on this matter.

6.143 Turning to the adequacy of the designated routes for HGV traffic, we are satisfied that the s106 agreement provides for this to be monitored, and for the Applicant to provide an HGV routeing plan (REP281, Appendix 24).

6.144 In reaching our conclusions on access arrangements and traffic impacts, we have had regard to the SoCGs agreed with LCC as the local highway authority and the Highways Agency (SoCGs 6 and 24). We see no access and traffic grounds for the Order not to be confirmed.

RIGHTS OF WAY

6.145 There are no proposals to permanently close any footpaths or bridleways, but the Applicant proposes the following temporary closures or diversion of public footpaths as shown on figure 1.35, APP19:

- Footpath 12, on the sea wall at Rossall to be closed for 12 weeks for installation of the of the brine discharge pipeline
- Footpath 42 (Wyre Way) to be partly diverted (near the booster pump station) for three years during the construction period
- Footpath 61 (near Cote Walls Farm) to be closed for three years during the construction period and walkers diverted to FP42
- six week closure of footpath (unnumbered) along the western boundary of Fleetwood WwTW to allow for construction of brine discharge pipeline; walkers to be diverted to Jameson Road.

6.146 Other temporary short term closures are required for a number of footpaths and bridleways to allow for construction of the gas interconnector pipeline, the brine discharge pipeline and the electrical control cables. Footpaths and bridleways would be either diverted for a temporary period during construction or temporary management measures would be put in place to allow their continued use (APP29, paragraph 2.43).

6.147 We have reviewed the proposals for temporary diversions and agree that they are acceptable. Notwithstanding this, the impact of the development on the long term use of the Wyre Way (Footpath 42) is a concern to us, as it passes close to a number of the wellheads. This is discussed in more detail in the section of Chapter 5 of this report which assesses risks to residential properties and amenities.

BUILT HERITAGE AND ARCHAEOLOGY

6.148 In assessing the development, the regulations23 oblige us to consider the setting of heritage assets such as listed buildings and scheduled ancient monuments, and the desirability of preserving or enhancing the character or appearance of conservation areas. Paragraph 5.8.18 of NPS EN-1 provides that where development does not preserve the setting, the harm should be weighed against the benefits.

6.149 The ES (APP17, Chapter 7) contains a detailed assessment of archaeology and built heritage. It concludes that the project would not affect any scheduled ancient monuments or have any direct physical effect on listed buildings. A non-designated built heritage asset, Higher Lickow Farm, is currently derelict and would experience a positive effect as a result of the proposed refurbishment, provided it is carried out in a manner that is sympathetic to the character of the post-mediaeval farmstead.

6.150 The main potential effects would be on the setting of a small number of listed and non-listed buildings, direct physical effects on non-designated archaeological remains and marine sites. The built heritage assets which are located within the vicinity of the

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23 Infrastructure Planning (Decisions) Regulations 2010
proposed permanent above ground structures have the potential to experience permanent impact on their setting, although these will be minor.

6.151 The proposed development would not directly affect any heritage assets, as there are none on the site itself. The nearest heritage asset is Hackensall Hall, a Grade 2 listed building which lies immediately north of the application boundary within the Knott End golf course. No representations were received about heritage matters and SoCGs were agreed between the Applicant and English Heritage (EH) (SoCG31) and the LCC and WBC (SoCG30 and SoCG32) that impacts on heritage assets would not be significant.

6.152 We conclude therefore that there are no built heritage or archaeology issues in connection with this application which would argue against the Order being confirmed.

**SOCIO-ECONOMIC EFFECTS**

6.153 The Applicant has prepared a socio-economic impact assessment as required by NPS EN-1 section 5.12 (APP17, section 11.7). There were few comments from IPs about socio-economic matters. Neither LCC nor WBC raised any issues on socio-economic effects in their LIRs.

6.154 The SoCGs agreed with LCC and WBC (SoCG39 and SoCG40) list the principal socio-economic benefits stated by the Applicant, namely:

- the project will generate 200 to 300 FTE jobs during construction and 35 to 40 FTE jobs once operational
- where possible, opportunities will be provided for apprenticeships, graduate placements and young people not in education or training
- a Corporate Social Responsibility Fund will be established to promote and fund activities that support the sustainability of the local community (particularly safety, security, heritage and education)
- the Applicant will contribute a sum of £50k during year 1 and amount not less than this for each year of the construction period
- the observation platform on the sea wall at Rossall will offer benefits for those using the coastal path at this location.

6.155 We note that the Corporate Responsibility Fund was included in the draft Heads of Terms for the s106 agreement (APP31), but was excluded from the final version (REP281, Appendix 24) by mutual agreement between the Applicant and WBC.

6.156 We have assessed the proposals for the observation platform on the sea wall, and remain unconvinced of its benefits. However, we appreciate that the local authorities consider it as a benefit and
notwithstanding our views therefore conclude the proposal is acceptable.

6.157 Turning to the possible socio-economic disadvantages, the areas of greatest concern for a number of IPs were the impact of the development on house prices and tourism. However, paragraph 5.12 of EN-1 advises that limited weight should be given to assertions of socio-economic impacts that are not supported by evidence. In this regard assertions that house prices would be damaged, and tourism and local business would suffer have not been supported with factual evidence. Accordingly we take the view that these concerns should not attract significant weight.

6.158 We have reviewed the socio-economic impact assessment and conclude that there are no grounds to refuse the Order on the socio-economic impact of the proposals.
7 THE PANEL’S CONCLUSION ON THE CASE FOR DEVELOPMENT

7.1 As noted above at paragraph 4.4 the relevant NPSs were formally designated in July 2011. They provide the primary basis for decisions about NSIPs falling within their scope. Our conclusions on the case for development contained in the application before us are therefore underpinned by the advice therein.

7.2 NPS EN-1 requires the ExA to assess all applications for development consent:

‘on the basis that the Government has demonstrated that there is a need for (the types of infrastructure covered by the NPSs) and that the scale and urgency of that need is as described for each of them...’ (paragraph 3.13), and that the ExA ‘should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent under the Planning Act 2008’ (paragraph 3.14).

7.3 NPS EN -4 reaffirms the principle that the ExA:

‘should act on the basis that the need for infrastructure covered by this NPS has been demonstrated’ (paragraph 2.1.2).

7.4 Plainly, an understanding of the nature of the geology in which the proposed caverns for UGS would be constructed is essential. This is not only to ensure the safe operation of the facility, which we fully acknowledge is a matter for subsequent approval procedures within the COMAH Regulations, but to be satisfied that the development can indeed be constructed as proposed and that the scale of surface infrastructure is needed for the level of gas to be stored. As Chapter 5 notes, we considered the material presented in the application covering geology in some detail, and pursued this through a number of questions put to the Applicant. Many of the representations concerned the robustness of the geological case in one form or another and the PWG in particular concentrated much of their challenge to the application on understanding the Applicant's case in relation to geological evidence.

7.5 We accept that there is a considerable volume of historic material, including boreholes, seismic lines and a large number of data sources relating to the brinewells constructed as part of the salt extraction industry at Preesall. The Applicant's argument that this volume of material is far in excess of what has been required for other applications elsewhere in the country has to be set in the context of the three previous refusals for similar UGS proposals in Preesall, with geological matters at the heart of the grounds for refusal. Circumstances in other parts of the country may or may not be comparable to those found at Preesall; but our responsibility
is to ensure that the material presented for this application is sufficient to enable clear conclusions to be drawn and a recommendation made in the light of the complexity of the geology that we consider exists this in this case.

7.6 We commend the Applicant’s approach in drawing together all the existing geological material in the GSR which presents it in a comprehensive and intelligible manner. Adopting a sieve map technique of all known hazards to define two polygons free from such constraints where the construction of UGS caverns could take place is a logical methodology. However, the problem we kept coming back to is that the areas which are defined as a result of avoiding all known constraints are themselves areas where there is little hard data to confirm the Applicant’s contention that these are devoid of any major geological difficulties, particularly faulting, which would otherwise preclude cavern construction. To deal with this uncertainty the Applicant has taken the approach of developing an indicative design giving the number, location and shape of individual UGS caverns which could be authorised by the Order, and which could then be firmed up in detail as better information subsequently became available.

7.7 To our minds, the major difficulty with this approach arises if the subsequent detailed geological surveys show that (in contrast to the assumptions made in the 3D model) the two polygon area for cavern development are faulted, and the application of the separation distances in Requirement 6 preclude the construction of several caverns. In turn, this might lead to a situation where the volume of gas that could be physically stored is substantially less than that being applied for. In this eventuality the requirements for surface infrastructure, particularly the GCC, might be significantly less than contained in the application before us. Although we accept this is highly improbable, in extremis neither of the two polygons might be capable of cavern construction at all if faulting turned out to be a much more serious presence than that currently forecast.

7.8 We note that the project construction programme is over 8 years, the first three years for the supporting infrastructure and 8 years of cavern construction. Indeed, the brine pipeline, outfall and the two main pump stations would need to be constructed before starting the first cavern, because these are needed to dissolve the salt, form the caverns and dispose of the brine. The GCC and gas interconnector pipeline would be constructed by year 3, when the first caverns are put into operation, and while other caverns are still under construction. We are concerned that on this intended programme it is entirely feasible that all of the supporting infrastructure would be constructed before sufficient data was available to determine whether the design volumes for gas storage could be met in the polygons. Although there are provisions for decommissioning in such a situation of abandonment, the consequence would be unnecessary disruption for local people
during construction and whilst the abortive surface infrastructure was being removed.

7.9 The main disbenefit of the proposal in our view is the visual impact of the GCC, despite the best endeavours of the Applicant to site it in a location where it would be screened to a substantial extent, coupled with the proposals for landscaping and mitigation in the LEMSP. If the volume of gas which could eventually be stored underground is substantially less than currently predicted, it could well be that a smaller GCC structure would be needed, and hence the impact of the current proposals on the landscape could have been reduced if not avoided entirely.

7.10 We have no direct evidence about the relationship of the facilities required at the GCC and the volume of gas stored. But it is unlikely to be a linear relationship, and certain fixed elements of the plant will be needed irrespective of how much actual gas is being transmitted. However, the ES and the Design and Access Statement suggest that the size of the GCC in the present application is considerably smaller than that proposed for previous applications which had a much larger volume of gas intended to be stored (APP17, paragraph 2.1.6 and APP29, paragraphs 3.55 and 5.4). For this reason, we think it reasonable to conclude that if the maximum volume of gas which could be stored was much lower than that proposed in the application, then it would be possible to reduce the size and scale of the GCC accordingly.

7.11 Whilst recognising:

- that the application is for storage of gas up to a maximum working capacity of 600 Mcm
- the flexibility sought by the Applicant
- the nature of the interface between the development proposed to be approved by this Order and the subsequent detailed approvals within the COMAH Regulations

we conclude that reassurance is needed to put beyond reasonable doubt the suitability of the two polygons for construction of UGS caverns in the manner proposed to store at least a substantial proportion of the volume of gas for which the application is seeking approval. We consider that this is a step which should be taken immediately if the Order is confirmed as a prerequisite to construction of surface infrastructure. Our recommendation about how this could be achieved by a modification to the Order is set out in Chapter 9.

7.12 We have also looked in detail at the other related matters concerning geology, for example:

- the assessment of risks related to gas storage covering subsidence and crown hole collapse
- permeability of the halite
- wet rockhead pathways and wild brine runs
- the risk of seismic activity
- the risks associated with gas leakage to residential properties and to community amenities
- how emergencies would be dealt with.

We conclude that in view of the requirements of the COMAH Regulations which would need to be met, there is no reason to suggest the Order should not be confirmed on their account.

7.13 Turning to the impact of the development on the landscape, there are few issues relating to the western side of the Estuary, where apart from the seawater pump station in the Fleetwood Fish Dock, there is little surface development in any event. The main impacts on the eastern side of the Estuary are in the largely rural landscape, the scene of the historic brinewells. Whilst nearly all evidence of the plant associated with the former salt extraction industry has disappeared, this is a locality which has seen substantial industrial activity the past. Most of the surface infrastructure proposed for this application, i.e. the booster and seawater pump stations, pipelines and access tracks, can be accommodated without too much difficulty, though we consider the landscaping treatment to the proposed wellhead compounds could be improved within the powers of Requirement 4(3).

7.14 The main landscape issue in our minds is the GCC. We accept that the location ultimately chosen is required to properly service the wellhead compounds and that substantial attempts have been made to fit it into the landscape, and further mitigate views particularly from the Wyre Way and from the south. Nonetheless, this is a complex array of industrial plant much of which would be sited externally and in our view would create an intrusion in the local landscape however well screened it is. This is one of the principal reasons that we suggest the verification of the geology to enable the UGS caverns to be constructed, in order to fully justify the size and scale of the surface infrastructure as proposed. If that is achieved, with the safeguards provided by the requirements in terms of future landscaping details, and particularly the continuing refinement of the LEMSP, we are satisfied that the landscape and design disbenefits of the proposal do not outweigh the presumption of need.

7.15 The application was accompanied by a Flood Risk Assessment as required by NPS EN-1. An agreement has been reached between the Applicant and the EA to cover any impact on the existing flood protection embankments. We are satisfied therefore that these matters have been adequately provided for.

7.16 The project requires a network of pipelines both to connect the gas storage development to the NTS at Nateby, as well as to pump seawater to enable the caverns to be constructed, and return the saturated brine to the Irish Sea. Electricity supplies are needed
through underground cables from Stanah Switchyard on the western side of the Estuary to the GCC. We consider that the routes chosen for the pipelines and the proposed methods of construction are acceptable for the purposes of considering whether the Order should be made.

7.17 The project will require substantial volumes of brine to be discharged to the Irish Sea. Despite several representations against this proposal being made, the EA has extended the discharge consent granted in connection with a previous planning application to permit the discharge of brine at this location in the Irish Sea, and on that basis we see no reason to consider the proposed arrangements are unacceptable.

7.18 The approach adopted in the draft DCO submitted with the application to handling noise impacts during construction and operation is essentially to deal with these on a site by site basis as construction proceeds. However, we were concerned about the impact of construction noise on the residential development currently underway adjacent to the Fish Dock in Fleetwood and the caravan parks adjacent to the Stanah Switchyard. During the course of the examination, several modifications were suggested by the Applicant to the noise requirements in the Order, and at the conclusion amendments were proposed which to our minds appear to undo earlier understandings about the limits during night time drilling. For these reasons, we do not consider that amendments proposed by the Applicant to Requirement 26 should be made for reasons explained in Chapter 6, but that point apart, we conclude that noise mitigation is adequately provided for in the Order.

7.19 NPS EN-1 requires us to consider whether the project may have a significant effect on European sites. We conclude that in the light of the advice from NE there are no significant effects from the project on European sites, and if the Secretary of State as the competent authority agrees with this conclusion, no appropriate assessment is required. We have also carried out an assessment of the proposed development on SSSIs and concluded that notifications under the WCA are not required for these designated sites. As far as European and nationally protected species are concerned, we are satisfied that there are no major issues arising and we find no reason why the Order should not be confirmed in relation to these impacts.

7.20 Temporary construction compounds needed on both sides of the Estuary are normal consequences of construction activity and no particular issues arise about them. The new access road proposed to be constructed between the A588 and Higher Lickow Farm and thence to the GCC is the main change to access. The engineering advantages of this new access road are well appreciated, and indeed arose in part from considerations of access proposals in previous planning applications. LCC as the local highway authority are content with these arrangements, despite the landscape
impact. There are consequences for farming operations and individual landowners across whose land the new road would need to pass.

7.21 Traffic volumes during construction and particularly once operational would be low. The proposed means of providing a dedicated site access to deal with heavy construction vehicles offers the further advantage of keeping any traffic impacts of the project to very low levels. Similarly, there are few long-term alterations needed to the network of footpaths or their permanent diversion. There will be some impact of a temporary nature during construction, including diversion of the Wyre Way for a period of three years, but there are no proposals to permanently close or divert any footpaths or bridleways. We consider therefore the proposals to deal with rights of way are acceptable.

7.22 The project would not have any direct effect on a scheduled ancient monument or listed buildings or their setting. We conclude therefore that there are no built heritage or archaeological issues in connection with this application which would suggest the Order should not be confirmed.

7.23 Finally, there are limited socio-economic effects. Job creation during construction would be modest at 200 to 300 FTE jobs, and 35 to 40 FTE jobs once operational. We conclude therefore that socio-economic matters should have little bearing on whether or not the Order should be made.

OVERALL CONCLUSION ON THE CASE FOR DEVELOPMENT

7.24 NPS EN-1 advises that, subject to the provisions of s104 of the Act\textsuperscript{24}, the starting point for determination is a presumption in favour of granting consent to applications for energy NSIPs (paragraph 4.1.2).

7.25 In reaching our conclusions on the case for the proposed development we have had regard to the relevant NPSs, the LIRs submitted by LCC and WBC, and all other matters which we consider are both important and relevant.

7.26 We understand the deep-seated anxiety expressed by local residents and the fear they have of the potential consequences of UGS. It is compounded by the experience of having opposed three applications under the TCPA, albeit for larger scales of development and volumes of potential gas storage. This was expressed perhaps most forcefully by the three MPs whose constituencies cover or adjoin the area of the proposed development at the final session of the OF hearing held on 18 October 2012.

\textsuperscript{24} Including adverse impacts from the development not outweighing the benefits.
7.27 In our view, provided the Applicant can demonstrate that the suitability of the salt in the two polygon areas is as high as it is assumed for the purposes of the application, there is no reason to suppose that the stringent safety requirements which would be imposed upon the operation of the scheme by the Competent Authority under the COMAH Regulations would not lead to an entirely safe and stable UGS facility, examples of which exist in other parts of the UK, and indeed in much larger numbers elsewhere in the world.

7.28 Bringing all these matters together, subject to a major proviso concerning the procurement of more detailed geological data to confirm the ability of the two polygons to store substantial volumes of gas, we conclude that in development terms, the application for development consent should be granted. We suggest how this proviso can be dealt with in terms of a modification to the Order in Chapter 9.

25 As opposed to considerations relating to the compulsory acquisition of land and rights, considered in the next chapter.
8 COMPULSORY ACQUISITION MATTERS

THE REQUEST FOR COMPULSORY ACQUISITION POWERS

8.1 Compulsory acquisition powers are sought in respect of the whole of the land included in the Order and comprises land required for:

- 19 underground natural gas storage caverns
- wellhead compounds to accommodate the drilling rig
- wellhead gas manifold and distribution infrastructure to connect the completed caverns to the GCC
- an interconnector pipeline from the GCC to the NTS near Nateby
- water washing infrastructure to dissolve the salt and create caverns together with pumps and pipelines and drilling compounds
- seawater pump station and booster pump station
- new access road from the A588 to the main project site at Preesall
- brine discharge pipeline from the main project site to a point 2.3km offshore from Rossall to a two port diffuser
- two power communication control pipelines from Fleetwood Fish Dock to the main project site
- underground electricity cables from United Utilities switchgear at the Stanah Switchyard to the GCC
- modification to the sea wall at Rossall to accommodate the brine outfall and an observation platform.

The land in respect of which such powers are sought is described in this chapter as the CA Land.

8.2 The CA Land included in the Order is described in Chapter 3 of this report and also in clause 6 of the Statement of Reasons (APP24). The Book of Reference (APP26) identifies more than 200 plots of land and these are shown on the Land Plan, comprising 23 sheets (APP6). The application also includes a Funding Statement (APP25). Revisions to these documents where appropriate were submitted by the Applicant near the close of the examination (REP281, Appendices 1-4).

8.3 The powers sought include acquisition of:

- the whole of the freehold interest
- freehold interests more than 175m below the surface
- rights in land extending from and including the surface to 1000m below the surface
- rights for future maintenance
- rights to carry out works relating to landscaping and ecological works.
8.4 In addition, in relation to all the CA Land, save where the surface freehold is being acquired, the Applicant is also seeking powers for temporary possession and use of land. The reason for seeking these powers is to enable the Applicant to minimize the exercise of the powers of compulsory acquisition of land and rights and to allow land that is not required permanently for the project following completion of construction to revert to owners and occupiers.

8.5 Further, as mentioned in paragraph 8.7, Article 21 of the draft Order contains provisions relating to the overriding of easements and other rights in relation to the land.

8.6 A number of the plots comprise land in respect of which some protection against compulsory acquisition (including the compulsory acquisition of rights) is given by requiring that the land in question may be subject to special parliamentary procedure. This protection applies to statutory undertakers land, local authority land and open space land. The protection arises if objections are made by these bodies and not withdrawn. These plots are listed in Parts 1 and 5 of APP26. Also included in the Order are plots in which the Crown has an interest and these are listed in Part 4 of APP26. In addition to this protection, further requirements in relation to statutory undertakers land and open space land have to be met pursuant to the provisions of sections 138 and 131 respectively of the PA 2008.

8.7 The Order seeks to incorporate the provisions of the Compulsory Purchase (General Vesting Declarations) Act 1981 and also a provision relating to the overriding of restrictive covenants (Article 21) in similar terms to those set out in s237 of the TCPA 1990. Section 120(5)(a) of the PA 2008 provides that a DCO may apply, modify or exclude a statutory provision which relates to any matter for which provision may be made in the DCO. Under s117(4) if a DCO includes such provisions it must be in the form of a statutory instrument.

**What the Planning Act 2008 (as amended) Requires**

8.8 Compulsory acquisition powers can only be granted if the conditions set out in s122 and s123 of the PA 2008 are complied with. Section 122(2) requires that the land must be required for the development to which the DCO relates or is required to facilitate or is incidental to the development. In respect of land required for the development, the land to be taken must be no more than is reasonably required and be proportionate.26

8.9 Section 122(3) requires that there must be a compelling case in the public interest, which means that the public benefit derived from the compulsory acquisition must outweigh the private loss

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26 Guidance related to procedures for compulsory acquisition DCLG February 2010
which would be suffered by those whose land is affected. In balancing public interest against private loss, compulsory acquisition must be justified in its own right. But this does not mean that the compulsory acquisition proposal can be considered in isolation from the wider consideration of the merits of the project, and there will be some overlap. There must be a need for the project to be carried out and consistency and coherency in the decision-making process.

8.10 Section 123 requires that one of three conditions is met by the proposal. We are satisfied that the condition in s123 (2) is met because the application for the DCO included a request for compulsory acquisition of the land to be authorised.

8.11 A number of general considerations also have to be addressed either as a result of following applicable guidance or in accordance with legal duties on decision-makers:

- all reasonable alternatives to compulsory acquisition must be explored
- the Applicant must have a clear idea of how it intends to use the land and to demonstrate funds are available
- the purposes stated for the compulsory acquisition are legitimate and sufficiently justify the interference with the human rights of those affected.

The Approach of the Panel

8.12 With the whole of the application site being the subject of a request for compulsory acquisition powers in one form or another, we raised with the Applicant questions concerning drafting issues, Crown land, open space land, statutory undertakers land and the corporate structure of the various companies involved in the ownership of land at the proposed development site (PD2). In subsequent questions we sought evidence of the financial strength of the Applicant to meet all the compulsory acquisition compensation as well as other residual liabilities including decommissioning costs (PD13).

8.13 All questions were responded to by the Applicant. The details of the financial arrangements being proposed by the Applicant both for the payment of compulsory acquisition compensation and decommissioning costs are set out at paragraphs 8.32 to 8.34 below.

8.14 At the IS hearing on 24 July 2012 we asked the Applicant to make submissions to us about the adequacy of the proposed compulsory acquisition and decommissioning accounts in circumstances of:

- the financial failure of the Applicant after the development had been commenced and compulsory acquisition powers exercised
- the indebtedness of the Applicant company.
A full response on these issues was received from the Applicant (REP278).

8.15 A CA hearing was held on 9 October 2012. Objections to the proposed grant of compulsory acquisition powers were made by a number of Affected Persons (APs): Blackpool Borough Council, Blackpool Transport Services Ltd., National Grid, Knott End Golf Club, GJT and V Parkinson, S and E Raby, J Houghton, and Blackpool and Fylde College.

8.16 A very late objection was also received from AR and J Whitlow at the OF hearing held on 18 October 2012. Nonetheless, we requested a full submission of the objection to be made (REP282) so that the Applicant could respond (albeit in a very short period of time) before the close of the examination (REP283).

THE APPLICANT’S CASE

8.17 The Applicant's case for the grant of compulsory acquisition powers is set out in the Statement of Reasons (APP24), together with the Funding Statement (APP25), revised as noted in paragraph 8.2 above. Additionally, further information was provided by the Applicant in response to the Panel’s questions and at the CA hearing.

Requirements for the Compulsory Acquisition of Land

8.18 At the time the application was submitted, the Applicant and Preesall Energy Services Ltd (PESL)\(^{27}\), had a substantial land holding in the area and a freehold interest in 539.5ha of land at and around the main project site (the Preesall Site, where most of the above ground infrastructure will be located). The majority of this land is agricultural land farmed under a series of agricultural tenancies which confer varying degrees of security on the tenants.

8.19 In addition to the Preesall Site, the Applicant has acquired further interests and rights in land relating to the project. It has acquired from Associated British Ports at Fleetwood Fish Dock a temporary construction compound and an easement strip (comprising 2.2ha) in connection with the seawater pump station, seawater pipeline and brine discharge pipeline.

8.20 The Applicant has an option to acquire 1.1ha of land for the gas metering station on the NTS interconnector pipeline at Nateby, and terms have been agreed with the Crown for a lease of the long sea outfall extending from Rossall Beach to the diffuser ports in the Irish Sea.

\(^{27}\) a company with which the Applicant has a contractual arrangement giving the Applicant the necessary rights to construct and operate the project on any land owned by it.
The Applicant is also in negotiations with the majority of other landowners and agricultural tenants who have interests in the DCO land.

**Need for Power to Override Rights and Easements**

8.22 Notwithstanding the Applicant’s progress in acquiring CA Land as outlined above, all plots in the Book of Reference (APP26) remain in the DCO to ensure that any outstanding easements or other private rights are subject to the power of compulsory acquisition, as well as granting to the Applicant temporary possession rights as referred to at paragraph 8.4 above.

**The Purpose in Seeking to Acquire the CA Land**

8.23 The CA Land is required for the purposes of the project set out in paragraph 8.1 above. The Applicant has already acquired or has contractual options for a substantial element of the land and rights required for the project. The Applicant has continued to acquire land and rights by agreement and following the CA hearing submitted to the Panel an updated schedule of the position regarding acquisition by agreement at that time (REP281, Appendix 2).

8.24 The Applicant does, however, need compulsory acquisition powers to acquire the following land and rights:

- land on the Knott End golf course in connection with the development of a wellhead compound and landscaping
- land for the permanent access road to the Preesall Site between the A588 and Back Lane
- rights relating to the interconnector pipeline from the Preesall Site to the NTS at Nateby
- rights relating to the sea wall to and brine discharge pipeline between the Preesall Site and the long sea outfall at Rossall
- rights relating to the electricity supply cable between Stanah Switchyard and the Preesall Site
- rights relating to ecological and mitigation works.

8.25 The Applicant also seeks compulsory acquisition powers in respect of land within its or PESL’s freehold ownership but which is subject to agricultural tenancies. The rights required are:

- for carrying out and maintaining landscape and ecological mitigation works
- relating to gas manifolds, distribution pipelines, power control and communications cables linking the wellhead compounds to the GCC
- in respect of the brine discharge pipeline, interconnector pipeline, electricity supply cable, seawater pipeline and brine outlet pipeline
- connecting the wellheads to the underground storage caverns.
8.26 To enable acquisition of any undisclosed and unknown interests and also the subsoil beneath Knott End golf course the Applicant is seeking compulsory acquisition powers to acquire any interests within the subsoil of the land within which the caverns will be created, at a depth of not less than 175m below the surface of the land.

8.27 The Applicant also seeks the compulsory acquisition of rights relating to the wells connecting the wellheads to the UGS caverns in land outside its freehold ownership in the area of Knott End Golf Club.

**Alternatives to compulsory acquisition**

8.28 Preesall is one of the few salt fields in the UK that does not already have an operating UGS facility or one that is under construction or with planning permission. The Applicant submits therefore that there is no practical alternative to the proposed location of the UGS caverns forming part of the project at the Preesall Site (APP24, paragraphs 9.2.2 and 9.8.1).

8.29 The GSR (APP37) explains why the proposed location of the UGS caverns is the most suitable from a geological perspective. Although the UGS caverns can only be located where suitable halite deposits are found the Applicant has examined a number of alternative designs for the infrastructure for the project including:

- for the siting of the above ground infrastructure
- alignments for the routeing of the gas interconnector to the NTS
- vehicular access to the main project.

8.30 These alternatives are assessed in the ES (APP17 to APP21), the Design and Access Statement (APP29) and the Planning and Sustainability Statement (APP28). The Applicant concludes that the most appropriate design for the project is the one put forward for development consent.

8.31 The Applicant argues that the need for UGS facilities is clearly established by national policies. Due to the particular characteristics of the project at Preesall, the Applicant considers that there are no reasonable alternatives to the project (APP24, paragraphs 9.2.2 and 9.8.1). Consequently the acquisition and temporary use of land and rights are necessary to enable the land required for the project to be assembled.

**Availability of funds for compensation**

8.32 The Funding Statement states that the Applicant has the ability to procure financial resources for the project, which includes the cost of acquiring any land and related compensation payments, and sets out how this will be carried out (APP25). We sought reassurance regarding the financial strength of the Applicant to
meet all the residual liabilities of the project including decommissioning costs (PD2).

8.33 The Applicant advised that it would commit through an obligation in the s106 agreement to place funds in a dedicated account to meet compulsory acquisition compensation. The amount in the account would be £2.5 million based on their professional adviser’s estimate. The obligation would:

- prevent the Applicant from implementing the DCO or exercising any compulsory acquisition powers until the account was established and in funds
- bind the Applicant to only draw upon these funds for the purposes of payment of compulsory acquisition compensation and to certify accordingly to WBC.

8.34 With regard to decommissioning costs, the s106 agreement would require the Applicant to create a similar fund for an amount sufficient to meet decommissioning obligations under the requirements as agreed with WBC, or a scheme to be agreed with WBC for any decommissioning necessary in the course of construction. A charge over the fund would be granted to WBC in the event of default by the Applicant to comply with the relevant requirements.

A compelling case

8.35 The Applicant states that the CA Land is required for (or incidental to) the purposes of the project. Without the CA Land the project cannot take place and without the compulsory acquisition powers the CA Land could not be acquired and it would be prevented from delivering the project.

8.36 The Planning and Sustainability Statement (APP28), Preesall Need Case (APP32) and the Statement of Reasons (APP24) set out the national need for UGS facilities. The project would:

- meet the acknowledged need for UGS facilities in the UK as recognized in NPS EN-1
- be in accordance with national and regional and local planning and energy policy
- utilize the particular locational advantages of Preesall for UGS
- provide employment opportunities
- mitigate environmental impacts during its construction, operational and decommissioning stages.

8.37 The Applicant considers that there is a compelling case in the public interest for the DCO to be made and to include powers of compulsory acquisition, the extent of which has been shown to be necessary and proportionate to the extent that interference with private land and rights is required.
Special considerations

Open Space Land

8.38 Some of the pipelines and cables forming part of the project run under parts of three small areas of the CA Land which constitute open space land (the King George’s Memorial Field, Kneps Farm Holiday Park and the Marine Parade area).

8.39 Under s131 and s132 of the PA 2008 a DCO is subject to special parliamentary procedure to the extent that it authorises the acquisition of land or rights over land forming part of open space, unless the Secretary of State is satisfied that certain statutory criteria have been met and issues a certificate to that effect.

8.40 The Applicant applied to the Secretary of State on 28 November 2011 for such a certificate. Notice of the Secretary of State's proposal to issue such a certificate was given on 18 July 2012 with a deadline of 17 August 2012 for representations to be made by the public.

8.41 At the CA hearing the Applicant advised us that a certificate was anticipated and it would be forwarded when received. Such a certificate had not been received by the close of the examination and accordingly the matter remains outstanding.

Crown land

8.42 The Crown has a number of interests in the CA Land which are held by different bodies:

- plot 1 is owned by The Queen's Most Excellent Majesty in Right of Her Crown
- plots 2, 3, 4, 5, 6, 7, 8, 9, 62, 63, 64, 65, 129, 130, 131, 132, 133, 134 and 135 are held by the Duchy of Lancaster
- plots 37 and 38 are held by the Secretary of State for Transport.

All Crown land is listed in the Book of Reference but is excepted from the request for compulsory acquisition powers.

8.43 Principal terms have been agreed with the Crown Estate for a lease for a term of 50 years. Whilst the Duchy of Lancaster has not objected to the application it has confirmed that it will not enter into negotiations for an option until a DCO is granted. Heads of terms have been agreed with the Highways Agency in relation to the Department of Transport land.

Statutory Undertakers

8.44 A number of statutory undertakers have interests in the CA Land. The position with regard to each undertaking is as follows:
**United Utilities**

8.45 United Utilities made no representation and have agreed and signed SoCG44. Protective provisions have been included in the Order and UU has confirmed it has no further comments on the matter (REP280, Paragraph 9.2).

**Associated British Ports (ABP)**

8.46 ABP made written representations (REP49) but following discussions and agreement reached with the Applicant withdrew them on 29 June 2012 (REP290).

**National Grid**

8.47 National Grid made written representations (REP214) but its solicitors confirmed that it was withdrawing its objection to both the compulsory acquisition powers sought under the draft Order and also its protective provisions (APP15).

**Electricity North-West Limited (ENWL)**

8.48 ENWL made a written representation but its solicitors confirmed that ENWL had no objections to the compulsory acquisition aspects of the application. Additionally ENWL has agreed the terms of an easements and wayleave with the Applicant (REP294).

**Blackpool Borough Council and Blackpool Transport Services Ltd.**

8.49 Written representations were made by Blackpool Transport (REP251) and by Blackpool Borough Council (REP250). Protective provisions have been included in the draft Order and an option agreement entered into. Consequently both Blackpool Borough Council and Blackpool Transport confirmed that their representations were withdrawn (REP261 and REP262).

**Local Authority Land**

8.50 Land owned by local authorities, in some cases land which is public highway, is included in the draft Order. No local authority has objected to the grant of compulsory acquisition powers in relation to its land but WBC submitted a representation at the CA hearing (REP247) and also requested changes to the arbitration clause in the draft Order. We comment on the request relating to the arbitration clause at paragraph 9.40 below.

**Human Rights**

8.51 The Applicant acknowledges that Article 1 of the First Protocol, Article 6 and Article 8 of the European Convention on Human Rights are engaged but considers that the project will not conflict with these rights and is proportionate. The Applicant argues that there is a compelling case in the public interest for the proposals...
which outweigh the impact on individual rights; it is relevant that those affected will be entitled to compensation and the public benefits are set out in section 9 of the Statement of Reasons (APP24).

8.52 With regard to Article 1 of the First Protocol and Article 8, the Applicant has weighed any interference with these rights with the potential public benefits if the DCO is made. It considers there would be significant public benefit arising from the grant of the DCO but these can only be realised if the compulsory acquisition powers are granted. It concludes that these significant public benefits outweigh the effect of the DCO upon those whose property interests are affected and that they would not be a disproportionate interference with Article 8 and Article 1 rights.

8.53 Further, those affected by compulsory acquisition or temporary use powers will be entitled to compensation and the Applicant has the resources to pay such compensation.

8.54 With regard to Article 6, third parties have been able to make representations and consultations have been carried out with those whose land is affected. A CA hearing will be held to consider the submissions of objectors to the proposal and if the DCO is made a person aggrieved may challenge the DCO by judicial review in the High Court if they consider they have grounds to do so pursuant to s118 of the PA 2008. Additionally, any dispute in relation to compensation can be referred to the Upper Tribunal (Lands Chamber).

8.55 For these reasons the Applicant considers that the grant of powers of compulsory acquisition would not breach the Convention rights of those affected, and that it would be appropriate and proportionate to make the DCO including the grant of compulsory acquisition powers.

**Applicant’s Case - Conclusion**

8.56 The inclusion of compulsory acquisition powers in the Order for the purposes of the project would meet the conditions of s122 of the PA 2008 and Guidance for the reasons summarised in APP24 and set out in full in the documents referred to it:

- the CA Land is either required for the development to which the development consent relates and/or is incidental to or required to facilitate the proposed development
- the CA Land is no more than is reasonably required for these purposes
- there is a compelling case in the public interest for the land to be acquired compulsorily: the substantial benefits to be derived from the proposed compulsory acquisition and temporary use of the CA Land would decisively outweigh the
private loss that would be suffered by those whose land is to be acquired.

**THE OBJECTORS CASES**

**Blackpool Borough Council and Blackpool Transport Services Ltd.**

8.57 The representations and objections of both parties were withdrawn (REP261 and REP262).

**National Grid**

8.58 National Grid’s objection was withdrawn (REP246).

**Knott End Golf Club (KEGC)**

8.59 KEGC submitted written representations and a series of subsequent letters opposing the Applicant’s wish to acquire land and rights over land owned by the Golf Club28. The Club also appeared and made representations at the CA hearing (REP256 and REP260).

8.60 KEGC objected to the application for temporary possession rights in relation to all plots owned by the Golf Club. Its position in relation to the individual plots was as follows:

- plot 66 - objection to temporary possession only
- plot 67 - objection to temporary possession only
- plot 68 - seeks removal of this plot from acquisition because it encroaches on the 11th green
- plot 69 - seeks removal of this plot from acquisition because KEGC will lose the 8th and 9th tees
- plot 70 - objection to temporary possession only
- plot 71 - objection to temporary possession only
- plot 72 - affects amenity value, future development potential, and also creates risks to adjacent KEGC land
- plot 73 - seeks removal of this plot from acquisition because KEGC believes it would encroach on the 5th and 6th tees
- plots 74, 75, 76, 77 and 79 - objection to temporary possession only
- plot 78 - no objection to its acquisition unless the plot extends to the east of the roadway.

In summary, KEGC:

- objects to temporary possession rights for all plots
- subject to the above has no objections to the acquisition of plots 66, 67, 70, 71, 74, 75, 76, 77, 78 and 79
- objects to the acquisition of plots 68, 69, 72 and 73.

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8.61 KEGC also expressed concerns regarding subsidence, the potential loss of development land and a number of other risk issues referring in particular to the Planning Advisory Zones considered by the HSE in the COMAH process (REP256).

**GJT and V Parkinson: Plots  and **

8.62 Mr Parkinson was concerned about the effect on drainage and the difficulties relating to reinstatement of the ground (REP212). Mr Parkinson farms approximately 22.7ha with between ; the proposed land take is about approximately 1ha and this area was one of the best fields on the farm.

8.63 Mr Parkinson expressed concern at the timescale for carrying out the works, the unstable nature of the subsoil, which in his opinion was unsuitable for installing a pipeline, and concerns regarding the safety of the pipeline in these circumstances. He was also concerned as to how access to the proposed strip of land would be secured. Mr Parkinson did acknowledge at the CA hearing that if the DCO was granted he would negotiate with the Applicant.

**S and E Raby: Plot  **

8.64 Mr Raby was concerned that the proposed 47m wide strip of land (which it was intended to be used for the underground pipeline and a surface road) would have a detrimental impact on the outlook from his property (REP213). He was particularly concerned about flooding which would arise if land drains and ditches were not kept clear. He hoped that if the proposal went ahead the road would be built as far away from his property as possible.

**Mr Houghton: Plot  **

8.65 Mr Houghton objected to the grant of compulsory acquisition powers because a nature reserve containing many species of wild flowers he had developed over many years would be destroyed (REP255). Mr Houghton owned some approximately 16.2ha including woodland and his house, and claimed that some 12ha would be affected by the proposals. He also expressed concern regarding the drainage of the land. So far as the nature reserve was concerned Mr Houghton confirmed that there were no public designations or public bodies involved. It was purely a private venture although he hinted it may one day become public.

**Blackpool and Fylde College: Plots  to  **

8.66 The College objected to the grant of compulsory acquisition powers in particular regarding the proposed permanent 20m access rights as well as the request for temporary possession rights. The College was also concerned that the rights would interfere with the College's right to access adjacent land to lay and maintain a foul sewer (REP215).
Mr Whitlow is a tenant farmer of approximately 55ha held under three tenancies. Two are Agricultural Holdings Act 1986 tenancies where Mr Whitlow has lifetime security of tenure but subject to a ‘development’ clause. This provides that the landlord can recover possession on notice if the land is required for development and has the benefit of planning permission to do so. The third tenancy is an Annual Farm Business Tenancy which if not renewed by the landlord would simply come to an end by the effluxion of time. The Applicant is the landlord in respect of all three tenancies.

Mr Whitlow objects to the compulsory acquisition of his land on the following grounds (REP282):

- the loss of agricultural land and the wider impact on his farming business; there would be a permanent land loss of approximately 10% of his land holding and over 40% of his holding would be affected
- the construction of the new access road from the A588 to Higher Lickow Farm would prevent access to parts of his land and if he were to build a new access this would take up more of his productive land
- there would be increased traffic generation in the local area making stock movements more difficult
- the combination of these factors, especially the loss of land on both a permanent and temporary basis would be devastating to his business making it unviable and would lead to its closure.

THE APPLICANT’S RESPONSE TO THE OBJECTIONS

Knott End Golf Club (KEGC)

The Applicant stated at the CA hearing that the power of temporary possession was required on all the KEGC plots (save those being acquired) in order to place monitoring pins if required on the land. Further, it would seek to locate the pins so as to cause as little interference as possible with the KEGC activities.

In relation to the other compulsory acquisition powers sought the Applicant’s response at the CA hearing to the KEGC objections was:

- plot 68 - this was a small slither of land needed to widen the roadway: the Applicant did not consider it interfered with the 11th fairway and 11th green
- plot 69 - instead of seeking to acquire the freehold of the plot the Applicant would only seek new rights to bore through the land, the freehold below 175m and rights of temporary possession to place monitoring pins on the land; (this was an
approach which was not unacceptable to KEGC in relation to other plots)
- plot 72 - this plot is required for the construction of wellhead 1 and the related compound
- plot 73 - there was some misunderstanding as to the location of this plot; it is in fact part of the field which is tenanted and as such it is understood there is no objection to the rights sought (save for the rights of temporary possession)
- plot 78 - there was no objection to the acquisition of this plot if it did not extend to the east of the road.

8.71 KEGC had raised a number of other concerns to which the Applicant responded as follows:

- Requirements 17 to 28 would control matters such as fencing, construction hours, drilling, construction practice and control of dust; this package of measures would provide effective mitigation and if there was an impact causing loss or damage to KEGC it could claim compensation
- the history of planning applications made by KEGC served perhaps to show the flexibility for the location of greens and tees
- golf courses do not come within any of the Planning Advisory Zones considered by the HSE in the COMAH process
- the Applicant reminded us that the risks were minimal (APP43, section 4.10.7)
- subsidence was addressed in the GSR (APP37) and whilst subsidence could occur the risk was small; further, Requirement 35 addresses subsidence
- there were three reasons why the wellhead 1 compound was where it was:
  - engineering factors relating to distances to other wells
  - the main sewer pipe to the Hackensall STW prevented the wellhead being located to the south
  - there was a desire to locate the wellhead compound 1 as far as possible from the Wyre Way.

8.72 In summary, the Applicant sought all the powers included in the Order, save for the amendment in relation to plot 69. It was conscious of the concern over the temporary possession rights needed to locate monitoring pins and would seek wherever possible to reach sensible solutions with KEGC.

GJT and V Parkinson

8.73 The Applicant referred us to their response to our first round of questions (REP203) which addressed many of the practical concerns raised by Mr Parkinson. Further, the Gas Interconnector Pipeline report (APP41) emphasized the need for discussions with landowners to understand the watercourses and drainage systems and this the Applicant sought to do where owners would meet and
discuss the issues. On the other points raised by Mr Parkinson the Applicant responded:

- access to the plot would be linear from the existing road system
- with regard to severed land, whilst there was no statutory obligation to provide accommodation works, the Applicant sought to make ongoing farming as easy as possible and tried to accommodate owner’s requirements wherever possible and thus minimising compensation
- treatment of soil is acknowledged as important and Requirements 29 and 30 provide adequate safeguards
- where owners are prepared to negotiate, agreements entered into provide considerable detail on how matters such as soil, drainage, compensation and accommodation works would be dealt with; the Applicant was in discussion with 20 of 26 landowning parties with a view to concluding such agreements.

S and E Raby

8.74 The plot in question was 47m wide from north to south. Of this, 10m would be roadway (almost certainly built along the southern boundary of the plot) and the pipeline would be laid in the remaining 37m with a reserved right of access over a 20m wide strip. It may be that the whole of the width of the plot would not need to be used. There would be a stock proof fence along the boundary and the LEMSP also required a hedge to be planted adjacent to it (REP203, Appendices 23, 24 and 25).

J Houghton

8.75 The Applicant advised us at the CA hearing that the nature reserve was a private venture and did not enjoy any statutory or public designation. Once the pipeline had been installed, then subject to access rights for maintenance of the pipeline the use of the land would revert to the owner. The legal agreements being offered to owners would if entered into provide an opportunity to take into account Mr Houghton’s particular use of the land.

AR and J Whitlow

8.76 The Applicant stated (REP283) that of the 13 plots owned by Mr Whitlow where compulsory acquisition powers were sought, only 4 were to be acquired on a permanent basis and the reasons for their acquisition are set out in APP24. As for the remainder, where rights were required in connection with the laying of the gas pipeline, landscape and ecological mitigation works, surface monitoring pins and electricity pylons and cables, whilst they would be subject to temporary disruption and to future access rights for maintenance, the land concerned would be retained by Mr Whitlow for agricultural use.
The Applicant acknowledged that the construction of the access road would disrupt the existing access arrangements on Monks Lane. Alternative accesses are available although a new access would require the construction of a new farm track. Crossing points on the new road have been agreed with Mr Whitlow and accommodation works would be offered by the Applicant both during and after construction.

The Applicant acknowledged that the loss of land on both a permanent and temporary basis would have an impact on the farm business but does not consider that this would make the business unviable.

THE PANEL’S CONCLUSIONS

Our approach to the consideration of the granting of compulsory acquisition powers has been to address the requirements of s122 and s123 of the PA 2008, the Guidance, Regulations and the Human Rights Act 1998, and to consider in the light of representations received from APs and evidence submitted whether a compelling case in the public interest has been made, balancing public interest against private loss.

We are mindful, however, that the DCO embraces both the development and compulsory acquisition powers, and that the case for the grant of compulsory acquisition powers cannot properly be addressed until the position regarding the development has been considered and determined. Accordingly, we have adopted a two stage approach. We have first formed a view on the case for development and then in this chapter have proceeded on the basis of that conclusion.

Chapter 7 reaches the conclusion that subject to a major proviso, in development terms consent should be granted. What we do in this Chapter is to consider whether the justification for the grant of the development consent forms a justifiable basis for the grant of the compulsory acquisition powers sought.

The effect of s122(1) and s122(2) of the PA 2008 is to require that the land is needed for the development to which the development consent relates: effectively that the land needs to be acquired, or rights over it acquired or impediments upon it removed, in order that the development can be carried out. To reach our judgment on this requirement we have examined the case which has been made for the grant of compulsory acquisition powers in respect of all the plots in the Book of Reference (APP26) for the works as described in clause 5.2.4 of the Statement of Reasons (APP24) and the justification as set out in clause 9. These seek to demonstrate that the Applicant has clear proposals for how it intends to use the

29 Planning Act 2008 Guidance related to procedures for compulsory acquisition, DCLG 2010
30 The Infrastructure Planning (Compulsory Acquisition) Regulations 2010.
Order land: each part of the Order land is either required for the development to which the DCO relates or is incidental to that development.

8.83 We are satisfied that in the event of the grant of development consent for the construction and operation of a UGS facility at Preesall there will be a need to acquire the rights and interests in the CA Land and the powers sought in the DCO would be required to implement the development.

8.84 With regard to s122(3), in considering whether there is a compelling case in the public interest there are a number of issues to be considered in balancing the public interest against the private loss which would occur.

8.85 The need for UGS facilities is recognised in NPS EN-1 and NPS EN-4. In our opinion, the public benefits associated with the development of the UGS facility at Preesall outweigh the disbenefits. Granting the DCO would be in accordance with both NPS EN-1 and NPS EN-4. Overall, the public benefits associated with the project would in our view outweigh the private loss that would be suffered by those whose land is to be acquired to enable the project to occur.

Alternatives

8.86 To determine whether or not alternatives to the proposed land take exist we have considered the approach taken by the Applicant. As set out in paragraphs 8.28–8.31 above, Preesall is one of the few salt fields in the UK that does not already have an operating UGS facility or one that is under construction or with planning permission. Its location therefore is determined by the presence of the salt fields in the area. Although the UGS caverns can only be located where the salt beds are found the Applicant has examined a number of different designs for the infrastructure for the project.

8.87 We accept that the site location is determined by the presence of the halite deposit and as such there is no alternative to this. We are satisfied that in so far as alternatives can be considered in relation to the design of the facility, the Applicant has considered reasonably all feasible alternatives and that there are no alternatives which ought to be preferred.

Funding

8.88 We are required to make a judgment as to whether adequate funding would be available to meet compensation claims in the event of compulsory acquisition powers being granted. In doing so we have had regard to the powers of the PA 2008, Guidance and the Human Rights Act 1998. Guidance requires that an application for a DCO authorising compulsory acquisition powers must be accompanied by a statement explaining how it will be funded and should include information about the resource implications of both
acquiring the land and implementing the project for which the land is required.

8.89 The Applicant submitted a Funding Statement (APP25) setting out how it proposed to finance both land and construction costs. We sought clarification from the Applicant on the corporate structure of the companies involved in the ownership of land within the project site and evidence of the Applicant’s ability to meet all the residual liabilities of the project including decommissioning (PD2 and REP203).

8.90 Paragraphs 8.32 to 8.34 refer to the discussions which took place with the Applicant regarding our concerns in relation to funding. We subsequently pursued with the Applicant the security of the funds which would be paid into the two dedicated accounts to meet compulsory acquisition compensation and decommissioning costs respectively and we were satisfied with the explanations provided (REP278, paragraph 5).

8.91 On 18 October 2012 the Applicant concluded with WBC an agreement under s106 of the TCPA (REP281, Appendix 24). The agreement provides that no powers of compulsory acquisition shall be exercised under the DCO until a compulsory purchase monies fund in the sum of £2.5million is in place and a legal charge over it has been granted to a security trustee (yet to be determined).

8.92 Further, the agreement also provides that the development shall not be implemented until the Applicant has:

- obtained WBC’s approval of a decommissioning scheme fund plan
- paid into the fund the amount specified prior to the commencement of the development
- granted to WBC a legal charge over the fund.

8.93 On the basis that the s106 agreement would secure funding for both compulsory acquisition compensation and decommissioning costs, we consider the Funding Statement (APP25) and the provisions set out in the s106 agreement are adequate to support a compelling case for the grant of compulsory acquisition powers.

Human Rights

8.94 The Applicant acknowledges that the DCO engages a number of the articles of the Human Rights Act:

- Article 1 rights of those whose property is to be compulsorily acquired and whose peaceful enjoyment of their property is to be interfered with
- Article 8 which protects the rights of the individual to respect for his private and family life
- Article 6 which entitles those affected by the project to a fair and public hearing by an independent and impartial tribunal.
8.95 The Applicant sets out at paragraph 10.3.3 of the Statement of Reasons (APP24) how it has weighed the interference with these Convention rights arising from the exercise of the compulsory acquisition powers with the potential public benefits if the DCO is made.

8.96 Having regard to the relevant provisions of the Human Rights Act 1998 we have considered the individual rights interfered with and are satisfied that in relation to Article 1 of the First Protocol and Article 8 the proposed interference with the individuals’ rights would be lawful, necessary, proportionate and justified in the public interest.

8.97 In relation to Article 6 we are satisfied that all objections which have been made have either been resolved by the Applicant with the objectors or they have had the opportunity to present their cases before us at the CA hearing.

The Panel’s Conclusions on the Issues Raised by Objectors

Knott End Golf Club (KEGC)

8.98 Subject to maintaining their objection to the acquisition of temporary possession rights in respect of all of their land affected by the DCO, KEGC adopted a pragmatic approach and were able to agree the proposed compulsory acquisition powers sought save in respect of plots 68, 69, 72 and 73. KEGC withdrew its objection to the inclusion of plot 78 because the Applicant met the condition stipulated by the KEGC.

8.99 In relation to plot 68 we do not consider that it interferes with the 11th fairway or the 11th green, and our final accompanied site visit on 19 October 2012 confirmed our view on this.

8.100 The powers sought in relation to plot 69 have been amended as described in paragraph 8.70 and we are satisfied that on this basis the requested powers should be granted.

8.101 Plot 72 is the site of the wellhead 1 compound and a key part of the development. Its location has been determined by the considerations set out at paragraph 8.29 above. We conclude that the objections by KEGC are not sufficient to overcome these and that their other concerns are adequately addressed in Requirements 17 to 28 which would ensure mitigation at an acceptable level. We do not believe that any issue arises with regard to the COMAH Regulations regarding planning zones since golf courses are not included in any of the zones as prohibited development. Subsidence is addressed in Requirement 35.

8.102 However, turning to the power sought for temporary possession on all plots, we consider that this would have a severe and unacceptable adverse impact on the continued use and enjoyment of the 18 hole Knott End golf course.
8.103 Our inclination was to refuse the grant of the power and leave the Applicant to secure the rights it required by agreement with KEGC. However, our discussions with the Applicant on this issue at the CA hearing on 9 October 2012 led us to request the conclusion of an agreement with KEGC if this was possible. This was not achieved, but our request resulted in the submission to us by the Applicant of a unilateral undertaking in favour of KEGC (REP281, Appendix 7).

8.104 Although not accepted by KEGC (REP281, Appendix 8), we consider that the terms of the undertaking address most of the concerns of KEGC regarding the temporary possession power. Accordingly in these circumstances we see no reason why the power should not be granted.

**GJT and V Parkinson**

8.105 Having considered and acknowledging all the concerns raised by Mr Parkinson, none in our view outweigh the public benefits arising from the implementation of the scheme. We are mindful that many of the issues raised can be addressed by negotiation and the conclusion of an agreement in similar form to that produced by the Applicant (REP281, Appendices 9 and 10). Further, subject to the rights in relation to access for maintenance sought by the Applicant, Mr Parkinson will be able to continue farming the land once reinstated and will be able to claim compensation for any losses which arise during the period of disruption.

**S and E Raby**

8.106 We are satisfied that the acquisition of land from Mr Raby for the access road and installation of the pipeline is necessary for the implementation of the project. The proposed mitigation by the provision of fencing and hedging will help to overcome some of Mr Raby's concerns and where they do not he remains able to pursue a claim for compensation.

**J Houghton**

8.107 The interference with Mr Houghton’s nature reserve is of temporary duration after which subject only to access rights for maintenance Mr Houghton will continue to use and enjoy his property.

**Blackpool and Fylde College**

8.108 We are of the view that nothing in the College's objection raises matters or issues which cannot be settled by agreement with the Applicant or by the payment of compensation if agreement cannot be reached.

**AR and J Whitlow**

8.109 We accept that there will be a loss of agricultural land both on a permanent and temporary basis and that this will have an effect on
Mr Whitlow's business. However, we have seen no evidence to suggest that the consequence will be that the business will become unviable and lead to its closure. Such losses that do occur if quantified will be eligible for compensation.

8.110 We also appreciate that the construction of the new access road will alter access arrangements but if this leads to a loss of productive agricultural land such loss would be eligible for compensation. We do not consider increased traffic generation will cause an unacceptable interference with stock movements.

THE PANEL'S RECOMMENDATION ON THE REQUEST FOR COMPULSORY ACQUISITION POWERS.

8.111 With regard to s122(2) of the PA 2008 we are satisfied that the legal interests in all plots described and set out in the Book of Reference (APP26) and on the Land Plans (APP6) as amended (REP281, Appendices 1-4) and in relation to plot 69, are required in order to implement the development.

8.112 With regard to s122(3) we are satisfied in relation to the application that:

- development consent for the development should be granted
- the NPSs are to be considered the pre-eminent policy
- the NPSs require that the need case is to be considered as already proven
- there are no sites which are alternatives to the Preesall Site
- the funding is adequate and secure so far as may be achieved under the PA 2008
- the interference with human rights is considered lawful in the public interest and proportionate.

8.113 In relation to all the objections from APs referred to above and considered by us we do not consider that the private losses suffered are such as to outweigh the public benefits that would accrue from the grant of the compulsory acquisition powers which are sought.

8.114 In these circumstances, we consider there is a compelling case in the public interest for the grant of the compulsory acquisition powers sought by the Applicant in respect of the CA Land as shown on the Land Plans.

8.115 Lastly, with regard to the incorporation of other statutory powers pursuant to s120 (5) (a) we are satisfied that as required by s117 (4) the DCO has been drafted in the form of a statutory instrument and further that no provision of the DCO contravenes the provisions of s126 which precludes the modification of compensation provisions.
9 THE PROPOSED ORDER AND THE S106 AGREEMENT

9.1 The proposed Development Consent Order (DCO) is the heart of the application, setting what the approval would cover, what is authorised, the compulsory acquisition of land and rights, and what is governed by way of requirements (analogous to planning conditions). The DCO submitted as part of the application enabled the Panel and participants in the process to see what is envisaged and precisely how the project is intended to be authorised and controlled. We identified at an early stage in the examination of the application that we needed to consider the draft DCO in detail and so provided in the timetable for two IS hearings on 24 July and 22 August 2012 for this purpose to discuss on an entirely without prejudice basis the drafting of the DCO.

9.2 The application documents contained the draft DCO (APP22) and explanatory memorandum (EM) (APP23), with applications for a deemed marine licence (APP16) (which forms part of the Order itself at Schedule 7) and a separate application for a deemed HSC (APP15). At the time the application was submitted, there was no draft development consent obligation pursuant to s106 of the TCPA 1990 (s106 agreement) in place between the Applicant and the local authorities, but there were draft heads of terms (APP31). We did not pose any specific questions about the DCO as part of our first round of questions given that we had fixed IS hearings in order to consider the draft DCO in detail.

9.3 The two local authorities (LCC and WBC) had no comments on the DCO other than a minor point in each case (SoCG3). However, both Councils in their LIRs raised a number of detailed comments about the requirements in Schedule 9, and the draft heads of terms. The Applicant supplied version 2 of the DCO shortly before the IS hearing arranged for 24 July 2012 (REP277). This revised version was in the light of representations received and particular comments from NE, EA and MMO. A first draft of the s106 agreement was also supplied.

9.4 At the IS hearing on 24 July 2012, we explored particularly the relationship between the deemed marine licence and the conditions attached to it contained in Schedule 7, and the potential geographic overlap with the requirements in Schedule 9. We asked for some further work to be done to clarify these matters and as a result decided to postpone the second IS hearing to consider the DCO arranged for 22 August 2012 in order to give the Applicant and the relevant IPs (particularly WBC, LCC, the MMO and NE), sufficient time to address these. We set a deadline of 31 August 2012 for a comprehensive response to our request which was met by the submission of a third version of the DCO, a revised EM, revised draft s106 agreement, and supporting documents (REP278).
Prior to the IS hearing which took place on 18 September 2012, the Applicant supplied a fourth version of the draft DCO and a revised s106 agreement taking into account further discussions with WBC, the MMO and NE. The s106 agreement also reflected further discussion with WBC about decommissioning arrangements and the funding of WBC’s costs for enforcement and handling of applications for discharge under the requirements. It was therefore the fourth version of the DCO which was used as the basis of discussions at the IS hearing on 18 September 2012 (REP279).

As explained in paragraph 5.56 above, we also arranged an IS hearing for the following day to deal in detail with the interrelationship between the DCO and the COMAH regime. In advance of the CA hearing arranged for 9 October 2012, the Applicant submitted a fifth version of the draft DCO and a revised s106 agreement (REP280). Following the CA hearing, we wrote to the Applicant with some further requests in relation to version 5 of the draft DCO and the s106 agreement, together with a request to bring together all the changes to plans, the Statement of Reasons and the Book of Reference (PD26). The Applicant duly supplied this shortly before the examination closed (REP281).

The sixth version of the DCO, the accompanying explanatory memorandum and the executed copy of the s106 agreement between WBC and the Applicant therefore represents the outcome of the attention given to the DCO during the examination (REP281, Appendices 20, 22, 24 and 25). We are grateful to the Applicant in readily responding to our requests and queries to make changes to the DCO to achieve this.

This final version of the Order is at Appendix D with the modifications we recommend should be made, and a summary of the s106 agreement is included at Appendix A.

THE ORDER

The final draft of the Order is in the form of a Statutory Instrument with 43 articles and 9 schedules. The authorised development is described in Schedule 1 in terms of 21 Works covering:

- the NSIP (the proposed 19 operational UGS caverns which constitute Work No 1A)
- associated development:
  - the wellheads, GCC, booster pump station, and seawater pump station which constitute Works Nos 1B, 2-4 and 15
  - related infrastructure such as access roads, pipelines, power supply arrangements which constitute Works Nos 5 - 14, 16 - 21
  - access improvements and cable connections which constitute Works Nos 3 to 9.

9.10 The EM (REP281, Appendix 22) contains a description of the provisions of the draft Order, systematically covering the purpose of each article, schedules and the requirements in detail. Other than the following paragraph, we have no further comments to make on Parts 1 – 4 of the Order, nor Schedules 1 – 6.

9.11 Section 138 of the PA 2008 states that any provision in the DCO for the extinguishment of a statutory undertaker’s right or removal of statutory undertaker’s apparatus requires the consent of the Secretary of State, unless the statutory undertaker’s representation has been withdrawn. Paragraphs 8.44 to 8.49 in Chapter 8 confirm that representations made by statutory undertakers have been withdrawn, and in these circumstances, the consent of the Secretary of State pursuant to s138 (4) is not required. However, s138 (4)(a) still requires the Secretary of State to be satisfied that the extinguishment or removal of rights or apparatus is necessary for the purpose of carrying out the development. As the representations have been withdrawn there is no reason in our view why the Secretary of State should not be so satisfied.

9.12 Schedule 7 of the Order contains a draft marine licence which is deemed to be granted under part 4 of the Marine and Coastal Access Act 2009. These are powers to be exercised by the MMO who have confirmed their agreement to the Applicant (REP280, paragraph, 3.2.4). The main aspects of the licence are conditions to control construction of works within the applicable part of the UK Marine area, essentially below mean the high water mark. The particular works to be consented are the offshore elements of the brine discharge pipe west of the sea wall into the Irish Sea. The licence is self-contained such that there is no overlap intended between the powers it covers and the rest of the Order. For that reason, we considered particular care is required to ensure the integrity with the requirements covering the construction of those underground caverns which stretch beneath the territory covered by the marine licence.

9.13 We were concerned therefore that in our view the Order as originally submitted contained a degree of confusion between the conditions in the draft marine licence to be met to the satisfaction of the MMO, and the requirements in Schedule 9 of the Order which would fall to WBC as the local planning authority to discharge. Several redrafts of the licence were progressed during the examination. That included at Schedule 7 is fully part of the Order: it is not a separate document as explained fully in the submission from the Applicant (REP280, section 7).
9.14 We sought the submission of a map to show the area described in paragraph 9 of Schedule 7 to which the licence relates. The precise description of the area by coordinates is otherwise difficult to follow, and although this does not form part of the Order it is helpful to refer to the plan supplied by the Applicant (REP280, Appendix 5).

9.15 We are now satisfied that the deemed marine licence does properly apply to those works which are relevant in paragraphs 8 and 13 of Schedule 7. Those conditions sought by other organisations have also been included in Schedule 7, for example a vessel movement plan requested by NE at paragraph 19, and marine archaeological investigation by English Heritage at paragraph 24.

9.16 Schedule 8 contains the protective provisions for statutory undertakers. Part 3 for the benefit of Blackpool Borough Council is now in an agreed form to protect the Council's interests as owner of the Blackpool to Fleetwood Tramway.

Requirements

9.17 Schedule 9 contains the requirements to control the detailed aspects of construction, and would fall entirely to WBC as the relevant planning authority. We discuss in Chapters 5 and 7 the arguments for proposing a modification to the requirements to provide a next step of geological survey to cover the two polygons within which the caverns are proposed to be constructed. The following paragraphs set out our reasoning for how this can be achieved.

Proposals for Modifications to Requirement 6

9.18 In answer to our further written questions about the additional survey work that would be carried out prior to the commencement of the COMAH process, the Applicant stated that should development consent be granted, they intend to conduct further surveys to provide additional detail about the geological structure. Such surveys could comprise 2D seismic lines or even 3D surveys of each polygon (REP207, paragraph 5.56). There would be pilot holes for each cavern, and additional geological surveys (based on the availability and reliability of down-hole exploration tools which can operate in deviated boreholes) would be considered bearing in mind the requirements of the Competent Authority (REP207, paragraphs 5.57 and 5.58). Down-hole investigations could comprise gamma-rays, density, temperature and caliper logs, which would provide targeted data on salt rockhead conditions at each proposed cavern location, and verify the levels and condition of salt/mudstone interfaces and the positions of the wild-brine runs (REP207, paragraph 5.63).

9.19 The Applicant stated at the IS hearing on 19 September 2012 that it would be their intention to investigate the cavern areas
geologically one by one, refine the model and seek Competent Authority approval as they progressed. Techniques for carrying out detailed geological surveys are improving rapidly and there is no commitment at this stage therefore as to exactly how this next stage of work would be carried out.

9.20 We explored during the examination how our concern to see a comprehensive geological survey of the two polygon areas before actual development commences could be secured through the requirements. On 28 September 2012, we asked for the views of the Applicant, LCC, WBC, HSE and EA about the construction of a potential new sub-paragraph in Requirement 6:

>Prior to the submission of the safety reports to the Competent Authority (pursuant to Regulations 7(1), 7(5) and 8 of the 1999 Regulations) such geological investigations as may be necessary shall be undertaken across the “area for cavern development” shown on the approved development plan with reference A-1000-030 Rev B, and shall be submitted for approval by Lancashire County Council to confirm the top and bottom levels of the halite bed to a confidence limit of ± 5 metres, and that no faults of such size as may affect the integrity of the proposed caverns penetrate the halite bed

(PD23)

9.21 The Applicant firmly opposed such an addition to the requirement as unnecessary and inappropriate for the following reasons:

- it would duplicate the COMAH regime
- the purpose of the requirement is not clear, given that LCC has signed SoCG1
- LCC is not a specialist safety regulator and does not have the necessary expertise
- the risk of delay and uncertainty to the project from an additional stage in the process
- a need to resort to appeal mechanisms in case of dispute with LCC
- the wording of the requirement is imprecise
- there is no precedent for such a condition in other UGS schemes approved by the Secretary of State under the TCPA (REP319).

9.22 LCC responded in support of a proposed amended requirement as being consistent with its LIR, and suggested it would:

- address the absence of physical information on the geology of the area within which caverns are proposed
- demonstrate the capability of the geology to accommodate the caverns
be helpful given that a significant percentage of the infrastructure needs to be constructed before a cavern could be created

but that:

- a requirement should be sufficiently precise to identify what geological site investigations are necessary to be undertaken
- restrictions on the development going ahead should be imposed in the event of faults of such size as may affect the integrity of the proposed caverns are identified
- the size of such faults should be defined
- the outcome of the site investigation should be submitted to WBC as the relevant planning authority (REP320).

9.23 HSE responded that they could not become involved in any assessment of how geological data might influence planning decisions (REP317). EA had no comments (REP318) and WBC did not respond.

9.24 We do not accept the Applicant’s point of view and consider that as detailed geological investigations are needed as part of submissions to the Competent Authority for approval under COMAH Regulations it is not an additional burden to provide them earlier in the process. To our minds, this would meet the detailed assessment required under NPS EN-4 to confirm that the sites selected (i.e. the two polygons) are suitable, which in our view means they have sufficient thickness of un-faulted suitable halite to contain the proposed volumes of gas to be stored.

9.25 We consider that such a modification to Requirement 6 is justified, but that its formulation needs to concentrate on the development aspects of the application, and avoid any overlap with the responsibilities of the Competent Authority under the COMAH Regulations, as the Applicant fairly points out. In this development context, paragraph 4.1.1(v) of NPS EN-1 also requires that we consider the balance of the adverse impacts (including any cumulative adverse impacts) against the benefits of the proposed development (taking into account the measures to avoid, reduce or compensate for the adverse impacts).

9.26 We propose therefore that the criterion to be met in the first instance is a minimum volume of gas storage on the basis that if the geology cannot support such a level, then it throws into question some elements of the surface infrastructure which the application contains, and particularly the size of the GCC. We consider this reflects the landscape disbenefits of the application on the eastern side of the Estuary concerning the impact of the GCC, together with the residual adverse impacts we noted in Chapters 5 and 6 such as disruption during construction, noise from extended working at the Wyre Estuary crossings and fears in the community of safety aspects.
9.27 We acknowledge that the draft Order provides for a working capacity of gas of up to 600 Mcm (i.e. without a lower limit) and therefore allows for much flexibility to develop the detailed design of cavern construction and indeed their number within the Preesall Halite deposit. But we consider that if only a materially lower volume of gas capacity can be achieved it may not give sufficient benefit to outweigh the adverse impacts of the project.

9.28 This leads to the question of the working volume of gas that the Applicant would have to demonstrate is achievable to outweigh the adverse impacts. This would be a minimum threshold of stored gas which is capable of being stored in the UGS caverns in the two polygons when the design parameters given in Requirement 6 are applied. We have adopted a figure of 300 Mcm for the minimum working capacity because we consider that a working capacity of less than this is materially different from the volume applied for (and in that eventuality it is likely that some of the surface infrastructure would be oversized.

9.29 We accept that there are elements of the infrastructure which are not in a linear relationship as the sizes are based on flow rates rather that stored gas volumes. But we are of the view that the GCC could be reduced in scale if it was only needed to handle a much smaller quantity of gas, and arguably its impact on the landscape would be reduced commensurately. If the minimum threshold cannot be met it would mean the development would not be permitted to proceed any further. This would ensure that the community and the environment would not be subjected to a large construction project, or subsequently disrupted by decommissioning when the infrastructure was removed, if the project was found not to be capable of achieving the quantities of gas storage and hence the benefits projected.

9.30 We appreciate that setting this level of the minimum threshold is to some extent arbitrary, but from our own calculations, we estimate that if the three scenarios set out in Chapter 5 (paragraphs 5.76 to 5.78) arose (i.e. the thickness of halite in the northern polygon is thinner and shallower near Cote Walls Farm, and that there may be faults in the southern polygon), then the indicative design would be reduced to approximately 300 Mcm working capacity (at 50% probability). If the faulting were found to extend into the northern polygon, then this volume might be even less. We consider therefore that a figure of 300 Mcm is a plausible minimum threshold for the purposes of the Order.

9.31 We consider that requiring a minimum threshold to be demonstrated still provides the Applicant with considerable flexibility. This is because it would be the first test to be met and if it is, then the development could be progressed as the Order proposes. If the Applicant can demonstrate that the two polygons can support the storage of at least 300 Mcm working capacity of gas then the justification for the scale of the supporting surface
infrastructure would have been made. It would then be up to the Applicant whether to construct up to 19 caverns to provide a working capacity of up to 600 Mcm of gas. The requirement would not oblige the Applicant to construct sufficient caverns to provide the minimum working capacity.

9.32 We recommend that if the Order is confirmed by the Secretary of State, the next immediate step would be to carry out a comprehensive geological survey of the two areas in which the caverns are proposed to be constructed. The purpose of this would be to demonstrate the top and bottom of the halite, the location of any faults and confirm the calculation of the volume of gas which can be stored.

9.33 We do not seek to prescribe the nature of such geological surveys. However, we understood from the Applicant at the IS hearing held on 19 September 2012, and the submissions made (REP243) that seismic-reflection surveys would be the most likely to provide a comprehensive grid of new geological information. As noted in paragraph 9.18 above, our understanding is that this nature of survey work is likely at an early stage in the Applicant's implementation programme in any event, though probably in a rather more piecemeal fashion than the comprehensive exercise we envisage. So we are of the view that this is more a matter of ensuring it is carried out at the outset of the development programme, rather than part way through it.

9.34 The results of such a survey, as far as the Applicant is concerned to confirm the validity of the projections of the 3D model, would be submitted to LCC for approval, and before the construction of any surface infrastructure begins. If LCC discharge the requirement, then the Applicant can proceed to implement the proposal. The detailed design of caverns and the submission of the pre-construction safety reports to the Competent Authority under the COMAH Regulations could progress in any event as provided for in Requirement 6.

9.35 We have considered whether this step should be one for WBC to approve, given that in every other instance it is the Borough Council designated as the relevant planning authority for the discharge of requirements. However, we are of the view that LCC is best placed to deal with these complex geological matters given its handling of the previous planning applications, and the expert advice it has sought from consultants to assist it in this regard. This is reinforced by the lack of any response from WBC to the consultation we carried out about this modification to the requirement (PD23).

9.36 We recommend therefore that two new sub paragraphs are inserted at the beginning of Requirement 6 in Schedule 9 of the Order as follows:
(1) **No stage of the authorised development shall commence until**

(a) a geological survey of the “area for cavern development” shown on the approved development plan with reference A-1000-030 Rev B has been carried out to confirm the top and bottom levels of the halite deposit and the presence of any faulting to a confidence limit of ±5 m;

(b) the working capacity of Work No 1A has been calculated taking account of the results of the geological survey and sub-paragraph 4 (a) to (h) of this requirement; and

(c) the results of the geological survey and the working capacity calculation have been submitted to and agreed by Lancashire County Council.

(2) **No authorised development shall be carried out if the working capacity of Work No 1A as agreed by Lancashire County Council pursuant to sub-paragraph 1 (c) is less than 300 million standard cubic metres at the standard temperature and pressure.**

(3) **No more than 19 operational caverns with a total storage capacity of up to --- continue requirement 6 as drafted.**

**Proposals for Modifications to Other Requirements**

9.37 Turning to noise requirements, as paragraphs 6.67 to 6.81 above explain, our concern about noise matters was to minimise the impact of construction noise on residential properties particularly at Harbour Village in Fleetwood, Kneps Farm Holiday Park and Flints Caravan Park. Version 5 of the DCO contained new sub clauses to Requirement 26 put forward by the Applicant which we consider negate the agreement to maximum noise levels achieved earlier in the examination. We consider therefore that Requirement 26 (8) and Requirement 26 (9) should be deleted, and references to these sub paragraphs in 26(6) and 26(7) should also be deleted.

9.38 We queried why the requirements provide for NE to be consulted by WBC prior to it agreeing details under Requirements 4, 9, 17, 18, 20, 26, 31 and 33 (PD26).This is at the request of NE to secure their approval to detailed measures necessary to avoid all mitigate significant effects on designated European sites. This is very much consistent with NE’s response to the habitats issues raised by the application, as set out in Chapter 6 above.

9.39 Nonetheless, we consider that such detailed prescription is unnecessary as NE’s primary interest is in landscape and ecological matters concerning designated European sites. We accept that NE’s interests should be reflected in Requirements 4, 7, 8 and 9. We would expect WBC to consult NE and indeed any other relevant statutory body in the normal course of handling requests to
discharge requirements as appropriate. For these reasons, we propose that the specific need to consult NE should be removed from Requirements 17 (fencing) 18 (ground/surface water and pollution prevention), 20 (external lighting) 26 (control of noise during construction and maintenance), 31 and 33 (decommissioning).

9.40 Finally, WBC submitted a comment on the DCO at the end of the examination requesting that Article 41 of the DCO dealing with arbitration should be amended to require each party in an arbitration event to bear their own costs. The Council's argument was that it could face a situation of having to meet all the costs of an arbitration claim (REP281, Appendix 28). The Applicant sets out reasons why this amendment to Article 41 should not be made (REP281, section 4) and we agree. For this reason, we recommend no modification to Article 41.

The S106 Agreement

9.41 We have considered the scope of the completed s106 agreement dated 22 October 2012 between the parties. The matters it covers are summarised in Appendix A. Although the s106 agreement is a matter between the parties and not specifically for decision by us, we conclude it is satisfactory in both the range of matters that covers, and the relationship with the requirements in the Order.

Application for Hazardous Substances Consent

9.42 An application for deemed HSC was submitted alongside the Order (APP15). Although not a statutory requirement, this was the subject of public consultation in September 2011. We have carried out the appropriate consultations with the local planning authorities and sought the advice of the HSE about those matters to which the Secretary of State must have regard in accordance with Regulation 6 of the Infrastructure Planning (Decisions) Regulations 2010. No issues were raised by WBC, and the HSE advised that unless there are any changes to the application since it was first consulted, it is unlikely that HSE would advise against the proposal.

9.43 We posed the questions to WBC relating to the use of land in the vicinity of the application required by the Regulation (PD2, question 9/1) and WBC responded at REP200. We also requested the Applicant (PD25) to draft the proposed hazardous substances direction in conjunction with the HSE concerning any conditions it may wish to impose in order to meet the requirements of paragraph 6 of the Regulations concerning the current land-use position, particularly in the light of WBC's response at REP200. The Applicant responded on 12 October 2012 which sets out the content of a proposed direction and condition (REP322).

9.44 In the light of this, we are able to recommend to the Secretary of State that deemed HSC should be granted under s12 of the
10 OVERALL CONCLUSIONS AND RECOMMENDATION

10.1 In coming to our overall conclusions, we have had regard to the matters listed in s104 (2) of the Planning Act 2008 as amended.

10.2 We conclude for the reasons set out above that the proposal would accord with NPSs EN-1 and EN-4. Section 104(3) of the Planning Act 2008 requires that the application must be decided in accordance with any relevant national policy statement, unless one or more of the exceptions in s104 (4) to (8) applies. We have had regard to the LIRs submitted by LCC and WBC.

10.3 We have considered the application against the test set by s104 (7) of the Planning Act 2008 and conclude, for the reasons stated in this report, that subject to the modifications to the Order that we propose, the adverse impacts of the proposed development would not outweigh its benefits.

10.4 As to the other exceptions referred to in s104, we find no reason to suppose that deciding the application in accordance with the relevant national policy statements would either:

- lead to the United Kingdom being in breach of its international obligations
- lead to the Secretary of State being in breach of any duty imposed on the Secretary of State by or under any enactment.
- be otherwise unlawful by virtue of any enactment.

10.5 We have further considered the effect the proposal would have on all potentially affected European and Ramsar sites. With the safeguards that would be secured by the requirements we recommend should be attached to any Order that the Secretary of State is minded to make, our conclusion is that the integrity of none of the sites would be compromised.

10.6 We have also considered the request for powers of compulsory acquisition to be included in any Order that is made and conclude that there is a compelling case in the public interest for the grant of the compulsory acquisition powers sought by the Applicant in respect of the CA Land shown on the Land Plans (as amended).

RECOMMENDATION

10.7 For the reasons set out above the Panel, as the Examining authority under s74 of the Planning Act 2008, concludes that subject to receipt of the certificate under s131(3)(b) referred to at paragraph 8.41, development consent for the Preesall underground gas storage facility should be granted and therefore recommends the Secretary of State to make an Order under s114 of the Planning Act 2008 in the form at Appendix D.
10.8 We also recommend the Secretary of State that deemed HSC should be granted under s12 of the Planning (Hazardous Substances) Act 1990 as amended by Schedule 2, paragraph 45 of the Planning Act 2008.
APPENDIX A – OBLIGATIONS

The S106 Agreement (REP281, Appendix 24)

Signatories

- Wyre Borough Council
- Halite Energy Group Limited
- Preesall Energy Services Ltd
- BNP Paribas SA
- Laminar Direct Capital Luxembourg S.A.R.L
- Ross and Catherine Hill Family Limited Partnership III

Summary of Provisions

Agreed on 18 October 2012 with the following provisions:

- maximising employment opportunities at the development for people living in the area of WBC and tendering of contracts for local goods and services
- continuation of a community liaison panel during between Halite, WBC, LCC, parish councils and residents
- prior to implementation of the development, WBC to approve and have a charge over a decommissioning scheme fund
- the purpose of the fund is to meet the costs if the development programme stalls for a lengthy period during construction, or Halite fails to implement an approved scheme for decommissioning in accordance with the requirements in the Order
- payment of fees by Halite to WBC to meet the costs of discharging actions included in the requirements in Schedule 9 of the Order
- payment by Halite to WBC meet the costs of monitoring the construction, operation and decommissioning of the development
- Halite to prepare a programme for monitoring and maintenance of existing brinewells, for approval by WBC following consultation with the HSE
- establishment of a separate fund to meet all the costs of compulsory acquisition authorised under the Order
- measures to ensure that during construction, vehicles entering and leaving the Preesall site use the new access road only, and HGVs comply with a routing plan, to preclude the use of Cemetery Lane.

Agreement with the Environment Agency (REP281, Appendix 26)

Signatories

- Halite Energy Group Limited
- Environment Agency

Summary of Provisions

Agreed on 18 October 2012 with the following provision:
Halite to meet the costs of maintaining the flood defences on the eastern side of the Estuary to the standards required by the EA should any damage to them occur consequent upon the construction of the pipelines under the Estuary between the seawater pump station in Fleetwood Fish Dock and the booster pump station, or the drilling works necessary for the creation of wellhead compounds 5 and 7.

**Option Agreement with Blackpool Borough Council (REP308)**

**Signatories**

- Halite Energy Group Limited
- Blackpool Borough Council

**Summary of Provisions**

Agreed on 22 October 2012 with the following provision:

Instead of using its compulsory acquisition powers (if granted), an easement is be granted in payment of an agreed consideration as a consequence of which the Applicant can construct a pipeline beneath the tramway to the rear of the properties in South Strand Fleetwood (adjacent to Rossall Square Station).

**Unilateral Undertaking to the Knott End Golf Club (REP281, Appendix 7)**

**Signatory**

- Halite Energy Group Limited

**Summary of Provisions**

Undertaking offered 22 October 2012 with the following provisions:

- Halite offer to limit the exercise of compulsory acquisition powers, if granted, over the surface of the golf course to the installation, and inspection etc of substance monitoring equipment.
- Halite will minimise disruption to the use of the golf course in terms of the location of substance monitoring equipment, and the times when site inspections are needed.
- Subsurface rights to be granted by the Order are not affected.

Rejected by Knott End Golf Club (REP281, Appendix 8)
APPENDIX B – THE EXAMINATION

The table below lists the main ‘events’ occurring during the examination and the main procedural decisions taken by the Panel.

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<td>Preliminary Meeting</td>
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<td>2 May 2012</td>
<td>Notice of procedural decision including confirmation of the examination timetable and first round of written questions from the Examining authority (ExA)</td>
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<tr>
<td>3 May 2012</td>
<td>Accompanied site visit to the application site</td>
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<td>6 June 2012</td>
<td>Deadline for receipt of:</td>
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<td>• Local Impact Report (s) (LIRs)</td>
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<td>• Statements of common ground (SoCG)</td>
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<td>4 July 2012</td>
<td>Deadline for receipt of comments on:</td>
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<td>• Relevant and written representations</td>
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<td></td>
<td>• Responses to the ExA’s questions</td>
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<td>• LIRs</td>
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<tr>
<td>18 July 2012</td>
<td>Issue of the ExA’s second round of written questions</td>
</tr>
<tr>
<td>24 July 2012</td>
<td>Issue specific (IS) hearing to consider the drafting aspects of the draft Development Consent Order, and the proposed agreement between the Applicant and local planning authorities under s106 of the Town and Country Planning Act 1990</td>
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<tr>
<td>15 August 2012</td>
<td>Deadline for (i) responses to the ExA’s second round of written questions and (ii) for interested parties to make representations to the ExA of the need for issue specific hearings</td>
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## Examination Events

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<tr>
<td>24 August 2012</td>
<td>Letter (Rule 17) from ExA to the Applicant and other specified IPs concerning the Conservation of Habitats and Species (Amendment) Regulations 2010</td>
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<tr>
<td>24 August 2012</td>
<td>Letter (Rule 17[^1]) from ExA to the Applicant and other specified interested parties concerning the Conservation of Habitats and Species (Amendment) Regulations 2010</td>
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<td>24 August 2012</td>
<td>ExA notification of the programme for further IS hearings</td>
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<td>24 August 2012</td>
<td>Deadline for the receipt of comments on responses to the ExA’s second round of written questions</td>
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<tr>
<td>24 August 2012</td>
<td>Deadline for i) interested parties to notify the ExA of their intention to be heard at an open floor (OF) hearing and ii) affected persons to notify the ExA of their wish to be heard at a compulsory acquisition (CA) hearing</td>
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<tr>
<td>31 August 2012</td>
<td>Letter from the ExA confirming dates and arrangements for the CA hearing</td>
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<tr>
<td>6 September 2012</td>
<td>Letter from the ExA confirming dates and arrangements for the OF hearing</td>
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<td>6 September 2012</td>
<td>Letter from the ExA confirming the arrangements and agenda for the IS hearings on 18 and 19 September</td>
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<td>18 September 2012</td>
<td>IS hearing on drafting of the DCO and requirements, the draft deemed marine licence and proposed s106 agreement</td>
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<td>19 September 2012</td>
<td>IS hearing on the relationship between the Order and the COMAH Regulations</td>
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<td>26 September 2012</td>
<td>Letter (Rule 17) from the ExA to the Applicant concerning Crown Land</td>
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<td>Letter (Rule 17) from the ExA to the Applicant and specified IPs inviting written representations about a proposed addition to Requirement 6 of the Order</td>
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<td>Letter from the ExA to the Applicant concerning proposed amendments to plans relating to the brine discharge outfall</td>
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<td>3 October 2012</td>
<td>Letter (Rule 17) from ExA to the Applicant concerning Part 5 of the Book of Reference</td>
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<tr>
<td>3 October 2012</td>
<td>Letter (Rule 17) from the ExA to the Applicant concerning the draft Hazardous Substances Direction, preparation of the final draft DCO and a list of minor corrections to the Order</td>
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<td>Deadline for the submission of the final draft of the DCO and proposed s106 agreement</td>
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PD  Project Documents – documents relating to the project excluding the application documents. These include the procedural decisions made by the ExA. Additional reference numbers (for example H6) are those used by the Applicant.

REP  Representations and Submissions – representations and submissions made to the Planning Inspectorate in accordance with the procedural deadlines specified in the examination timetable issued in the Rule 8 letter at the start of the examination. Also additional evidence or documents received during the examination outside these deadlines and accepted by the Panel. Additional reference numbers (for example H1) are those used by the Applicant.

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APP3  1.3 Register of Application Documents
APP4  1.6 Newspaper Notices Report
APP5  2.1 Application boundary plans 1 2
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APP9  2.5 Design drawings, sections and overview plans 1 2

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**RELEVANT REPRESENTATIONS**

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| REP2 | Ray Hutchinson |
| REP3 | Mrs Gemma Jackson |
| REP4 | Mrs Joan Reilly |
| REP5 | Mr Jeanne Kenneth Manning |
| REP6 | D.S.Jackson |
| REP7 | Peter Hulme |
| REP8 | A Beniston |
| REP9 | M. J. Jackson |
| REP10 | Neville Mawdsley |
| REP11 | Mrs. V. Parkinson |
| REP12 | George J T Parkinson |
| REP13 | Mr Ben Wallace MP |
| REP14 | R.S. Jackson |
| REP15 | Kenneth Wade |
| REP16 | John William Croft |
| REP17 | Paul Maynard MP |
| REP18 | Eric Ollerenshaw OBE MP |
| REP19 | David Evans |
| REP20 | Peter Boden Haigh |
| REP21 | John Bradbury |
| REP22 | Ruth Bradbury |
| REP23 | Jacqueline Budhwani |
| REP24 | Fleetwood Civic Society |
| REP25 | Mrs Rosemary Hogarth |
| REP26 | Gordon Heald |
| REP27 | Sarah Johnson |
| REP28 | Over Wyre Action Group (OWAG) |
| REP29 | Ms Lesley Maxwell |
| REP30 | Robert Foden |
| REP31 | Kevin Mellor |
| REP32 | Cllr Lady Atkins |
| REP33 | Anthony Coppin |
| REP34 | South Ribble Borough Council |
| REP35 | Dr MD Connaughton |
| REP36 | Howard Phillips |
| REP37 | Kenneth Davenport |
| REP38 | John Holmes on behalf of Electricity North West Limited |
| REP39 | Edward Hogarth |
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**WRITTEN REPRESENTATIONS**

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PREESALL UNDERGROUND GAS STORAGE FACILITY

Panel's Report to the Secretary of State

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COMMENTS ON RELEVANT AND WRITTEN REPRESENTATIONS, AND LOCAL IMPACT REPORTS

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**DRAFT DEVELOPMENT CONSENT ORDERS AND RELATED DOCUMENTS**

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<td>REP286</td>
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<td>19/03/2012 - Invitation to Preliminary Meeting and Initial Assessment of Principal Issues</td>
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<td>27/07/2012 - Notice of Cancellation of 22 August IS Hearing</td>
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<td>02/08/2012 - Letter to Halite regarding wellhead plans</td>
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<td>PD9</td>
<td>23/08/2012 - Notice of 18 and 19 September IS Hearings</td>
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<td>PD10</td>
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<td>PD11</td>
<td>06/09/2012 - Venues for OF hearings</td>
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<td>PD14</td>
<td>02/10/2012 - Letter Accepting Proposed Changes to Outfall Pipeline</td>
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<td>PD15</td>
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<td>18/04/2012 - Letter from BLP regarding S56 advertisements</td>
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<td>PD17</td>
<td>[H6][H7]15/08/2012 - Letter from BLP seeking to amend outfall pipeline</td>
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<td>23/08/2012 - Letter from BLP regarding request for hearing</td>
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<td>REP312</td>
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**STATEMENTS OF COMMON GROUND**

SoCG  [H2] List of Statements of Common Ground
SoCG1  Geology (Halite Energy and LCC)
SoCG1A Geology (Halite Energy and WBC Endorsement)
SoCG2  Ecology and Habitats Regulations Assessment (Halite Energy and NE)
SoCG3  Draft DCO (Halite Energy and LCC)
SoCG4  LEMSP (Halite Energy and WBC)
SoCG5  LEMSP (Halite Energy and LCC)
SoCG5A LEMSP (Halite Energy and WBC Endorsement)
SoCG6  Transport and Access (Halite Energy and LCC)
SoCG6A Transport and Access (Halite Energy and WBC Endorsement)
SoCG7  Noise and Vibration (Halite Energy and WBC)
SoCG8  Application for deemed Hazardous Substances Consent (Halite Energy and HSE)
SoCG8A Application for deemed Hazardous Substances Consent (Halite Energy and WBC Endorsement)
SoCG9  Reference not assigned
SoCG10 Deemed Marine Licence (Halite Energy and MMO)
SoCG11 Ecology (Halite Energy and EA)
SoCG12 Ecology (Halite Energy and RSPB)
SoCG13 Ecology (Halite Energy and LWT)
SoCG14 Ecology (Halite Energy and LCC)
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SoCG15 Safety and risk above ground (Halite Energy and LCC)
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SoCG23 Marine water quality (Halite Energy and MMO)
SoCG24 Transport and Access (Halite Energy and Highways Agency)
SoCG25 Health Impact (Halite Energy and NHS North Lancashire)
SoCG26 Sustainable use of salt (Halite Energy and WBC)
SoCG27 Use of Salt (Halite Energy and LCC)
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## Parties Making Oral Representations at Hearings

### MEETINGS

**Preliminary Meeting - 24 April 2012**
- Halite Energy (Michael Humphries QC)
- Wyre Borough Council (David Thow)
- Lancashire County Council (Stuart Perigo and Ian Blinkho)
- Stalmine with Staynall Parish Council (June Jackson)
- Roy Pickup
- Protect Wyre Group (Ian Mulroy and Howard Phillips)
- Hilda Dickinson
- Mandy Knott

**First Issue Specific Hearing (DCO) 24 July 2012**
- Halite Energy (Michael Humphries QC and Jeremy Pike)
- Environment Agency (Jeremy Pickup)
- Marine Management Organisation (Jonathan Peters and Richard Moles)
- Protect Wyre Group (Ian Mulroy and Howard Phillips)
- Wyre Borough Council (Vicky Westhead)
- Lancashire County Council (Stuart Perigo)

**Second Issue Specific Hearing (DCO) 18 September 2012**
- Halite Energy (Michael Humphries QC)
- Knott End Golf Club (Derek Hughes)
- Marine Management Organisation (Jonathan Peters and Richard Moles)
- Environment Agency (Amy Heys)
- Blackpool Borough Council (Ruth Stockley and Carmel White)
- Wyre Borough Council (Sarah Reid and Vicky Westhead)
- Lancashire County Council (Stuart Perigo and Claire Hallwood)
- Natural England (Janet Belfield)

**Third Issue Specific Hearing (COMAH) 19 September 2012**
- Halite Energy (Michael Humphries QC and Brian Stanley - Safety and Risk Director)
- Halite Energy (Colin Harding - Divisional Director for Geology and Nigel Harrison - Associate Director for Safety – Mott MacDonald)
- Environment Agency (Kevin Lodge and Amy Heys)
- Protect Wyre Group (Howard Phillips)
- Lancashire County Council (Stuart Perigo)

### COMPULSORY ACQUISITION HEARING

**Compulsory Acquisition Hearing 9 October 2012**
- Halite Energy (Michael Humphries QC and William Bashall)
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**OPEN FLOOR HEARING**

**17 October 2012**
**Morning: Fleetwood**
- Wilfred Marsh
- David Entwistle

**Afternoon: Fleetwood**
- (None)

**Evening: Fleetwood**
- Malcolm Clegg
- Howard Phillips
- Ian Mulroy
- Geoff Draper
- David Aston
- David Entwistle

**18 October 2012**
**Morning: Stalmine**
- (None)

**Afternoon: Stalmine**
- Mike Tucker
- Roy Pickup

**Evening: Stalmine**
- June Jackson (Stalmine with Staynall Parish Council)
- Ben Wallace MP
- Eric Ollerenshaw MP
- Paul Maynard MP
- Janet Whitlow
- Mark Hamer
- David Evans
- Ken Jenson
- Jeremy Pike (Halite Energy)
APPENDIX D – THE DEVELOPMENT CONSENT ORDER
The [Draft] Preesall (Underground Gas Storage Facility) Development Consent Order 201[●]

Made - - - - [●] 201[●]

Coming into force - - [●] 201[●]

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5. Limits of Deviation
6. Defence to proceedings in respect of statutory nuisance

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7. Benefit of Order
8. Transfer of benefit of Order

Streets

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10. Power to alter layout, etc., of streets
11. Maintenance of altered streets
12. Temporary stopping up of streets and rights of way
13. Access to works
14. Agreements with street authorities

Supplemental powers

15. Discharge of water
16. Protective work to buildings
17. Authority to survey and investigate the land
PART 3
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19. Compulsory acquisition of rights
20. Acquisition of subsoil only
21. Power to override easements and other rights

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24. Temporary use of land for maintaining authorised development

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25. Disregard of certain interests and improvements
26. Set-off for enhancement in value of retained land
27. No double recovery

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SCHEDULE 9 — REQUIREMENTS
An application was made to the former Infrastructure Planning Commission in accordance with section 37 of the Planning Act 2008(a) for an order under sections 37, 114, 115, 120, 121, 122, 123 and 142 of that Act.

The Examining authority (b) appointed by the former Infrastructure Planning Commission examined the application in accordance with Chapter 4 of Part 6 of that Act(c) and made a recommendation under section 74 of that Act(d) that the application should be granted.

Accordingly, the Secretary of State, having the function of deciding the application(e), in exercise of the powers conferred by sections 103, 114, 115, 120, 121, 122, 123 and 142 of that Act, makes the following Order—

PART 1
PRELIMINARY

Citation and Commencement

1. This Order may be cited as the Preesall (Underground Gas Storage Facility) Development Consent Order 201[●] and shall come into force on [●] 201[●].

Interpretation

2.—(1) In this Order—

“the 1961 Act” means the Land Compensation Act 1961(f);
“the 1965 Act” means the Compulsory Purchase Act 1965(g);
“the 1980 Act” means the Highways Act 1980(h);
“the 1984 Act” means the Road Traffic Regulation Act 1984(i);
“the 1990 Act” means the Town and Country Planning Act 1990(j);
“the 1991 Act” means the New Roads and Street Works Act 1991(k);
“the 2008 Act” means the Planning Act 2008;
“access and temporary stopping up plans” means the plans certified as the access and temporary stopping up plans by the Secretary of State for the purposes of this Order;
“authorised development” means the development and associated development described in Schedule 1 (authorised development) and any other development authorised by this Order, which is development within the meaning of section 32 of the 2008 Act;
“Blackpool Borough Council” has the same meaning as in Part 3 of Schedule 8 (protective provisions);

(a) 2008 c.29; section 37 is amended by the Localism Act 2011 (c. 20) s.137 and Sch. 13, para.3(2), (3).
(b) See section 86 of the Planning Act 2008 as amended by the Localism Act 2011, Sch. 13 para.37.
(c) The provisions of that Part are amended by the Localism Act 2011.
(d) Section 74 is amended by the Localism Act 2011, Sch.13 para.29(3) and Sch. 25 para.1.
(e) See section 103 of the Planning Act 2008 as amended by the Localism Act 2011 Schs. 13, 25.
(f) 1961 c.33.
(g) 1965 c.56.
(h) 1980 c.66.
(i) 1984 c. 27.
(j) 1990 c.8.
(k) 1991 c.22.
“the book of reference” means the book of reference certified by the Secretary of State as the book of reference for the purposes of this Order;
“building” includes any structure or erection or any part of a building, structure or erection;
“carriageway” has the same meaning as in the 1980 Act;
“compulsory acquisition notice” means a notice served in accordance with section 134 of the 2008 Act;
“gas” has the same meaning as natural gas in section 235 (interpretation) of the 2008 Act;
“Halite Energy Group” means Halite Energy Group Limited (company number 04145789) whose registered office is at Unit 5, St Georges Park, Kirkham, Lancashire, PR4 2EF;
“highway” and “highway authority” have the same meaning as in the 1980 Act;
“existing brine cavern” means any brine cavern which existed prior to the making of this Order;
“existing brine well” means any brine well which existed prior to the making of this Order;
“the land plans” means the plans certified as the land plans by the Secretary of State for the purposes of this Order;
“maintain” includes maintain, inspect, repair, adjust, alter, remove, clear, refurbish, reconstruct, decommission, demolish, replace or improve the authorised development and “maintaining” and “maintenance” shall be construed accordingly;
“operational cavern” means an underground cavern created pursuant to the powers contained in this Order and brought into operation for the storage of gas;
“Order land” means the land shown on the land plans which is within the limits of land to be acquired and described in the book of reference;
“the Order limits” means the limits shown on the works plans within which the authorised development may be carried out;
“owner”, in relation to land, has the same meaning as in section 7 of the Acquisition of Land Act 1981(a);
“Preesall halite deposit” means the member of the Kirkham Mudstone formation being a deposit characterised by halite with varying marl content and localised mudstone interbeds, more particularly described and shown as the Preesall Salt on the Geological Survey of Great Britain (England and Wales) Sheet 66, 1:50,000 Series, Solid and Drift Edition, of the British Geological Survey Classification entitled “The Geology of the country around Blackpool” dated 1990 and further described in the accompanying British Geological Survey Sheet Memoir 66;
“relevant planning authority” means Wyre Borough Council and any successors to its function as planning authority for the area in which the land to which the provisions of this Order apply;
“solution mining” means the pumping of a leaching solution into the Preesall halite deposit, such that the leaching solution dissolves the halite, thereby forming a void, and is then pumped back to surface as a halite saturated brine;
the “standard temperature and pressure” means 15 degrees centigrade and 1 bar atmospheric;
“statutory undertaker” means any person falling within section 127(8), 128(5) or 129(2) of the 2008 Act;
“street” means a street within the meaning of section 48 of the 1991 Act(b), together with land on the verge of a street or between two carriageways, and includes part of a street;
“street authority”, in relation to a street, has the same meaning as in Part 3 of the 1991 Act;
“the tribunal” means the Lands Chamber of the Upper Tribunal;

(a) 1981 c.67; the definition of “owner” is amended by the Planning and Compensation Act 1991 c. 34 Sch.15(I) para.9.
(b) Section 48 is amended by the Local Transport Act 2008 c. 26 Pt 7 s.124(2).
“UK marine area” has the same meaning as in section 42 of the Marine and Coastal Access Act 2009(a);

“undertaker” means the person who has the benefit of this Order in accordance with Articles 7 and 8 of this Order;

“watercourse” includes all rivers, streams, ditches, drains, canals, cuts, culverts, dykes, sluices, sewers and passages through which water flows except a public sewer or drain; and

“the works plans” means the plans certified as the works plans by the Secretary of State for the purposes of this Order.

(2) Save for the definition of the “undertaker”, the definitions in paragraph 1 shall not apply to Schedule 7 (deemed marine licence under Part 4 of the Marine and Coastal Access Act 2009).

(3) The definition of the “undertaker” in paragraph 1 shall not apply to Schedule 8 (protective provisions).

(4) References in this Order to rights over land include references to rights to do or to place and maintain, anything in, on or under land or in the air-space above its surface.

(5) All distances, directions and lengths referred to in this Order and any document referred to in this Order are approximate and distances between points on a work comprised in the authorised development shall be taken to be measured along that work.

PART 2
WORKS PROVISIONS

Development consent etc. granted by the Order

3. Subject to the provisions of this Order and to the requirements in Schedule 9 (requirements) the undertaker is granted—

(a) development consent for the authorised development to be carried out within the Order limits; and

(b) consent to use the authorised development for the purpose for which it is designed including use of the cavities to be created for the underground storage of gas.

Maintenance of authorised development

4.—(1) The undertaker may at any time maintain the authorised development, except to the extent that this Order, or an agreement made under this Order, provides otherwise and may enter on any land within the Order limits if such entrance is reasonably required for the purpose of maintaining the authorised development.

(2) Subject to paragraph (3) and to the requirements in Schedule 9 (requirements), the power to maintain the authorised development includes the power to carry out and maintain such of the following works as may be necessary or expedient for the purposes of, or for purposes ancillary to, the construction or operation of the authorised development, namely—

(a) works to alter the position of apparatus below ground level, including mains, sewers, drains and cables including below ground structures associated with that apparatus within the Order limits;

(b) works of decommissioning and demolition.

(3) Paragraph (2) shall only authorise the carrying out or maintenance of works within the Order limits.

(a) 2009 c.23.
Limits of Deviation

5. In constructing or maintaining the authorised development, the undertaker may deviate laterally from the lines or situations of the authorised development shown on the works plans to the extent of the limits of deviation shown on those plans.

Defence to proceedings in respect of statutory nuisance

6.—(1) Where proceedings are brought under section 82(1) of the Environmental Protection Act 1990(a) (summary proceedings by person aggrieved by statutory nuisance) in relation to a nuisance falling within paragraph (g) of section 79(1) of that Act (noise emitted from premises so as to be prejudicial to health or a nuisance) no order shall be made, and no fine may be imposed, under section 82(2) of that Act if—

(a) the defendant shows that the nuisance—

(i) relates to premises used by the undertaker for the purposes of or in connection with the construction or maintenance of the authorised development and that the nuisance is attributable to the carrying out of the authorised development in accordance with a notice served under section 60 (control of noise on construction site), or a consent given under section 61 (prior consent for work on construction site) or 65 (noise exceeding registered level), of the Control of Pollution Act 1974(b); or

(ii) is a consequence of the construction or maintenance of the authorised development and that it cannot reasonably be avoided; or

(b) the defendant shows that the nuisance—

(i) relates to premises used by the undertaker for the purposes of or in connection with the use of the authorised development and that the nuisance is attributable to the use of the authorised development which is being used in accordance with a scheme for noise management approved by the relevant planning authority as described in paragraph 27 of Schedule 9 (requirements); or

(ii) is a consequence of the use of the authorised development and that it cannot reasonably be avoided.

(2) Section 61(9) (consent for work on construction site to include statement that it does not of itself constitute a defence to proceedings under section 82 of the Environmental Protection Act 1990) of the Control of Pollution Act 1974 and section 65(8) of that Act (corresponding provision in relation to consent for registered noise level to be exceeded), shall not apply where the consent relates to the use of premises by the undertaker for the purposes of or in connection with the construction or maintenance of the authorised development.

Benefit of Order

7. Subject to article 8 (transfer of benefit of Order), the provisions of this Order shall have effect solely for the benefit of Halite Energy Group.

Transfer of benefit of Order

8.—(1) The undertaker may with the consent of the Secretary of State—

(a) transfer to another person (“the transferee”) any or all of the benefit of the provisions of this Order and such related rights as may be agreed between the undertaker and the transferee; or

(a) 1990 c.43. section 82 is amended by section 5 of the Noise and Statutory Nuisance Act 1993 (c.40), Schedule 17 to the Environment Act 1995 (c.25) and section 103 of the Clean Neighbourhoods and Environment Act 2005 (c.16).
(b) 1974 c.40. sections 61 and 65 are amended by section 133 of the Building Act 1984 (c.55), Schedule 24 to the Environment Act 1995 (c.25) and section 162 of, and Schedule 15 to, the Environmental Protection Act 1990 (c.43); there are other amendments not relevant to this Order.
(b) grant to another person ("the lessee") for a period agreed between the undertaker and the lessee any or all of the benefit of the provisions of this Order and such related statutory rights as may be so agreed.

(2) Where an agreement has been made in accordance with paragraph (1) references in this Order to the undertaker shall include references to the transferee or the lessee.

(3) The exercise by a person of any benefits or rights conferred in accordance with any transfer or grant under paragraph (1) shall be subject to the same restrictions, liabilities and obligations as would apply under this Order if those benefits or rights were exercised by Halite Energy Group.

Streets

Street works

9.—(1) The undertaker may, for the purposes of the authorised development, enter on so much of any of the streets specified in Schedule 2 (streets subject to street works) as is within the Order limits and may—

(a) break up or open the street, or any sewer, drain or tunnel under it;
(b) tunnel or bore under the street;
(c) place apparatus in the street;
(d) maintain apparatus in the street or change its position;
(e) demolish, remove, replace and relocate any bus shelter and associated bus stop infrastructure;
(f) execute any works to provide or improve sight lines required by the highway authority; and
(g) execute any works required for or incidental to any works referred to in sub-paragraphs (a), (b), (c), (d), (e) and (f).

(2) The authority given by paragraph (1) is a statutory right for the purposes of sections 48(3) (streets, street works and undertakers) and 51(1) (prohibition of unauthorised street works) of the 1991 Act(a).

(3) The provisions of sections 54 to 106 of the 1991(b) Act apply to any street works carried out under paragraph (1).

(4) In this article “apparatus” has the same meaning as in Part 3 of the 1991 Act save that it shall further include a bus shelter and associated bus stop infrastructure.

Power to alter layout, etc., of streets

10.—(1) The undertaker may alter the layout of or carry out any ancillary works in the street specified in column (2) of Schedule 3 (streets subject to alteration of layout) in the manner specified in relation to that street in column (3).

(2) Without prejudice to the specific powers conferred by article 3 or paragraph (1) but subject to paragraph (3), the undertaker may, for the purposes of constructing and maintaining the authorised development, alter the layout of any street within the Order limits and the layout of any street having a junction with such a street; and, without limiting the scope of this paragraph, the undertaker may—

(a) increase the width of the carriageway of the street by reducing the width of any kerb, footpath, footway, cycle track or verge within the street;

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(a) Section 48 is amended by the Local Transport Act 2008 (c. 26) s.124(2); section 51 is amended by Schedule 1 to the Traffic Management Act 2004 (c.18).
(b) Sections 54 to 106 are amended by Schedule 7 to the Road Traffic Act 1991 (c.40), Schedule 1 to the Water Consolidation (Consequential Provisions) Act 1991 (c.60), sections 255 and 256 of the Transport Act 2000 (c.38), sections 40 to 64 of, and Schedule 1 to, the Traffic Management Act 2004 (c.18), Schedule 3 to the Flood and Water Management Act 2010 (c.29), and regulation 17 of S.I. 2007/1951; there are other amendments that are not relevant to this Order.
(b) alter the level or increase the width of any such kerb, footpath, footway, cycle track or verge; and
(c) reduce the width of the carriageway of the street.

(3) The powers conferred by paragraph (2) shall not be exercised without the consent of the street authority but such consent shall not be unreasonably withheld.

(4) The alteration of the layout of any street carried out pursuant to paragraphs (1) or (2) shall be completed to the reasonable satisfaction of the street authority.

**Maintenance of altered streets**

11.—(1) Where a street is altered or diverted under this Order, the altered or diverted part of the street shall, unless otherwise agreed with the street authority, be maintained by and at the expense of the undertaker.

(2) In any action against the undertaker in respect of loss or damage resulting from any failure by it to maintain a street under this article, it shall be a defence (without prejudice to any other defence or the application of the law relating to contributory negligence) to prove that the undertaker had taken such care as in all the circumstances was reasonably required to secure that the part of the street to which the action relates was not dangerous to traffic.

(3) For the purposes of a defence under paragraph (2), the court shall in particular have regard to the following matters—

(a) the character of the street and the traffic which was reasonably to be expected to use it;
(b) the standard of maintenance appropriate for a street of that character and used by such traffic;
(c) the state of repair in which a reasonable person would have expected to find the street;
(d) whether the undertaker knew, or could reasonably have been expected to know, that the condition of the part of the street to which the action relates was likely to cause danger to users of the street;
(e) where the undertaker could not reasonably have been expected to repair that part of the street before the cause of action arose, what warning notices of its condition had been displayed,

but for the purposes of such a defence it is not relevant to prove that the undertaker had arranged for a competent person to carry out or supervise the maintenance of the part of the street to which the action relates unless it is also proved that the undertaker had given the competent person proper instructions with regard to the maintenance of the street and that the competent person had carried out those instructions.

**Temporary stopping up of streets and rights of way**

12.—(1) The undertaker, during and for the purposes of carrying out the authorised development, may temporarily stop up, alter or divert any street or any other right of way and may for any reasonable time—

(a) divert the traffic or a class of traffic from the street or right of way; and
(b) subject to paragraph (2), prevent all persons from passing along the street or right of way.

(2) The undertaker shall provide reasonable access for pedestrians going to or from premises abutting a street affected by the temporary stopping up, alteration or diversion of a street under this article if there would otherwise be no such access.

(3) Without prejudice to the generality of paragraph (1), the undertaker may temporarily stop up, alter or divert the streets or rights of way specified in columns (1) and (2) of Schedule 4 (streets and rights of way to be temporarily stopped up) to the extent specified, by reference to the letters and numbers shown on the access and temporary stopping up plans, in column (3) of that Schedule.

(4) The undertaker shall restore to the reasonable satisfaction of the highway authority any street that has been temporarily stopped up, altered or diverted under paragraph (1).
(5) The undertaker shall not temporarily stop up, alter or divert—

(a) any street or right of way specified as mentioned in paragraph (3) without first consulting the highway authority; and

(b) any other street without the consent of the highway authority which may attach reasonable conditions to any consent.

(6) Any person who suffers loss by the suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

Access to works

13.—(1) The undertaker may, for the purposes of the construction and/or the maintenance of the authorised development—

(a) form and lay out means of access, or improve existing means of access, in the locations specified in columns (1) and (2) of Schedule 5 (access to works); and

(b) with the approval of the relevant planning authority after consultation with the highway authority, form and lay out such other means of access or improve existing means of access, at such locations within the Order limits as the undertaker reasonably requires for the purposes of the authorised development.

Agreements with street authorities

14.—(1) A street authority and the undertaker may enter into agreements with respect to—

(a) the construction of any new street including any structure carrying the street over or under any part of the authorised development;

(b) the strengthening, improvement, repair or reconstruction of any street under the powers conferred by this Order;

(c) any stopping up, alteration or diversion of a street authorised by this Order; or

(d) the carrying out in the street of any of the works referred to in article 9(1) (street works).

(2) Such an agreement may, without prejudice to the generality of paragraph (1)—

(a) make provision for the street authority to carry out any function under this Order which relates to the street in question;

(b) include an agreement between the undertaker and street authority specifying a reasonable time for completion of the works; and

(c) contain such terms as to payment and otherwise as the parties consider appropriate.

Supplemental powers

Discharge of water

15.—(1) The undertaker may use any watercourse or any public sewer or drain for the drainage of water in connection with the carrying out or maintenance of the authorised development and for that purpose may lay down, take up and alter pipes and may, on any land within the Order limits, make openings into, and connections with, the watercourse, public sewer or drain.

(2) Any dispute arising from the making of connections to or the use of a public sewer or drain by the undertaker pursuant to paragraph (1) shall be determined as if it were a dispute under section 106 of the Water Industry Act 1991(a) (right to communicate with public sewers).

(3) The undertaker shall not discharge any water into any watercourse, public sewer or drain except with the consent of the person to whom it belongs; and such consent may be given subject to

(a) 1991 c.56; section 106 is amended by sections 36(2) and 99 of the Water Act 2003 (c.37). There are other amendments to this section which are not relevant to this Order.
such terms and conditions as that person may reasonably impose, but shall not be unreasonably withheld.

(4) The undertaker shall not make any opening into any public sewer or drain except—

(a) in accordance with plans approved by the person to whom the sewer or drain belongs, but such approval shall not be unreasonably withheld; and

(b) where that person has been given the opportunity to supervise the making of the opening.

(5) The undertaker shall not, in carrying out or maintaining works pursuant to this article, damage or interfere with the bed or banks of any watercourse forming part of a main river.

(6) The undertaker shall take such steps as are reasonably practicable to secure that any water discharged into a watercourse or public sewer or drain pursuant to this article is as free as may be practicable from gravel, soil or other solid substance, oil or matter in suspension.

(7) This article does not authorise the discharge or entry into inland fresh waters or coastal waters of any matter whose entry or discharge into those waters is prohibited by regulation 38 of the Environmental Permitting (England and Wales) Regulations 2010(a).

(8) In this article—

(a) “public sewer or drain” means a sewer or drain which belongs to the Homes and Communities Agency, the Environment Agency or a harbour authority within the meaning of section 57 of the Harbours Act 1964(b) (interpretation), an internal drainage board, a joint planning board, a local authority or a sewerage undertaker; and

(b) Other expressions, excluding watercourse, used both in this article and in the Water Resources Act 1991 have the same meaning as in that Act.

Protective work to buildings

16.—(1) Subject to the following provisions of this article, the undertaker may at its own expense carry out such protective works to any building lying within the Order limits as the undertaker considers necessary or expedient.

(2) Protective works may be carried out—

(a) at any time before or during the carrying out in the vicinity of the building of any part of the authorised development; or

(b) after the completion of that part of the authorised development in the vicinity of the building at any time up to the end of the period of 5 years beginning with the day on which that part of the authorised development is first opened for use.

(3) For the purpose of determining how the functions under this article are to be exercised the undertaker may enter and survey any building falling within paragraph (1) and any land within its curtilage.

(4) For the purpose of carrying out protective works under this article to a building the undertaker may (subject to paragraphs (5) and (6))—

(a) enter the building and any land within its curtilage; and

(b) where the works cannot be carried out reasonably conveniently without entering land which is adjacent to the building but outside its curtilage, enter the adjacent land (but not any building erected on it).

(5) Before exercising—

(a) a right under paragraph (1) to carry out protective works to a building;

(b) a right under paragraph (3) to enter a building and land within its curtilage;

(c) a right under paragraph (4)(a) to enter a building and land within its curtilage; or

(d) a right under paragraph (4)(b) to enter land,

(a) S.I. 2010/675.
(b) 1964 c.40; there are amendments to section 57 that are not relevant to this Order.
the undertaker shall, except in the case of emergency, serve on the owners and occupiers of the building or land not less than 14 days’ notice of its intention to exercise that right and, in a case falling within sub-paragraph (a) or (c), specifying the protective works proposed to be carried out.

(6) Where a notice is served under paragraph (5)(a), (c) or (d), the owner or occupier of the building or land concerned may, by serving a counter-notice within the period of 10 days beginning with the day on which the notice was served, require the question whether it is necessary or expedient to carry out the protective works or to enter the building or land to be referred to arbitration under article 41 (arbitration).

(7) The undertaker shall compensate the owners and occupiers of any building or land in relation to which rights under this article have been exercised for any loss or damage arising to them by reason of the exercise of those rights.

(8) Where—

(a) protective works are carried out under this article to a building; and

(b) within the period of 5 years beginning with the day on which the part of the authorised development carried out in the vicinity of the building is first opened for use it appears that the protective works are inadequate to protect the building against damage caused by the carrying out or use of that part of the authorised development,

the undertaker shall compensate the owners and occupiers of the building for any loss or damage sustained by them.

(9) Nothing in this article shall relieve the undertaker from any liability to pay compensation under section 10(2) of the 1965 Act (compensation for injurious affection).

(10) Any compensation payable under paragraph (7) or (8) shall be determined, in case of dispute, under Part 1 of the 1961 Act (determination of questions of disputed compensation).

(11) In this article “protective works” in relation to a building means—

(a) underpinning, strengthening and any other works the purpose of which is to prevent damage which may be caused to the building by the carrying out, maintenance or use of the authorised development; and

(b) any works the purpose of which is to remedy any damage which has been caused to the building by the carrying out, maintenance or use of the authorised development.

Authority to survey and investigate the land

17.—(1) The undertaker may for the purposes of this Order enter on any land shown within the Order limits or which may be affected by the authorised development and—

(a) survey and/or investigate the land;

(b) without prejudice to the generality of sub-paragraph (a), make trial holes in such positions on the land as the undertaker thinks fit to investigate the nature of the surface layer and/or subsoil and/or to remove soil samples;

(c) without prejudice to the generality of sub-paragraph (a), carry out ecological and/or archaeological investigations on such land; and

(d) place on, leave on and remove from the land apparatus for use in connection with the survey and/or investigation of land and/or the making of trial holes.

(2) No land may be entered or equipment placed or left on or removed from the land under paragraph (1) unless at least 14 days’ notice has been served on every owner and occupier of the land.

(3) Any person entering land under this article on behalf of the undertaker—

(a) shall, if so required entering the land, produce written evidence of their authority to do so; and

(b) may take with them such vehicles and equipment as are necessary to carry out the survey or investigation or to make the trial holes.

(4) No trial holes shall be made under this article—
(a) in land located within the highway boundary without the consent of the highway authority; or
(b) in a private street without the consent of the street authority,
but such consent shall not be unreasonably withheld.

(5) The undertaker shall compensate the owners and occupiers of the land for any loss or damage arising by reason of the exercise of the authority conferred by this article, such compensation to be determined, in case of dispute, under Part 1 (determination of questions of disputed compensation) of the 1961 Act.

PART 3
ACQUISITION AND POSSESSION OF LAND
Powers of acquisition

Compulsory acquisition of land

18.—(1) The undertaker may acquire compulsorily so much of the Order land as is required for the authorised development or to facilitate it, or is incidental to it.

(2) As from the date on which a compulsory acquisition notice under section 134(3) of the 2008 Act is served or the date on which the Order land, or any part of it, is vested in the undertaker, whichever is the later, that land or that part of it which is vested (as the case may be) shall be discharged from all rights, trusts and incidents to which it was previously subject.

(3) Any person who suffers loss by the extinguishment or suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(4) This article is subject to article 20 (acquisition of subsoil only) and article 23 (temporary use of land for carrying out the authorised development).

Compulsory acquisition of rights

19.—(1) The undertaker may acquire compulsorily the existing rights and create and acquire compulsorily the new rights described in the book of reference and shown on the land plans.

(2) As from the date on which a compulsory acquisition notice is served or the date on which any new right is vested in the undertaker, whichever is the later, the land over which any new rights is acquired shall be discharged from all rights, trusts and incidents to which it was previously subject so far as their continuance would be inconsistent with the exercise of that new right.

(3) Subject to section 8 of the 1965 Act, as substituted by article 28 (acquisition of part of certain properties), where the undertaker acquires an existing right over land under paragraph (1), the undertaker shall not be required to acquire a greater interest in that land.

(4) Any person who suffers loss as a result of the extinguishment or suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

Acquisition of subsoil only

20.—(1) The undertaker may acquire compulsorily so much of, or such rights in, the subsoil of the land referred to in paragraph (1) of article 18 (compulsory acquisition of land) as may be required for any purpose for which that land may be acquired under that provision instead of acquiring the whole of the land.

(2) Where the undertaker acquires any part of, or rights in, the subsoil of land under paragraph (1), the undertaker shall not be required to acquire an interest in any other part of the land.
(3) Paragraph (2) shall not prevent article 28 (acquisition of part of certain properties) from applying where the undertaker acquires a cellar, vault, arch or other construction forming part of a house, building or manufactory.

**Power to override easements and other rights**

21.—(1) Any authorised activity which takes place on land within the Order limits (whether the activity is undertaken by the undertaker or by any person deriving title from the undertaker or by any servants or agents of the undertaker) is authorised by this Order if it is done in accordance with the terms of this Order, notwithstanding that it involves—

(a) an interference with an interest or right to which this article applies; or

(b) a breach of a restriction as to the user of land arising by virtue of a contract.

(2) In this article “authorised activity” means—

(a) the erection, construction or carrying out, or maintenance of any building or work on land;

(b) the erection, construction, or maintenance of anything in, on, over or under land; or

(c) the use of any land (including the temporary use of land).

(3) The interests and rights to which this article applies are any easement, liberty, privilege, right or advantage annexed to land and adversely affecting other land, including any natural right to support and include restrictions as to the user of land arising by the virtue of a contract.

(4) Where any interest or right to which this article applies is interfered with or any restriction breached by any authorised activity in accordance with the terms of this article the interest, right or restriction shall be extinguished, abrogated or discharged at the time that the interference or breach in respect of the authorised activity in question commences.

(5) In respect of any interference, breach, extinguishment, abrogation or discharge in pursuance of this article, compensation—

(a) shall be payable under section 7 or 10 of the 1965 Act(a); and

(b) shall be assessed in the same manner and subject to the same rules as in the case of other compensation under those sections where—

(i) the compensation is to be estimated in connection with a purchase under that Act; or

(ii) the injury arises from the execution of works on or use of land acquired under that Act.

(6) Where a person deriving title under the undertaker by whom the land in question was acquired—

(a) is liable to pay compensation by virtue of paragraph (5), and

(b) fails to discharge that liability,

the liability shall be enforceable against that undertaker.

(7) Nothing in this article shall be construed as authorising any act or omission on the part of any person which is actionable at the suit of any person on any grounds other than such an interference or breach as is mentioned in paragraph (1) of this article.

**Application of the Compulsory Purchase (Vesting Declarations) Act 1981**

22.—(1) The Compulsory Purchase (Vesting Declarations) Act 1981(b) shall apply as if this Order were a compulsory purchase order and as if the undertaker were a public authority under section 1(2) of that Act.

(a) There are amendments that are not relevant to this Order.

(b) 1981 c. 66.
(2) The Compulsory Purchase (Vesting Declarations) Act 1981, as so applied, shall have effect with the following modifications.

(3) In section 3 (preliminary notices), for subsection (1) there shall be substituted—

“(1) Before making a declaration under section 4 with respect to any land which is subject to a compulsory purchase order, the acquiring authority shall include the particulars specified in subsection (3) in a notice which is—

(a) given to every person with a relevant interest in the land with respect to which the declaration is to be made (other than a mortgagee who is not in possession); and

(b) published in a local newspaper circulating in the area in which the land is situated.”.

(4) In that section, in subsection (2), for “(1)(b)” there shall be substituted “(1)” and after “given” there shall be inserted “and published”.

(5) In that section, for subsections (5) and (6) there shall be substituted—

“(5) For the purposes of this section, a person has a relevant interest in land if—

(a) that person is for the time being entitled to dispose of the fee simple of the land, whether in possession or in reversion; or

(b) that person holds, or is entitled to the rents and profits of, the land under a lease or agreement, the unexpired term of which exceeds one month.”.

(6) In section 5 (earliest date for execution of declaration)—

(a) in subsection (1), after “publication” there shall be inserted “in a local newspaper circulating in the area in which the land is situated”; and

(b) subsection (2) shall be omitted.

(7) In section 7 (constructive notice to treat), in subsection (1)(a), the words “(as modified by section 4 of the Acquisition of Land Act 1981)” shall be omitted.

(8) References to the 1965 Act in the Compulsory Purchase (Vesting Declarations) Act 1981 shall be construed as references to that Act as applied by section 125 of the 2008 Act to the compulsory acquisition of land under this Order.

Temporary possession of land

Temporary use of land for carrying out the authorised development

23.—(1) The undertaker may, in connection with the carrying out of the authorised development—

(a) enter on and take temporary possession of the land specified in columns (1) and (2) of Schedule 6 (land of which temporary possession may be taken) for the purpose specified in relation to that land in column (3) of that Schedule relating to the part of the authorised development specified in column (4) of that Schedule;

(b) remove any buildings and vegetation from that land; and

(c) construct temporary works (including the provision of means of access) and buildings on that land.

(2) Not less than 14 days before entering on and taking temporary possession of land under this article the undertaker shall serve notice of the intended entry on the owners and occupiers of the land.

(3) The undertaker may not, without the agreement of the owners of the land, remain in possession of any land under this article after the end of the period of one year beginning with the date of completion of the part of the authorised development specified in relation to that land in column (4) of Schedule 6 (land of which temporary possession may be taken) unless and to the extent that it is authorised to do so by the acquisition of rights over land or the creation of new rights over land pursuant to article 19 (compulsory acquisition of rights) of this Order.
Before giving up possession of land of which temporary possession has been taken under this article, the undertaker shall remove all temporary works and restore the land to the reasonable satisfaction of the owners of the land; but the undertaker shall not be required to replace a building removed under this article.

The undertaker shall pay compensation to the owners and occupiers of land of which temporary possession is taken under this article for any loss or damage arising from the exercise in relation to the land of the provisions of any power conferred by this article.

Any dispute as to a person’s entitlement to compensation under paragraph (5), or as to the amount of the compensation, shall be determined under Part 1 of the 1961 Act.

Nothing in this article shall affect any liability to pay compensation under section 10(2) of the 1965 Act (further provisions as to compensation for injurious affection) or under any other enactment in respect of loss or damage arising from the carrying out of the authorised development, other than loss or damage for which compensation is payable under paragraph (5).

The undertaker may not compulsorily acquire under this Order the land referred to in paragraph (1) except that the undertaker shall not be precluded from—

(a) acquiring new rights over any part of that land under article 19 (compulsory acquisition of rights); or

(b) acquiring any part of the subsoil (or rights in the subsoil) of that land under article 20 (acquisition of subsoil only).

Where the undertaker takes possession of land under this article, the undertaker shall not be required to acquire the land or any interest in it.

Section 13 of the 1965 Act(a) (refusal to give possession to acquiring authority) shall apply to the temporary use of land pursuant to this article to the same extent as it applies to the compulsory acquisition of land under this Order by virtue of section 125 of the 2008 Act (application of compulsory acquisition provisions).

Temporary use of land for maintaining authorised development

24.—(1) Subject to paragraph (2), at any time during the maintenance period relating to any part of the authorised development, the undertaker may—

(a) enter on and take temporary possession of any land within the Order limits if such possession is reasonably required for the purpose of maintaining the authorised development;

(b) enter on any land within the Order limits for the purpose of gaining access as is reasonably required for the purpose of maintaining the authorised development; and

(c) construct such temporary works (including the provision of means of access) and buildings on the land as may be reasonably necessary for that purpose.

(2) Paragraph (1) shall not authorise the undertaker to take temporary possession of—

(a) any house or garden belonging to a house; or

(b) any building (other than a house) if it is for the time being occupied.

(3) Not less than 28 days before entering on and taking temporary possession of land under this article the undertaker shall serve notice of the intended entry on the owners and occupiers of the land.

(4) The undertaker may only remain in possession of land under this article for so long as may be reasonably necessary to carry out the maintenance of the part of the authorised development for which possession of the land was taken.

(5) Before giving up possession of land of which temporary possession has been taken under this article, the undertaker shall remove all temporary works and restore the land to the reasonable satisfaction of the owners of the land.

(a) Section 13 is amended by section 139 of the Tribunals, Courts and Enforcement Act 2007 (c.15).
(6) The undertaker shall pay compensation to the owners and occupiers of land of which
temporary possession is taken under this article for any loss or damage arising from the exercise in
relation to the land of the provisions of this article.

(7) Any dispute as to a person’s entitlement to compensation under paragraph (6), or as to the
amount of the compensation, shall be determined under Part 1 of the 1961 Act.

(8) Nothing in this article shall affect any liability to pay compensation under section 10(2) of the
1965 Act (further provisions as to compensation for injurious affection) or under any other
enactment in respect of loss or damage arising from the maintenance of the authorised development,
other than loss or damage for which compensation is payable under paragraph (6).

(9) Where the undertaker takes possession of land under this article, the undertaker shall not be
required to acquire the land or any interest in it.

(10) Section 13 of the 1965 Act (refusal to give possession to acquiring authority) shall apply to
the temporary use of land pursuant to this article to the same extent as it applies to the compulsory
acquisition of land under this Order by virtue of section 125 of the 2008 Act (application of
compulsory acquisition provisions).

(11) In this article “the maintenance period”, in relation to any part of the authorised development,
means the period of 5 years beginning with the date on which that part of the authorised
development is first opened for use.

Compensation

Disregard of certain interests and improvements

25.—(1) In assessing the compensation payable to any person on the acquisition from that
person of any land or right over any land under this Order, the tribunal shall not take into
account—

(a) any interest in land; or

(b) any enhancement of the value of any interest in land by reason of any building erected,
works executed or improvement or alteration made on relevant land,

if the tribunal is satisfied that the creation of the interest, the erection of the building, the execution
of the works or the making of the improvement or alteration as part of the authorised development
was not reasonably necessary and was undertaken with a view to obtaining compensation or
increased compensation.

(2) In paragraph (1) “relevant land” means the land acquired from the person concerned or any
other land with which that person is, or was at the time when the building was erected, the works
executed or the improvement or alteration made as part of the authorised development, directly or
indirectly concerned.

Set-off for enhancement in value of retained land

26.—(1) In assessing the compensation payable to any person in respect of the acquisition from
that person of any new rights over land (including the subsoil), under article 19 (compulsory acquisition
of rights), the tribunal shall set off against the value of the rights so acquired—

(a) any increase in the value of the land over which the new rights are required; and

(b) any increase in value of any contiguous or adjacent land belonging to that person in the
same capacity,

which will accrue to that person by reason of the construction of the authorised development.
(3) The 1961 Act shall have effect, subject to paragraphs (1) and (2), as if this Order were a local enactment for the purposes of that Act.

**No double recovery**

27. Compensation shall not be payable in respect of the same matter both under this Order and under any other enactment, any contract or any rule of law, or under two or more different provisions under this Order.

*Supplementary*

**Acquisition of part of certain properties**

28.—(1) This article shall apply instead of section 8(1) of the 1965 Act (other provisions as divided land) (as applied by section 125 of the 2008 Act) where—

(a) a notice to treat is served on a person (“the owner”) under the 1965 Act (as so applied) in respect of land forming only part of a house, building or manufactory or of land consisting of a house with a park or garden (“the land subject to the notice to treat”); and

(b) a copy of this article is served on the owner with the notice to treat.

(2) In such a case, the owner may, within the period of 21 days beginning with the day on which the notice was served, serve on the undertaker a counter-notice objecting to the sale of the land subject to the notice to treat which states that the owner is willing and able to sell the whole (“the land subject to the counter-notice”).

(3) If no such counter-notice is served within that period, the owner shall be required to sell the land subject to the notice to treat.

(4) If such a counter-notice is served within that period, the question whether the owner shall be required to sell only the land subject to the notice to treat shall, unless the undertaker agrees to take the land subject to the counter-notice, be referred to the tribunal.

(5) If on such a reference the tribunal determines that the land subject to the notice to treat can be taken—

(a) without material detriment to the remainder of the land subject to the counter-notice; or

(b) where the land subject to the notice to treat consists of a house with a park or garden, without material detriment to the remainder of the land subject to the counter-notice and without seriously affecting the amenity and convenience of the house,

the owner shall be required to sell the land subject to the notice to treat.

(6) If on such a reference the tribunal determines that only part of the land subject to the notice to treat can be taken—

(a) without material detriment to the remainder of the land subject to the counter-notice; or

(b) where the land subject to the notice to treat consists of a house with a park or garden, without material detriment to the remainder of the land subject to the counter-notice and without seriously affecting the amenity and convenience of the house,

the notice to treat shall be deemed to be a notice to treat for that part.

(7) If on such a reference the tribunal determines that—

(a) the land subject to the notice to treat cannot be taken without material detriment to the remainder of the land subject to the counter-notice; but

(b) the material detriment is confined to a part of the land subject to the counter-notice,

the notice to treat shall be deemed to be a notice to treat for the land to which the material detriment is confined in addition to the land already subject to the notice, whether or not the additional land is land which the undertaker is authorised to acquire compulsorily under this Order.

(8) If the undertaker agrees to take the land subject to the counter-notice, or if the tribunal determines that—
(a) none of the land subject to the notice to treat can be taken without material detriment to
the remainder of the land subject to the counter-notice or, as the case may be, without
material detriment to the remainder of the land subject to the counter-notice and without
seriously affecting the amenity and convenience of the house; and
(b) the material detriment is not confined to a part of the land subject to the counter-notice,
the notice to treat shall be deemed to be a notice to treat for the land subject to the counter-notice
whether or not the whole of that land is land which the undertaker is authorised to acquire
compulsorily under this Order.

(9) Where, by reason of a determination by the tribunal under this article, a notice to treat is
deemed to be a notice to treat for less land or more land than that specified in the notice, the
undertaker may, within the period of 6 weeks beginning with the day on which the determination is
made, withdraw the notice to treat; and, in that event, shall pay the owner compensation for any loss
or expense occasioned to the owner by the giving and withdrawal of the notice, to be determined in
case of dispute by the tribunal.

(10) Where the owner is required under this article to sell only part of a house, building or
manufactory or of land consisting of a house with a park or garden, the undertaker shall pay the
owner compensation for any loss sustained by the owner due to the severance of that part in addition
to the value of the interest acquired.

Statutory undertakers

29. The undertaker may—

(a) acquire compulsorily the land belonging to statutory undertakers shown on the land plans
within the limits of the land to be acquired and described in the book of reference;
(b) within the Order limits extinguish the rights of, and/or remove, replace, reposition, renew,
alter and supplement the apparatus belonging to, statutory undertakers shown on the
access and temporary stopping up plans and described in the book of reference; and
(c) acquire compulsorily the new rights over land belonging to statutory undertakers shown
on the land plans and described in the book of reference.

Recovery of costs of new connections

30.—(1) Where any apparatus of a public utility undertaker or of a public communications
provider is removed under article 29 (statutory undertakers) any person who is the owner or
occupier of premises to which a supply was given from that apparatus shall be entitled to recover
from the undertaker compensation in respect of expenditure reasonably incurred by that person,
in consequence of the removal, for the purpose of effecting a connection between the premises
and any other apparatus from which a supply is given.

(2) Paragraph (1) shall not apply in the case of the removal of a public sewer but where such a
sewer is removed under article 29, any person who is—

(a) the owner or occupier of premises the drains of which communicated with that sewer; or
(b) the owner of a private sewer which communicated with that sewer,
shall be entitled to recover from the undertaker compensation in respect of expenditure reasonably
incurred by that person, in consequence of the removal, for the purpose of making the drain or
sewer belonging to that person communicate with any other public sewer or with a private
sewerage disposal plant.

(3) This article shall not have effect in relation to apparatus to which Part 3 of the 1991 Act
applies.

(4) In this paragraph—
“public communications provider” has the same meaning as in section 151(1) of the Communications Act 2003\(^{(a)}\); and

“public utility undertaker” has the same meaning as in the 1980 Act.

### Time limit for exercise of authority to acquire land compulsorily

31.—(1) After the end of the period of 5 years beginning on the day on which this Order is made—

(a) no notice to treat shall be served under Part 1 of the 1965 Act; and

(b) no declaration shall be executed under section 4 of the Compulsory Purchase (Vesting Declarations) Act 1981\(^{(b)}\) as applied by article 22 (application of the Compulsory Purchase (Vesting Declarations) Act 1981).

(2) The authority conferred by article 23 (temporary use of land for carrying out the authorised development) shall cease at the end of the period referred to in paragraph (1), save that nothing in this paragraph shall prevent the undertaker remaining in possession of land after the end of that period, if the land was entered and possession was taken before the end of that period.

### Private rights of way

32.—(1) Subject to the provisions of this article, all private rights of way over land subject to compulsory acquisition under this Order shall be extinguished—

(a) as from the date of acquisition of the land by the undertaker, whether compulsorily or by agreement; or

(b) on the date of entry on the land by the undertaker under section 11(1) of the 1965 Act\(^{(c)}\) (power of entry),

whichever is the earlier.

(2) Subject to the provisions of this article, all private rights of way over land owned by the undertaker which, being within the limits of land which may be acquired shown on the land plans, is required for the purposes of this Order shall be extinguished on the appropriation of the land by the undertaker for any of those purposes.

(3) Subject to the provisions of this article, all private rights of way over land of which the undertaker takes temporary possession under this Order shall be suspended and unenforceable for as long as the undertaker remains in lawful possession of the land.

(4) Any person who suffers loss by the extinguishment or suspension of any private right of way under this article shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(5) This article does not apply in relation to any right of way to which section 138 of the 2008 Act (extinguishment of rights, and removal of apparatus, of statutory undertakers etc.) or article 29 (statutory undertakers) applies.

(6) Paragraphs (1) to (3) shall have effect subject to—

(a) any notice given by the undertaker before—

(i) the completion of the acquisition of the land,

(ii) the undertaker’s appropriation of it,

(iii) the undertaker’s entry onto it, or

(iv) the undertaker’s taking temporary possession of it,

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\(^{(a)}\) 2003 c.21; there are amendments to section 151 that are not relevant to this Order.

\(^{(b)}\) 1981 c.66.

\(^{(c)}\) Section 11 is amended by Schedule 4 to the Acquisition of Land Act 1981 (c.67), Schedule 1 to the Housing (Consequential Provisions) Act 1985 (c.71), the Church of England (Miscellaneous Provisions) Measure 2006 No. 1 Sch.5 para.12(1) and the Transfer of Tribunal Functions (Lands Tribunal and Miscellaneous Amendments) Order 2009 (S.I. 2009/1307).
that any or all of those paragraphs shall not apply to any right of way specified in the notice; and
(b) any agreement made at any time between the undertaker and the person in or to whom the right of way in question is vested or belongs.

(7) If any such agreement as is referred to in paragraph (6)(b)—
(a) is made with a person in or to whom the right of way is vested or belongs; and
(b) is expressed to have effect also for the benefit of those deriving title from or under that person,
it shall be effective in respect of the persons so deriving title, whether the title was derived before or after the making of the agreement.

Rights under or over streets

33.—(1) The undertaker may enter on and appropriate so much of the subsoil of, or air-space over, any street within the Order limits as may be required for the purposes of the authorised development and may use the subsoil or air-space for those purposes or any other purpose ancillary to the authorised development.

(2) Subject to paragraph (3), the undertaker may exercise any power conferred by paragraph (1) in relation to a street without being required to acquire any part of the street or any easement or right in the street.

(3) Paragraph (2) shall not apply in relation to—
(a) any subway or underground building; or
(b) any cellar, vault, arch or other construction in, on or under a street which forms part of a building fronting onto the street.

(4) Subject to paragraph (5), any person who is an owner or occupier of land appropriated under paragraph (1) without the undertaker acquiring any part of that person’s interest in the land, and who suffers loss as a result, shall be entitled to compensation to be determined, in case of dispute, under Part 1 of the 1961 Act.

(5) Compensation shall not be payable under paragraph (4) to any person who is an undertaker to whom section 85 of the 1991 Act (sharing cost of necessary measures) applies in respect of measures of which the allowable costs are to be borne in accordance with that section.

PART 4
MISCELLANEOUS AND GENERAL

Application of landlord and tenant law

34.—(1) This article applies to—
(a) any agreement for leasing to any person the whole or any part of the authorised development or the right to operate the same; and
(b) any agreement entered into by the undertaker with any person for the construction, maintenance, use or operation of the authorised development, or any part of it, so far as any such agreement relates to the terms on which any land which is the subject of a lease granted by or under that agreement is to be provided for that person’s use.

(2) No enactment or rule of law regulating the rights and obligations of landlords and tenants shall prejudice the operation of any agreement to which this article applies.

(3) Accordingly, no such enactment or rule of law shall apply in relation to the rights and obligations of the parties to any lease granted by or under any such agreement so as to—
(a) exclude or in any respect modify any of the rights and obligations of those parties under the terms of the lease, whether with respect to the termination of the tenancy or any other matter;
(b) confer or impose on any such party any right or obligation arising out of or connected with anything done or omitted on or in relation to land which is the subject of the lease, in addition to any such right or obligation provided for by the terms of the lease; or
(c) restrict the enforcement (whether by action for damages or otherwise) by any party to the lease of any obligation of any other party under the lease.

Deemed consent under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009

35.—(1) A marine licence shall be deemed to have been issued to the undertaker under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009(a).

(2) The marine licence deemed to have been issued under this article is set out at Schedule 7 (deemed marine licence under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009).

Operational land for purposes of the 1990 Act

36. Development consent granted by this Order shall be treated as specific planning permission for the purposes of section 264(3)(a) of the 1990 Act (cases in which land is to be treated as not being operational land for the purposes of that Act).

Felling or lopping of trees or shrubs

37.—(1) The undertaker may fell or lop any tree or shrub near any part of the authorised development, or cut back its roots, if it reasonably believes it to be necessary to do so to prevent the tree or shrub—

(a) from obstructing or interfering with the construction, maintenance or operation of the authorised development or any apparatus used in connection with the authorised development; or

(b) from constituting a danger to persons using the authorised development.

(2) In carrying out any activity authorised by paragraph (1), the undertaker shall do no unnecessary damage to any tree or shrub and shall pay compensation to any person for any loss or damage arising from such activity.

(3) Any dispute as to a person’s entitlement to compensation under paragraph (2), or as to the amount of compensation, shall be determined under Part 1 of the 1961 Act.

Protective provisions

38. Schedule 8 to this Order has effect.

Certification of plans etc

39.—(1) The undertaker shall, as soon as practicable after the making of this Order, submit to the Secretary of State copies of—

(a) the access and temporary stopping up plans;

(b) the approved development plans;

(c) the book of reference;

(d) the environmental statement;

(a) 2009 c.23; there are amendments that are not relevant to this Order.
(e) Flints Caravan Park plan;
(f) geology summary report;
(g) Harbour Village plan;
(h) Kneps Farm Holiday Park plan;
(i) the land plans;
(j) the landscape and ecological management strategy plan; and
(k) Preesall site plan,

for certification that they are true copies of the plans or documents referred to in this Order.

(2) A plan or document so certified shall be admissible in any proceedings as evidence of the contents of the document of which it is a copy.

Service of notices

40.—(1) A notice or other document required or authorised to be served, given or supplied under this Order may be served, given or supplied in any of these ways—

(a) by delivering it to the person on whom it is to be served or to whom it is to be given or supplied;
(b) by leaving it at the usual or last known place of abode of that person or, in a case where an address for service has been given by that person, at that address;
(c) by sending it by post, addressed to that person at that person’s usual or last known place of abode or, in a case where an address for service has been given by that person, at that address;
(d) by sending it in a prepaid registered letter, or by the recorded delivery service, addressed to that person at that person’s usual or last known place of abode or, in a case where an address for service has been given by that person, at that address;
(e) in a case where an address for service using electronic communications has been given by that person, by sending it using electronic communications, in accordance with the condition set out in paragraph (2), to that person at that address;
(f) in the case of an incorporated company or body—
   (i) by delivering it to the secretary or clerk of the company or body at their registered or principal office;
   (ii) by sending it by post, addressed to the secretary or clerk of the company or body at that office; or
   (iii) by sending it in a prepaid registered letter or, or by the recorded delivery service, addressed to the secretary or clerk of the company or body at that office.

(2) The condition mentioned in paragraph (1)(e) is that the notice or other document must be -

(a) capable of being accessed by the person mentioned in that provision;
(b) legible in all material respects; and
(c) in a form sufficiently permanent to be used for subsequent reference.

(3) For the purposes of paragraph (2), “legible in all material respects” means that the information contained in the notice or document is available to that person to no lesser extent than it would be if served, given or supplied by means of a notice or document in printed form.

Arbitration

41. Any difference or dispute under any provision of this Order (other than a difference or dispute which falls to be determined by the tribunal) shall, unless otherwise provided for in this Order and unless otherwise agreed between the parties, be referred to and settled by a single arbitrator to be agreed between the parties or, failing agreement, to be appointed on the
application of either party (after giving notice in writing to the other) by the President of the
Institution of Civil Engineers.

Requirements

42.—(1) Schedule 9 to this Order has effect.

(2) Save for paragraphs 4(1) and 4(2) (detailed design approval) of Schedule 9 (requirements) and
the definition of “approved development plans” in paragraph 1 (interpretation) of Schedule 9
(requirements), Schedule 9 (requirements) shall not apply to—

(a) Work Nos. 16J, 16K and 16L of Schedule 1 (authorised development) so far as these fall
within the UK marine area; and

(b) the incorporation of filters into the existing water intake structure comprised in Work No.
15 of Schedule 1 (authorised development).

Appeals relating to decisions under requirements

43.—(1) Where the relevant planning authority—

(a) refuses an application for any consent, agreement or approval of that authority required
by a requirement listed in Schedule 9 (requirements) to this Order or grants that consent,
agreement or approval subject to conditions; or

(b) does not give notice to the undertaker of its decision on an application for any consent,
agreement or approval of that authority required by a requirement listed in Schedule 9
(requirements) of this Order within 8 weeks beginning with the day immediately
following that on which the application is received by that authority or within such
extended period as may at any time be agreed upon in writing between the undertaker and
that authority,

article 41 (arbitration) does not apply but the undertaker may by notice appeal to the Secretary of
State.

(2) Any appeal to the Secretary of State under paragraph (1) shall be made under Part III (control
over development) of the 1990 Act as if the requirement in Schedule 9 (requirements) of this Order
which is the subject of the appeal were a condition under subsection 78(1)(b) of the 1990 Act.

Signed by authority of the Secretary of State

[Name of Secretary of State]

[●][●] 201[●] Department of [●]
SCHEDULES

SCHEDULE 1

AUTHORISED DEVELOPMENT

In the Borough of Wyre in the County of Lancashire and in the Irish Sea adjacent to the Borough of Wyre—

A nationally significant infrastructure project as defined in sections 14 and 17 of the 2008 Act comprising—

Work No. 1A— An underground gas storage facility to store gas in, extract gas from and inject gas into, with a total storage capacity of up to 900 million standard cubic metres and working capacity of up to 600 million standard cubic metres, both specified at the standard temperature and pressure, comprising up to 19 operational caverns formed by solution mining of the Preesall halite deposit; all to be constructed to any extent downwards below 220 metres below ground surface and to be confined within the Preesall halite deposit; and

Associated development within the meaning section 115(2) of the 2008 Act comprising—

Work No. 1B— Vertical wells, S-shaped wells, slant wells and extended reach slant wells and internal operational pipeline strings connecting the multiple wellhead compounds (Work Nos. 2A to G) to the gas storage caverns (Work No.1A);

Work No. 2A— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2B— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2C— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2D— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads
from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2E— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2F— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 2G— A wellhead compound area containing multiple wellheads, valve boxes, emergency hydraulic packs, manifold valve boxes, instrument enclosures, close circuit television facilities, intruder detectors, compound lighting, grassed mounds, stock proof fencing, security fencing and hard standings, below ground gas manifold pipelines, brine feeds and returns and power and communication cables situated beneath the wellhead compound and gated access roads from the wellheads to the gas compressor compound (Work No. 3) and to the booster pump station (Work No. 4).

Work No. 3— A gas compressor compound containing gas compressor station, electrical utilities building and equipment including pig launchers and receivers, slug catchers, glycol contactors and regeneration system, compressors, compressor knock out separators, compressor aftercoolers, gas filters, and heaters and all storage tanks, sub stations, switch yards and valve pits, a vent stack within the fire water storage pond, drainage and interception facilities, internal and external site access roads linking to the public highway and individual wellhead compounds (Work Nos. 2A to 2G), diversion of overhead electricity cables, stock proof fencing, security fencing, gates, close circuit television, intruder detector system and external and internal lighting; and extensions of those parts of the 132kv electrical circuits, 11kv power cables and electrical control cables and interconnector gas main comprised in Work Nos. 17A, 18, 19 and 20A which link to elements within this Work No. 3.

Work No. 4— A booster pump station, de-brine facility and control centre compound including hardstandings for nitrogen tanks, hydrocyclones, a de-brine pond, other pumping equipment and a transformer compound. Internal vehicular access routes, turning areas, pedestrian areas, walls, fencing, close circuit television, intruder detector security systems and external lighting, a screen wall and grassed mounds situated on the north and west sides and underground and above ground pipework, electrical cables and other utilities; and extensions of those parts of the wash water pipelines, brine discharge pipelines, power and control cables comprised in Work Nos. 10, 11, 12, 13, 14, 18 and 19 which link to elements within this Work No. 4.

Work No. 5— A security and support facility at Higher Lickow farm including staff facilities, a maintenance workshop, an administration, health and safety and training facility and a security gatehouse, security fencing, power circuits, telecommunications cables and other facilities, close circuit television, intruder sensing security systems and external lighting; and those extensions of the roads comprised in Work Nos. 6 and 7 which link with elements of this Work No. 5.

Work No. 6— An internal/external site road from the A588 up to and including the security and support facility at Higher Lickow farm (Work No. 5) including drainage and interceptors, lighting, piped culverts/bridge, realigned watercourses, grass mounding and landscape screening.

Work No. 7— An internal site access road from the security and support facility at Higher Lickow farm (Work No. 5) to the gas compressor compound area (Work No. 3) including drainage
and interceptors, lighting, piped culverts, realigned watercourses, grass mounding and landscaping.

**Work No. 8**— Internal site access roads from the wellhead compounds (Works 2A to 2G) to the booster pump station (Work No. 4) and the gas compressor compound (Work No. 3).

**Work No. 9**— A gas manifold, distribution pipelines, power, control and telecommunications cables including underground pressure pipelines, pipelines and cables linking the wellhead compounds (Work Nos. 2A to 2G) to the gas compressor compound (Work No. 3); all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the pipelines, power, control and telecommunications cables rise to interface with the wellhead compounds (Work Nos. 2A to 2G) and the gas compressor compound (Work No. 3).

**Work No. 10**— A wash water pipeline including underground pressure pipelines linking each wellhead compound (Work Nos. 2A to 2G) to the booster pump station and de-brine facility (Work No. 4); all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the wash water pipeline rises to interface with the wellhead compounds (Work Nos. 2A to 2G) and the booster pump station (Work No. 4).

**Work No. 11**— A brine outlet pipeline including underground pressure pipelines linking each wellhead compound (Work Nos. 2A to 2G) to the booster pump station and de-brine facility (Work No. 4); all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the brine outlet pipeline rises to interface with the wellhead compounds (Work Nos. 2A to 2G) and the booster pump station (Work No. 4).

**Work No. 12**— A wash water pipeline from the seawater pump station (Work No. 15) to the booster pump station (Work No. 4) including an underground, under river pressure pipeline crossing constructed in trench, in pre-placed sleeves or placed by trenchless methods where not below the bed of the river Wyre and placed by trenchless methods where below the bed of the river Wyre; all to be constructed not less than 1 metre below ground surface (or not less than 8 metres below the bed of the river Wyre where applicable) and not more than 10 metres below ground surface (or not more than 35 metres below the bed of the river Wyre where applicable) save where the wash water pipeline rises to interface with the seawater pump station (Work No. 15) and the booster pump station (Work No. 4).

**Work No. 13**— A brine discharge pipeline between the booster pump station, (Work No. 4) and the seawater pump station (Work No. 15) including an underground, under river pressure pipeline crossing constructed in trench, in pre-placed sleeves or placed by trenchless methods where not below the bed of the river Wyre and placed by trenchless methods where below the bed of the river Wyre; all to be constructed not less than 1 metre below ground surface (or not less than 8 metres below the bed of the river Wyre where applicable) and not more than 10 metres below ground surface (or not more than 35 metres below the bed of the river Wyre where applicable) save where the brine discharge pipeline rises to interface with the booster pump station (Work No. 4) and the seawater pump station (Work No. 15).

**Work No. 14**— Twin 11kv power and control cables from the seawater pumping station (Work No 15) to the booster pump station and debrine facility (Work No 4), sleeves, service pipes, power and control cables laid in trench, in pre placed sleeves or placed by trenchless methods where not below the bed of the river Wyre and placed by trenchless methods where below the bed of the river Wyre; all to be constructed not less than 1 metre below ground surface (or not less than 8 metres below the bed of the river Wyre where applicable) and not more than 10 metres below ground surface (or not more than 35 metres below the bed of the river Wyre where applicable) save where the cables and sleeves rise to interface with the booster pump station (Work No. 4) and the seawater pump station (Work No. 15).
**Work No. 15**— A seawater pump station containing a wet well abstraction facility and multiple pumps connected to the fish dock by an existing culvert, a connection to the brine discharge pipeline and flow meters and monitoring systems for the brine discharge pipeline, the incorporation of filters into the existing water intake structure, extensions of those parts of the wash water pipelines, brine discharge pipelines, power and control cables comprised in Work Nos. 12, 13, 16A and 14 which link to elements of this Work No. 15, a bunded transformer compound, a mobile gantry crane and roller shutter doors, internal vehicular access routes, parking areas, pedestrian areas and landscaping, gated security fencing, close circuit television and intruder detection systems, lighting and drainage, temporary and permanent access from Amounderness Way via Dock Avenue and Herring Arm Road.

**Work No. 16A**— A brine discharge pipeline from seawater pump station (Work No. 15) to United Utilities treatment plant, approximate chainage 3445m to 2690m, including a pressure pipeline laid in trench or within a pre-existing sleeve beneath a newly constructed housing area road; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary works compound and fencing adjacent to Amounderness Way and temporary access from Herring Arm, Road, Amounderness Way and Jameson Road.

**Work No. 16B**— A brine discharge pipeline from United Utilities treatment plant to Jameson Road approximate chainage 2690m to chainage 1960m, including a pressure pipeline laid in trench; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary access from Jameson Road to a temporary works compound and temporary fencing.

**Work No. 16C**— A brine discharge pipeline from Jameson Road, approximate chainage 1960m, to the temporary works compound/pipe insertion and reception compound, approximate chainage 1820m, including a pressure pipeline laid in trench; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where it crosses the former rail line adjacent to Jameson Road on a pipe bridge at ground surface (shown on drawing no. MMD-277663-C-DR-00-XX-0003); and a temporary works compound/pipe insertion, reception compound and fencing adjacent to Jameson Road and a fenced temporary access from Jameson Road.

**Work No. 16D**— A brine discharge pipeline from the Jameson Road temporary works compound, approximate chainage 1820m, to the temporary works compound/pipe insertion and reception compound, approximate chainage 1580m, including a pressure pipeline and sleeve laid by trenchless methods beneath Fleetwood Road and adjacent land; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary works compound/pipe insertion and reception compound and fencing, a temporary access road and fencing from the temporary works compound at approximate chainage 1580m to Fleetwood Road and any temporary subsidence monitoring stations within Fleetwood Road required by the highway authority.

**Work No. 16E**— A brine discharge pipeline from the temporary works compound/pipe insertion and reception compound, approximate chainage 1580m, to pipe insertion and reception compound, approximate chainage 1410m, including a pressure pipeline and sleeve laid by trenchless methods beneath Amounderness Way and adjacent land; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and a temporary works compound/pipe insertion and reception compound and fencing, a temporary access road and fencing from the temporary works compound at approximate chainage 1410m to Rossall Lane and any temporary subsidence monitoring stations within Amounderness Way required by the highway authority.
Work No. 16F — A brine discharge pipeline from the temporary works compound/pipe insertion and reception compound, approximate chainage 1410m, to the temporary works compound/pipe insertion and reception compound, at approximate chainage 890m, including a pressure pipeline laid in trench; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and a temporary works compound/pipe insertion and reception compound and fencing adjacent to the Blackpool Tramway and temporary access and fencing to South Strand.

Work No. 16G — A brine discharge pipeline from the temporary works compound/pipe insertion and reception compound, approximate chainage 890m, to the temporary works compound/pipe insertion and reception compound, approximate chainage 770m, including a pressure pipeline and sleeve laid by trenchless methods beneath the Blackpool Tramway and adjacent land; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and a temporary works compound/pipe insertion and reception compound and fencing, a temporary access road and fencing from the temporary works compound at approximate chainage 770m to South Strand/Broadway and any temporary subsidence monitoring stations within the Blackpool Tramway required by Blackpool Borough Council.

Work No. 16H — A brine discharge pipeline from the temporary works compound/pipe insertion and reception compound, approximate chainage 770m, to the temporary works compound/pipe insertion and reception compound, approximate chainage 610m, including a pressure pipeline and sleeve laid by trenchless methods beneath the junction of Broadway, South Strand, the Strand and adjacent land; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and a temporary works compound/pipe insertion and reception compound and fencing, access from South Strand and any temporary subsidence monitoring stations within Broadway or South Strand required by the highway authority.

Work No. 16I — A brine discharge pipeline from the temporary works compound/pipe insertion and reception compound, approximate chainage 610m, to the temporary works compound at Rossall Promenade, approximate chainage 0.00m, including a pressure pipeline laid in trench; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and a temporary works compound and fencing on and adjacent to Rossall Promenade, temporary access and fencing to Fairway, temporary modifications or closures to existing public rights of way, car parking areas and access to the promenade.

Work No. 16J — A brine discharge pipeline within and adjacent to Rossall Promenade including a pressure pipeline laid in trench beneath the promenade; all to be constructed not less than 1 metre below ground surface and not more than 10 metres below ground surface, or affixed to the existing modified sea wall to descend to and beneath the foreshore to a depth of not less than 1 metre below the foreshore and not more than ten metres beneath the foreshore; and pipe protection where appropriate, all permanent or temporary, full or partial, removal of the existing promenade surfacing, access ramps and retaining walls from the landward and seaward sides of the promenade, modifications to and breaking through the sea wall to allow the passage of the pipeline beneath the promenade to the foreshore, modifications to the promenade rear flood wall including the provision of flood gates and the construction of an observation platform/shelter, including new steps, retaining walls and revetments to access the foreshore.

Work No. 16K — A brine discharge pipeline from the Rossall Promenade (sea wall) to approximately the mean low water mark, including a pressure pipeline laid in trench from and beneath the foreshore; all to be constructed not less than 1 metre below the surface of the foreshore and not more than 10 metres below the surface of the foreshore.

Work No. 16L — A brine discharge pipeline from approximately mean low water mark to the pipeline’s termination at the single two-port diffuser, including a pressure pipeline laid in a backfilled trench beneath the sea bed from a seagoing vessel; all to be constructed not less than 1
metre below the sea bed and not more than 10 metres below the sea bed; and a single two-port diffuser fitted to distribute flows into the Irish Sea and all warning measures required to delineate the works area.

**Work No. 17A**— 132kv cables from the electric substation at the gas compressor compound (Work No. 3) to the south river crossing and splice pits laid in trench beneath Agglebys Road, Corcas Lane, the public highway linking High Gate Lane with Burrows Lane named as being part of High Gate Lane and Burrows Lane; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and splice pits situated in the vicinity of the river exit point, adjacent to Burrows Lane, Highgate Lane and Agglebys Road.

**Work No. 17B**— Twin sleeves and 132kv electricity cables from the south river temporary exit compound to the south river temporary entry compound; all to be constructed by trenchless methods not less than 8 metres below the bed of the river Wyre and not more than 35 metres below the bed of the river Wyre save where the electricity cables rise to enter the drive and reception pits at the limits of Work No. 17B; and temporary works sites at the under river entry and exit points containing drive and reception pits, temporary fencing and temporary access track from Burrows Lane.

**Work No. 17C**— Twin sleeves and 132kv electricity cables from the south river temporary entry compound to the 132kv grid substation operated by Electricity North West and located within the National Grid 400kv substation and switchyard at Stanah; all to be constructed by trenchless methods not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the electricity cables rise to enter the drive and reception pits situated at the limits of Work No. 17C; and sleeves and cables to be laid beneath the existing Flints caravan park and Hillilaid Pool, temporary works sites at the river exit points and within the Stanah Substation Switchyard, temporary access from River Road to the temporary compound, temporary fencing and connection to National Grid electricity infrastructure at the Stanah substation.

**Work No. 18**— 11kv electrical circuits from the electrical substation/switchyard at the gas compressor compound (Work No. 3) to the booster pump station (Work No. 4), including twin 11kv electric cables laid in trench crossing Footpaths 45, 61 and 42 and an unnamed watercourse designated as main river; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the circuits rise to interface with the electrical substation/switchyard at the gas compressor compound (Work No. 3) and the booster pump station (Work No. 4).

**Work No. 19**— Electrical control cables extending from the proposed electrical substation/switchyard at the gas compressor compound (Work No. 3) to the booster pump station (Work No. 4), including electrical control cables laid in trench and sleeves, crossing Footpaths 45, 61 and 42 and an unnamed watercourse designated as main river; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the circuits rise to interface with the electrical substation/switchyard at the gas compressor compound (Work No. 3) and the booster pump station (Work No. 4).

**Work No. 20A**— An interconnector gas pipeline from the gas compressor compound (Work No. 3) to the A588 Hall Gate Lane including a gas pressure pipeline laid in trench or by trenchless methods crossing Monks Lane, Back Lane, Hall Gate Lane and watercourses/drains; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the pipeline rises to interface with the gas compressor compound (Work No. 3); and temporary fencing, stock proof fencing, temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.
Work No. 20B— An interconnector gas pipeline from the A588/Hall Gate Lane to Lancaster Road C308 including a gas pressure pipeline laid in trench or by trenchless methods crossing Footpath 31, Bridleway 29, White Lane, Shaws Lane, Footpath 34, Longwood Lane (New Lane), Lancaster Road C308 and watercourses/drains; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary fencing, stock proof fencing, temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.

Work No. 20C— An interconnector gas pipeline from Lancaster Road C308 to Bradshaw Lane C414 including a gas pressure pipeline laid in trench or by trenchless methods crossing Bradshaw Road C414, Ridgy Pool and other watercourses/drains; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary fencing, stock proof fencing, temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.

Work No. 20D— An interconnector gas pipeline from Bradshaw Lane C414 to Bone Hill Lane including a gas pressure pipeline laid in trench or by trenchless methods crossing Footpath 39 and Bone Hill Lane; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary fencing, stock proof fencing, temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.

Work No. 20E— An interconnector gas pipeline from Bone Hill Lane to Black Lane C436 including a gas pressure pipeline laid in trench or by trenchless methods crossing Black Lane; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary fencing, stock proof fencing, temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.

Work No. 20F— An interconnector gas pipeline from Black Lane C436 connecting to metering station including a gas pressure pipeline laid in trench or by trenchless methods, crossings of other ordinary watercourses/drains, temporary fencing, stock proof fencing; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the pipeline rises to interface with metering station (Work. No. 21); and temporary access, temporary access roads and any temporary subsidence monitoring stations required by the highway authority.

Work No. 20G— An interconnector gas pipeline connecting from metering station (Work No. 21) National Grid feeder main No. 21 to Station Lane including a gas pressure pipeline laid in trench or by trenchless methods crossing Station Lane and watercourses/drains; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable) save where the pipeline rises to interface with metering station (Work. No. 21); and temporary fencing, stock proof fencing, temporary access and temporary access roads.

Work No. 20H— An interconnector gas pipeline from Station Lane connecting to National Grid feeder main No. 15 including a gas pressure pipeline laid in trench or by trenchless methods crossing Station Lane, Footpath No. 4 and Footpath No. 2 and watercourses/drains; all to be constructed not less than 1 metre below ground surface (or below bed of watercourse where applicable) and not more than 10 metres below ground surface (or below bed of watercourse where applicable); and temporary fencing, stock proof fencing, temporary access and temporary access roads.

Work No. 21— An interconnector gas pipeline metering station including a gas metering station containing underground pipework, a metering station instrument building, above ground valves and pipework, a pipe pig reception/insertion area, an area reserved for extension of the facility,
extensions of those parts of the interconnector gas pipeline comprised in Work Nos. 20F and 20G which link to elements of this Work No. 21, temporary access tracks and turning areas adjacent to the NTS Feeder 21 control valve station and an access track to Station Lane and security fencing and landscaping.

In connection with the above Work Nos. further associated development within the Order limits consisting of—

(a) mechanical, electrical and telecommunications equipment and the provision of utilities services;
(b) ramps, means of access, footpaths and bridleways;
(c) embankments, shafts, foundations, retaining walls, drainage, valves, air valves, washout valves, stopcocks and other pipe fittings, fencing and culverts;
(d) works to alter the course of, or otherwise interfere with a watercourse other than a navigable watercourse;
(e) works to construct pipelines and to remove or alter the position of apparatus including mains, sewers, drains and cables;
(f) landscaping, ecological mitigation works and other works to mitigate any adverse effects of the construction, maintenance or operation of the authorised development;
(g) works for the benefit or protection of land affected by the authorised development;
(h) works required for the strengthening, improvement, maintenance or reconstruction of any streets;
(i) works to install subsidence monitoring systems and equipment where any subsidence to existing brine caverns may affect any part of the authorised development; and
(j) such other works, including working sites and works of demolition as may be necessary to expedite for the purposes of or in connection with the construction of the authorised development and which fall within the scope of the environmental statement.
### SCHEDULE 2

#### Article 9

**STREETS SUBJECT TO STREET WORKS**

<table>
<thead>
<tr>
<th>(1) Area</th>
<th>(2) Subject to street works</th>
</tr>
</thead>
<tbody>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 1A and 1B, Work Nos. 2 to 5 inclusive and Work Nos. 8 to 11 inclusive— Footpath 42 (Preesall) Footpath 43 (Preesall) Footpath 45 (Preesall) Footpath 46 (Preesall) Footpath 61 (Preesall) Footpath 53 (Preesall) Monks Lane (Unadopted) (drawing nos. MMD-277663-C-DR-00-XX-0005, 0006, 0007 and 0015), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 6— A588 Hall Gate Lane (Adopted Classified Road) Back Lane (Adopted unclassified Road) (drawing nos. MMD-277663-C-DR-00-XX-0010 and 0016), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 7— Monks Lane (Unadopted) (drawing no. MMD-277663-C-DR-00-XX-0010), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 13— Unnamed track adjacent to Fleetwood Fish Dock. (drawing no. MMD-277663-C-DR-00-XX-0004), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 15— Herring Arm Road (drawing no. MMD-277663-C-DR-00-XX-0004), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 16A to 16L inclusive— Jameson Road (Adopted Unclassified) Rossall Lane B5409, Wyre Way (Adopted classified) South Strand (Adopted Unclassified) Broadway A587 (Adopted classified) Broadway Playing Field Entrance (Adopted unclassified) Fairway/Westway (Adopted Unclassified) Rossall Promenade</td>
</tr>
<tr>
<td>(1) <strong>Area</strong></td>
<td>(2) <strong>Subject to street works</strong></td>
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<tr>
<td></td>
<td>(drawing nos. MMD-277663-C-DR-00-XX-0002 and 0003), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 17A, 17B and 17C—Agglebys Road Corcas Lane Bridleway 2a (Stalmine-with-Staynall) High Gate Lane, linking High Gate Lane with Burrows Lane (Adopted unclassified) Footpath 13 (Fleetwood) River Road (Adopted unclassified) (drawing nos. MMD-277663-C-DR-00-XX-0010, 0012 0013 and 0015), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 18—Footpath 42 (Preesall) Footpath 45 (Preesall) Footpath 61 (Preesall) (drawing nos. MMD-277663-C-DR-00-XX-0005 and 0007), where crossed by the authorised development within the Order limits</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 19—Footpath 42 (Preesall) Footpath 43 (Preesall) Footpath 45 (Preesall) Footpath 61 (Preesall) Footpath 53 (Preesall) Monks Lane (Unadopted) (drawing nos. MMD-277663-C-DR-00-XX-0005 and 0007), where crossed by the authorised development within the Order limits</td>
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<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 20A to 20H inclusive—A 588 Hall Gate Lane (Adopted classified) Footpath 31 (Preesall) Bridleway 29 (Nateby) White Lane (Unadopted) Shaws Lane, Footpath 34 (Pilling) (Unadopted) Longwood Lane (New Lane) Lancaster Road C305 (Adopted classified) Bradshaw Lane C414 (Adopted classified) Footpath 39 (Pilling) Bonehill Lane (Adopted unclassified) Black Lane C436 (Adopted classified) Bridleway 1 (Nateby) Station Lane (Adopted unclassified) Footpath 4 (Nateby)</td>
</tr>
<tr>
<td>(1) Area</td>
<td>(2) Subject to street works</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>(drawing nos. MMD-277663-C-DR-00-XX-0016, 0017, 0018, 0019, 0020, 0021 and 0022), where crossed by the authorised development within the Order limits.</td>
</tr>
</tbody>
</table>
## SCHEDULE 3

### Article 10

### STREETS SUBJECT TO ALTERATION OF LAYOUT

<table>
<thead>
<tr>
<th>(1) Area</th>
<th>(2) Street subject to alteration of layout</th>
<th>(3) Description of alteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>The A588 Hall Gate Lane in Preesall, Lancashire</td>
<td>Widening of the existing adopted highway (classified road), and the creation of a left turn lane for northbound traffic wishing to enter the new private access road (Schedule 1, Work No. 6 and Work No. 7), between points AA and BB on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0216)</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>Back Lane Preesall, Lancashire</td>
<td>Formation of two junctions with Back Lane to carry the private access road across the existing adopted highway to the gas compressor compound (Schedule 1, Work No. 6 and Work No. 7), between points M and N on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210)</td>
</tr>
</tbody>
</table>
## SCHEDULE 4

### Article 12

## STREETS AND RIGHTS OF WAY TO BE TEMPORARILY STOPPED UP

<table>
<thead>
<tr>
<th>(1) Area</th>
<th>(2) Street to be temporarily stopped up</th>
<th>(3) Extent of temporary stopping up</th>
</tr>
</thead>
<tbody>
<tr>
<td>County of Lancashire, Borough of Wyre,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Footpath 42 (Preesall)</td>
<td>For the purposes of Work Nos. 1A and 1B, Work Nos. 2 to 5 inclusive, Work Nos. 8 to 11 inclusive and Work nos. 18 and 19—</td>
<td>For a distance of 70m measured along the length of the footpath between points A and B on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0205)</td>
</tr>
<tr>
<td>Footpath 45 (Preesall) and Footpath 43 (Preesall)</td>
<td>For the purposes of Work No. 6 and Work No. 20A—</td>
<td>For a distance of 40m measured along the length of the footpath between points C and D and I and J on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0207)</td>
</tr>
<tr>
<td>Footpath 61 (Preesall)</td>
<td>For the purposes of Work No. 7 and Work No. 17A—</td>
<td>For a distance of 20m measured along the length of the footpath between points E and F and G and H on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0207)</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>Back Lane</td>
<td>For the purposes of Work No. 6 and Work No. 20A— Between points M and N on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210)</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>Monks Lane</td>
<td>For the purposes of Work No. 7 and Work No. 17A— Between its junction with Back Lane to the Westerly limit of the gas compressor compound between points Q1 to R1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210)</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>Unnamed track adjacent to Fleetwood Fish Dock (Private access)</td>
<td>For the purposes of Work No. 13— Between the sea water pumping station and the dock edge between points Q2 and R2 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0204)</td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>Rossall Promenade (Footpath 12 (Fleetwood))</td>
<td>For the purposes of Work No. 16A to 16L inclusive— From the access point from Fairway to the Order limits between points S1, T1 and U1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0202)</td>
</tr>
<tr>
<td>(1) Area</td>
<td>(2) Street to be temporarily stopped up</td>
<td>(3) Extent of temporary stopping up</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Wyre Way Adjacent to B5049</td>
<td>For the width of the proposed temporary access track between points V1 and W1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0203)</td>
<td></td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 17A to 17C inclusive—</td>
<td></td>
</tr>
<tr>
<td>Agglebys Road</td>
<td>Between points K and L on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210)</td>
<td></td>
</tr>
<tr>
<td>Bridleway 2a (Stalmine-with-Staynall)/Corcas Lane</td>
<td>Between points Q and P on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0212)</td>
<td></td>
</tr>
<tr>
<td>High Gate Lane linking High Gate Lane with Burrows Lane (Adopted unclassified)</td>
<td>Between points T and T2 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0213)</td>
<td></td>
</tr>
<tr>
<td>Burrows Lane (Adopted unclassified)</td>
<td>Between points R and S on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0213)</td>
<td></td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work No. 19—</td>
<td></td>
</tr>
<tr>
<td>Footpath 42 (Presetall)</td>
<td>Between points A and B on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0205).</td>
<td></td>
</tr>
<tr>
<td>Footpath 45 (Presetall)</td>
<td>Between points C and D on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0207)</td>
<td></td>
</tr>
<tr>
<td>Footpath 61 (Presetall)</td>
<td>Between points E and F on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0207)</td>
<td></td>
</tr>
<tr>
<td>County of Lancashire, Borough of Wyre</td>
<td>For the purposes of Work Nos. 20A to 20H inclusive—</td>
<td></td>
</tr>
<tr>
<td>Footpath 31 (Presetall)</td>
<td>Between points U and V on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0216)</td>
<td></td>
</tr>
<tr>
<td>Bridleway 29 (Presetall)</td>
<td>Between points W and X on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0217)</td>
<td></td>
</tr>
<tr>
<td>White Lane</td>
<td>Between points Y and Z on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0217)</td>
<td></td>
</tr>
<tr>
<td>Shaws Lane (Footpath 34 (Pill))</td>
<td>Between points A1 and B1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0217)</td>
<td></td>
</tr>
<tr>
<td>(1) Area</td>
<td>(2) Street to be temporarily stopped up</td>
<td>(3) Extent of temporary stopping up</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Longwood Lane (New Lane)</td>
<td>Between points C1 and D1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0218)</td>
<td></td>
</tr>
<tr>
<td>Lancaster Road</td>
<td>Between points C2 and D2 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0218)</td>
<td></td>
</tr>
<tr>
<td>Bradshaw Lane</td>
<td>Between points E1 and F1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0219)</td>
<td></td>
</tr>
<tr>
<td>Footpath 39 (Pilling)</td>
<td>Between points E2 and F2 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0220)</td>
<td></td>
</tr>
<tr>
<td>Bone Hill Lane</td>
<td>Between points G1 and H1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0220)</td>
<td></td>
</tr>
<tr>
<td>Black Lane</td>
<td>Between points I1 and J1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0221)</td>
<td></td>
</tr>
<tr>
<td>Station Lane</td>
<td>Between points K1 and L1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0221)</td>
<td></td>
</tr>
<tr>
<td>Footpath 4 (Nateby)</td>
<td>Between points M1 and N1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0222)</td>
<td></td>
</tr>
<tr>
<td>Bridleway 1 (Nateby)</td>
<td>Between points K2 and K1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0222)</td>
<td></td>
</tr>
<tr>
<td>Footpath 2 (Nateby)</td>
<td>Between points O1 and P1 on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0223)</td>
<td></td>
</tr>
</tbody>
</table>
## SCHEDULE 5
### ACCESS TO WORKS

<table>
<thead>
<tr>
<th>Area</th>
<th>Description of access</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>County of Lancashire, Borough of Wyre</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Permanent Access to Works** | Preesall, main access private road to A588 formed within Work No. 6  
Access from the A588 Hall Gate Lane opposite Moss House Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0216) |
| | Preesall, secondary access/road crossing formed within Work No. 6  
Access from Back Lane approximately 95m south of Monks Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210) |
| | Preesall, emergency access to works area from Acres Road  
Access from Acres Road approximately 90m west of Acre House as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0208) |
| | Fleetwood Fish Dock  
Access to seawater pump station, connection to Herring Arm Road and Dock Avenue within the Fleetwood Fish Dock as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0204) |
| **Temporary Access to Works** | Preesall, access to works area from A588 formed within Work No. 6  
Access from the A588 Hall Gate Lane opposite Moss House Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0216) |
| | Preesall, secondary access/road crossing formed within Work No. 6  
Access from Back Lane approximately 95m south of Monks Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210) |
| | Fleetwood Fish Dock  
Access to seawater pump station, connection to Herring Arm Road within the Fleetwood Fish Dock as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0204) |
| | Fleetwood Fish Dock to Work No. 16A  
Access from Herring Arm Road within the Fleetwood Fish Dock as shown on the access and temporary stopping up plans (drawing no. |
<table>
<thead>
<tr>
<th>(1) Area</th>
<th>(2) Description of access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleetwood, Jameson Road two access points to Work Nos. 16B, 16C and 16D</td>
<td>Access from Jameson Road to the temporary works compound close to the disused railway, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0203)</td>
</tr>
<tr>
<td></td>
<td>Access from Jameson Road to the temporary works compound sited approximately 90m west of the disused railway, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0203)</td>
</tr>
<tr>
<td>Fleetwood, Fleetwood Road to Work Nos. 16D and 16E</td>
<td>Access from Fleetwood Road to the temporary work compound and works. The access is situated approximately 100m south east of its junction (roundabout) with Amounderness Way, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0203)</td>
</tr>
<tr>
<td>Fleetwood, Rossall Lane to Work Nos. 16E and 16F</td>
<td>Access from Rossall Lane to the temporary works compound north of Rossall Lane. The access is situated approximately 25m west of the junction with Amounderness Way, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0203)</td>
</tr>
<tr>
<td>Fleetwood, South Strand to Work No. 16F</td>
<td>Access from South Strand access to field area. The access is situated approximately 230m south west of its junction with Broadway, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0202)</td>
</tr>
<tr>
<td>Fleetwood, South Strand to Work Nos. 16G and 16H</td>
<td>Access from South Strand to the works compound situated adjacent to South Strand/Broadway. The access is situated at the junction of South Strand with Broadway, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0202)</td>
</tr>
<tr>
<td>Rossall Promenade, Fairway/Westway to Work Nos. 16I, 16J, 16K and 16L</td>
<td>Access from Fairway/ Westway at the point of the existing access to the promenade/car parking areas, as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0202)</td>
</tr>
<tr>
<td>Preesall, Agglebys Road to Work No. 17A</td>
<td>Access from Agglebys Road at a point approximately 20m to the west of its junction with Back Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0210)</td>
</tr>
<tr>
<td>Preesall, Corcas Lane to Work No. 17A</td>
<td>Access to work from Corcas Lane at a point approximately 20m west</td>
</tr>
<tr>
<td>(1) Area</td>
<td>(2) Description of access</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>of its junction with Back Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0212)</td>
<td></td>
</tr>
<tr>
<td><strong>Preesall, High Gate Lane linking Burrows Lane to High Gate Lane to Work No. 17A</strong></td>
<td>Access to work from High Gate Lane at a point approximately 180m east of its junction with Burrows Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0213)</td>
</tr>
<tr>
<td><strong>Preesall, Burrows Lane to Work No. 17A</strong></td>
<td>Access to work from Burrows Lane at a point approximately 350m south of its junction with High Gate Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0213)</td>
</tr>
<tr>
<td><strong>Preesall, Burrows Lane to Work Nos. 17A and 17B, temporary works compound</strong></td>
<td>Access to work from Burrows Lane at a point approximately 1040m south of its junction with High Gate Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0214)</td>
</tr>
<tr>
<td><strong>Preesall, Burrows Lane to Work Nos. 17A and 17B, temporary works compound</strong></td>
<td>Access to work from Burrows Lane at a point approximately 300m north west of its junction with Staynall Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0214)</td>
</tr>
<tr>
<td><strong>Thornton-Cleveland, Stanah Substation, River Road to Work No. 17C</strong></td>
<td>Access from River Road via two existing access roads serving a caravan park and the Stanah Substation as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0215)</td>
</tr>
<tr>
<td><strong>Preesall, Access from A588 Hall Gate Lane to Work No. 20B Interconnector Gas Main</strong></td>
<td>Access from the A588, High Gate Lane approximately 40m north of Moss House Lane as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0216)</td>
</tr>
<tr>
<td><strong>Pilling Moss, Lancaster Road to Work No. 20B and Work No. 20C</strong></td>
<td>Access from Lancaster Road approximately 125m north of Bankfield as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0218)</td>
</tr>
<tr>
<td><strong>Pilling Moss, Bradshaw Lane to Work No. 20C and 20D</strong></td>
<td>Access from Bradshaw Lane approximately 110m east of Ridgy Pool as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0219)</td>
</tr>
<tr>
<td>(1) Area</td>
<td>(2) Description of access</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Pilling Moss, Bone Hill Lane to Work No. 20D and 20E</strong></td>
<td>Access from Bone Hill Lane approximately 200m south east of Bone Hill Farm as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0220)</td>
</tr>
<tr>
<td><strong>Nateby Moss, Black Lane to Work Nos. 20E, 20F and 21</strong></td>
<td>Access to work from Black Lane at a point approximately 100m north BAP habitats west of its junction with Footpath No. 6 as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0221)</td>
</tr>
<tr>
<td><strong>Nateby, Station Lane to Work No. 20H and 20G</strong></td>
<td>Access from Station Lane via existing access roads serving the National Grid gas compound at Black Wood approximately 175m south of the Orchard as shown on the access and temporary stopping up plans (drawing no. MMD-277663-C-DR-00-XX-0222)</td>
</tr>
</tbody>
</table>
## SCHEDULE 6

### Article 23

**LAND OF WHICH TEMPORARY POSSESSION MAY BE TAKEN**

<table>
<thead>
<tr>
<th>(1) Area</th>
<th>(2) Number of land shown on land plans</th>
<th>(3) Purpose for which temporary possession may be taken</th>
<th>(4) Relevant part of the authorised development</th>
</tr>
</thead>
</table>
SCHEDULE 7

DEEMED MARINE LICENCE UNDER PART 4 (MARINE LICENSING) OF THE MARINE AND COASTAL ACCESS ACT 2009

PART 1

Interpretation

1.—(1) In this Schedule—

“the 2009 Act” means the Marine and Coastal Access Act 2009(a);
“authorised development” means the development and associated development described in Schedule 1 (authorised development) and any other development authorised by this Order, which is development within the meaning of section 32 of the 2008 Act;
“commencement” means beginning to carry out any material operation (as defined in section 155 of the 2008 Act) other than operations consisting of marine and benthic surveys, archaeological investigations and investigations for the purpose of assessing ground and geological conditions and “commence” and “commenced” shall be construed accordingly;
“environmental statement” means the document certified as the environmental statement by the Secretary of State for the purposes of this Order;
“key BAP habitats” means the Sabellaria alveolata reef;
“licence conditions” means the licence conditions set out at paragraphs 2 to 42;
“licence holder” means the “undertaker” as defined in Article 2 (interpretation) of this Order to whom this licence is issued;
“licensed activity” means an activity described in paragraph 8 of this licence;
“licensed location” means the area bounded by the coordinates set out at paragraph 9 of this licence;
“licensed works” means any works constructed in the course of a licensed activity;
“licensing authority” means the Secretary of State;
“maintenance” includes maintain, inspect, repair, adjust, alter, remove, clear, refurbish, reconstruct, decommission, demolish, replace and/or improve;
“MMO” or “the Marine Management Organisation” means the body created under the 2009 Act responsible for the monitoring of this licence or any successor to its statutory functions;
“pipeline” means the brine discharge pipeline comprised in the licensed works;
“sea bed” means the solid surface of the earth which lies under the sea;
“UK marine area” has the same meaning as that given at section 42 (UK marine area) of the 2009 Act;
“vessel” means every description of vessel, however propelled or moved, and includes a non-displacement craft, a personal watercraft, a seaplane on the surface of the water, a hydrofoil vessel, a hovercraft or any other amphibious vehicle and any other thing constructed or adapted for movement through, in, on or over water and which is at the time in, on or over water;
“working day” means a day which is not a Saturday, Sunday, Bank Holiday or other public holiday.

(a) 2009 c.23.
Unless otherwise indicated all geographical co-ordinates contained within this licence shall be taken to be latitude and longitude degrees and minutes to three decimal places.

Except where otherwise indicated—

(a) the point of contact with the MMO shall be at its main office(a); and

(b) details for contact with the MMO’s marine pollution response team shall be at its main office(b).

**Licence validity period**

2.—(1) This licence is valid from the licence commencement date until the licence termination date.

(2) For the purposes of this licence—

(a) the “licence commencement date” means the date on which this Order is made; and

(b) the “licence termination date” means an indefinite period unless a licensed activity has not been commenced by the fifth anniversary of the licence commencement date, in which case it means the fifth anniversary of the licence commencement date.

**Inspection of records etc.**

3. The licence holder shall—

(a) permit any person who is appointed by the MMO for the purpose to inspect, and make notes from, all books, papers, maps and other records of any kind kept by the licence holder in pursuance of this licence or in connection with activities associated with this licence; and

(b) furnish that person at reasonable times with such information at reasonable times with such reasonable assistance as may be requested by that person in connection with or arising out of an inspection in pursuance of this paragraph.

**Rights of access**

4. Any person authorised by the MMO shall be entitled at all reasonable times to enter into and upon any of the licence holder’s installations, vessels or equipment used or to be used in connection with the activities authorised by this licence in accordance with Chapter 2 of Part 8 (common enforcement powers) of the 2009 Act.

**Transfer**

5. In the application of section 72 of the 2009 Act to this licence, subsection 72(8) of the 2009 Act shall not apply to a transfer made in accordance with article 8 (transfer of benefit of Order) of this Order.

**Force majeure**

6.—(1) If by reason of force majeure any substances or articles are deposited or removed otherwise than at the licensed location then the licence holder shall notify the MMO of the full details of the circumstances of that deposit within 48 hours of the incident occurring.

(2) For the purposes of this paragraph, “force majeure” means when, due to stress of weather or any other cause, the master of a vessel determines that it is necessary to deposit substances or

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(a) Contact details for the main office of the MMO are Marine Management Organisation, Inshore Marine Licensing, Lancaster House, Hampshire Court, Newcastle upon Tyne, NE4 7YH; telephone 0300 123 1032; fax: 0191 376 2681; and email: infrastructure@marinemanagement.org.uk.

(b) Contact details for the main office of the MMO’s Marine Pollution response team are Marine Management Organisation, Marine Pollution Response Team, Lancaster House, Hampshire Court, Newcastle upon Tyne, NE4 7YH; telephone 0870 785 1050 or 07770 977825; and email: dispersants@marinemanagement.org.uk.
articles otherwise than at the licensed location because the safety of human life or the vessel is threatened.

**Licence conditions binding other parties**

7. The licence conditions shall bind any person who for the time being owns, occupies or enjoys any use of the licensed works.

**PART 2**

**Licensed activities**

8. Subject to the licence conditions this licence authorises the licence holder (and any agent, contractor or subcontractor acting on its behalf) to—

(a) carry out those elements of—

(i) Work No. 1A;
(ii) Work No. 1B;
(iii) Work No. 15;
(iv) Work No. 16J;
(v) Work No. 16K; and
(vi) Work No. 16L.

of Schedule 1 (authorised development) of this Order, and of any further associated development listed at items (a) to (j) in Schedule 1 in connection with those Work Nos., which fall within the UK marine area and constitute licensable marine activities under section 66 of the 2009 Act; and

(b) undertake a borehole survey in connection with the installation of the brine outfall pipeline comprised within the licensed activities set out at paragraph (a), the purpose of which would be to inform the micro-siting of the pipeline and to determine if there are any archaeological remains or there is any palaeoenvironmental evidence present which could be directly affected by such pipeline installation.

**Licensed location**

9. The licence holder (and any agent, contractor or subcontractor acting on its behalf) may engage in the licensed activities in the area bounded by the following coordinates—

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### Reporting of engaged agents, contractors or sub-contractors

10.—(1) The licence holder shall notify the MMO in writing of any agents, contractors or sub-contractors that will be carrying out the licensed activities on behalf of the licence holder no less than 5 working days before the commencement of that activity.

(2) The licence holder shall ensure that a copy of this licence and any subsequent revisions or amendments has been read and understood by any agents, contractors or sub-contractors that will be carrying out the licensed activities on behalf of the licence holder.

### Notification of vessels

11.—(1) The licence holder shall ensure that the MMO is provided with notification of any vessel being used to undertake the licensed activities no less than 24 hours before that vessel first commences licensed activities.

(2) The licence holder shall ensure that a copy of this licence and any subsequent revisions or amendments has been read and understood by the masters of any vessel being used to undertake any licensed activity, and that a copy of this licence is held on board any such vessel.

### Latitude and Longitude

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Distribution of copies

12.—(1) The licence holder shall ensure that a copy of this licence and any subsequent revisions or amendments made to it in accordance with section 72 (variation, suspension, revocation and transfer) of the 2009 Act are given to—
   (a) any agent, contractor or subcontractor undertaking a licensed activity;
   (b) the master of any vessel undertaking a licensed activity;
   (c) the transport manager responsible for any vehicle undertaking a licensed activity.
(2) The licence holder shall keep a copy of this licence at its registered address.

PART 3

Application of licence conditions

13.—(1) Reference to licensed activities in paragraphs 15 and 18 to 42 shall not include the undertaking of the borehole survey referred to at paragraph 8(b), unless the MMO (following a review of the method statement submitted in respect of such survey pursuant to paragraph 17) notifies the licence holder otherwise.
(2) Paragraphs 15 to 42 shall not apply to—
   (a) Work Nos. 1A and 1B of Schedule 1 (authorised development) of the Order; or
   (b) any part of Work No. 15 of Schedule 1 (authorised development) other than the incorporation of filters into the existing water intake structure comprised in that Work No.

Licence conditions prior to commencement of the licensed activities

14. The licence holder shall, unless otherwise agreed in writing with the MMO, within ten working days of receipt of a copy of this licence notify the MMO that it accepts the terms and conditions of this licence; and no licensed activities may be carried out until that notice has been given.

15. No licensed activities shall commence until a written scheme setting out all the stages of the licensed activities and a list of all proposed licensed activities additional to those listed at paragraphs 8(a)(i) to 8(a)(vi) (if any), have been submitted to and approved by the MMO.

16. The licence holder shall, unless otherwise agreed in writing with the MMO, no less than ten working days prior to the commencement of any stage of the licensed activities notify the MMO of the proposed commencement date of that stage; and no stage of the licensed activities may be carried out until notice for that stage has been given.

17.—(1) The licence holder shall no less than two months prior to the commencement of any stage of the licensed activities submit to the MMO a method statement for that stage, the scope of which is to be agreed by the MMO prior to its submission; and no stage of the licensed activities may commence until the method statement for that stage has been approved in writing by the MMO.
(2) The licence holder shall carry out any stage of licensed activities in accordance with the approved method statement for that stage.

18.—(1) The licence holder shall prior to the commencement of any stage of the licensed activities carry out a marine benthic ecology and habitats survey for that stage.
(2) The scope of any marine benthic ecology and habitats survey shall be agreed with the MMO in writing prior to it being carried out.
(3) Any report arising from any marine benthic ecology and habitats survey and any necessary monitoring requirements shall be agreed in writing with the MMO prior to the commencement of
the stage of the licensed activities to which that survey relates; and no stage of the licensed activities
may commence until such monitoring requirements (if any) for that stage and any amendments to
the licence conditions (if required by the MMO) have been agreed.

19.—(1) The licence holder shall prior to the commencement of any stage of the licensed
activities agree in writing with the MMO a vessel movement plan for that stage; and no stage of
the licensed activities may commence until such a plan for that stage has been agreed.
(2) The licence holder shall carry out the licensed activities in accordance with the approved
vessel movement plan, unless otherwise agreed in writing by the MMO.

20.—(1) The licence holder shall prior to the commencement of any stage of the licensed
activities agree in writing with the MMO a construction monitoring plan (or, if so agreed with the
MMO, construction monitoring plans) for that stage; and no stage of the licensed activities may
commence until such a plan or plans for that stage have been agreed.
(2) Any construction monitoring plan shall include but not be limited to a pre-construction,
construction and post-construction plan for monitoring the laying of the pipeline, consisting of trawl
surveys within the transshipment area and barge approach routes for the delivery of rock armouring,
and surveys of the pipeline corridor to ensure that the pipeline does not become exposed.
(3) The licence holder shall carry out any stage of the licensed activities in accordance with any
approved construction monitoring plan for that stage.

21.—(1) The licence holder shall no less than six weeks prior to the transshipment of rock
armouring comprised in any stage of the licensed activities submit a method statement relating to
such transshipment for that stage, including details of the location of the transshipment area and
barge approach routes for the delivery of rock armouring; and no stage of the licensed activities
may commence until such a method statement for that stage has been approved in writing by the
MMO.
(2) The licence holder shall carry out any stage of the licensed activities in accordance with the
rock armouring transhipment method statement approved for that stage.

22.—(1) The licence holder shall prior to the commencement of any stage of the licensed
activities agree with the MMO the lighting and marking of the licensed works comprised in that
stage.
(2) The details of such lighting and marking shall be included in the method statement to be
submitted for approval under paragraph 17.

23.—(1) The licence holder shall prior to the commencement of any stage of the licensed
activities notify local mariners’ and fishermen’s organisations of that commencement by
procuring issue of a notice to mariners; and no stage of the licensed activities may commence
until such notice for that stage has been given.
(2) For the purposes of this paragraph, “notice to mariners” includes any notice to mariners issued
by the Admiralty, Trinity House, Queen's harbormasters, government departments or harbour or
pilotage authorities.

24.—(1) The licence holder shall prior to the commencement of any stage of the licensed
activities, following consultation with English Heritage, submit to the MMO for that stage a
written scheme of investigation of areas of archaeological interest; and no stage of the licensed
activities may commence until the written scheme of investigation for that stage has been
approved in writing by the MMO.
(2) In undertaking any stage of the licensed activities, the licence holder shall act in accordance
with the written scheme of investigation approved for that stage (if any).

Licence conditions during construction of the licensed works

25. The licence holder shall minimise the re-suspension of sediment during any stage of
construction of the licensed works. Details of how this is to be achieved shall be included in the
method statement for that stage to be submitted for approval under paragraph 17.
26.—(1) The licence holder shall in the course of any stage of construction of the licensed works take appropriate steps to minimise damage to the foreshore, including to key BAP habitats so far as they are located on the foreshore. Details of such steps, and for steps to identify damage caused (if any) by the construction of the licensed works to key BAP habitats so far as they are located on the foreshore, shall be included in the method statement for that stage to be submitted for approval under paragraph 17.

(2) For the purposes of this paragraph, “the foreshore” means land which is covered and uncovered by the ordinary movement of the tide.

27. The licence holder shall in the course of construction of any stage of the licensed works ensure that the pipeline, anchoring and rock armouring (if present during construction of that stage) are fully covered and do not protrude above the seabed. Details of the necessary steps shall be included in the method statement for that stage to be submitted for approval under paragraph 17.

28. The licence holder shall in the course of construction of any stage of the licensed works only access the licensed location within a defined and marked out area which shall be set out in the method statement to be submitted for approval for that stage under paragraph 17, thereby limiting personnel and plant access to the licensed location.

29.—(1) The licence holder shall in the course of construction of the licensed works fit diffusers to the discharge end of the pipeline, unless otherwise agreed in writing by the MMO.

(2) The details of such diffusers shall be included in the method statement to be submitted for approval under paragraph 17.

30.—(1) The licence holder shall in the course of construction of the licensed works ensure that all chemicals utilised are selected from the list of notified chemicals assessed for use by the offshore oil and gas industry under the Offshore Chemicals Regulations 2002(a) or has gone through a similar level of ecotoxicological hazard or risk assessment.

(2) The licence holder shall obtain from the MMO prior written approval for the use of drilling fluids other than water-based mud for carrying out drilling operations comprised in any stage of the licensed activities.

(3) The licence holder shall comply with any guidance provided to it by the MMO in relation to the disposal of any arisings resulting from drilling operations using drilling fluids other than water-based mud.

31.—(1) The licence holder shall in the course of construction of the licensed works ensure that any coatings or treatments are suitable for use in the marine environment and are used in accordance with best environmental practice.

(2) For the purposes of this paragraph, “best environmental practice” means best environmental practice as defined in Appendix 1 of the 1992 OSPAR Convention of the Protection of the Marine Environment of the North-East Atlantic.

32. The licence holder shall in the course of construction of the licensed works, unless otherwise agreed in writing by the MMO, ensure that a soft-start procedure is used, whereby pile power is incrementally increased over a time period of not less than twenty minutes until full operational power is achieved. In the event that piling ceases for a period greater than ten minutes, the soft-start procedure shall be repeated.

33.—(1) The licence holder shall in the course of construction of the licensed works install bunding and/or storage facilities to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment into the marine environment.

(2) There shall be containment facilities secondary to the bunding or storage facilities described in sub-paragraph (1).

(a) S.I. 2002/1355; amended by S.I. 2005/2055; 2010/1513; 2011/78; and 2011/982.
(3) The capacity of those secondary containment facilities shall not be less than 100% of the storage capacity of the bunding or storage facilities described in sub-paragraph (1).

34. The licence holder shall ensure that any oil, fuel or chemical spill within the marine environment is reported to the MMO’s Marine Pollution Response Team by email or by telephone.

35. The licence holder shall in the course of construction of the licensed works ensure that during the works all waste is stored in designated areas which are isolated from surface water drains, open water and bunded to contain any spillages.

36.—(1) The licence holder shall in the course of construction of the licensed works ensure that no waste concrete slurry or wash water from concrete or cement works is discharged into the marine environment.

(2) Concrete and cement mixing shall, unless otherwise agreed in writing by the MMO, be contained and sited at least ten metres from any watercourse or surface water drain.

(3) For the purposes of this paragraph “watercourse” includes all rivers, streams, ditches, drains, canals, cuts, culverts, dykes, sluices, sewers and passages through which water flows except a public sewer or drain.

37. The licence holder shall ensure that any vessels used for rock transhipment or delivery operations—

(a) are suitably constructed and loaded to prevent rock falling over the side; and

(b) use suitable screening to prevent the loss of rock or shingle through drainage holes.

38. The licence holder shall ensure that any rock misplaced or lost below the level of mean high water springs in the course of construction of the licensed works is reported to the MMO within 48 hours and located and recovered within six weeks, unless otherwise agreed in writing with the MMO.

Licence conditions following completion of the licensed works

39. The licence holder shall prior to the commencement of any stage of the licensed activities in which backfilling operations within the marine environment are to take place following the completion of that stage, submit to the MMO for that stage details of the materials to be used in such backfilling operations; and no such stage of the licensed activities may commence until those details have been approved in writing by the MMO.

40. The licence holder shall ensure that, unless otherwise agreed in writing with the MMO, within six weeks of completion of the licensed works, backfill operations shall return the intertidal area to its profile prior to the commencement of the licensed activities; and the licence holder shall use the materials the details of which have been approved pursuant to paragraph 39 in respect of those backfill operations.

41. The licence holder shall within six weeks of completion of the licensed works ensure that any equipment, temporary structures, waste and/or debris associated with those works are removed, unless otherwise agreed in writing by the MMO.

42.—(1) The licence holder shall as soon as reasonably practicable following completion of the licensed works notify the Hydrographic Office of that completion.

(2) The “Hydrographic Office” means the Hydrographic Office of the Ministry of Defence, Taunton, Somerset TA1 2DN.
SCHEDULE 8
PROTECTIVE PROVISIONS

PART 1
FOR THE PROTECTION OF ELECTRICITY, GAS, WATER AND SEWERAGE
UNDERTAKERS

Application
1. For the protection of the undertakers referred to in this part of this Schedule the following provisions shall, unless otherwise agreed in writing between the promoter and the undertaker concerned, have effect.

Interpretation
2. In this Part of this Schedule—

“alternative apparatus” means alternative apparatus adequate to enable the undertaker in question to fulfil its statutory functions in a manner not less efficient than previously;

“apparatus” means—
(a) in the case of an electricity undertaker, electric lines or electrical plant (as defined in the Electricity Act 1989(a)), belonging to or maintained by that undertaker;
(b) in the case of a gas undertaker, any mains, pipes or other apparatus belonging to or maintained by a gas transporter for the purposes of gas supply;
(c) in the case of a water undertaker, mains, pipes or other apparatus belonging to or maintained by that undertaker for the purposes of water supply; and
(d) in the case of a sewerage undertaker—
   (i) any drain or works vested in the undertaker under the Water Industry Act 1991(b) and Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011; and
   (ii) any sewer which is so vested or is the subject of a notice of intention to adopt given under section 102(4) of that Act or an agreement to adopt made under section 104 of that Act, and includes a sludge main, disposal main (within the meaning of section 219 of that Act) or sewer outfall and any manholes, ventilating shafts, pumps or other accessories forming part of any such sewer, drain or works, and includes any structure in which apparatus is or is to be lodged or which gives or will give access to apparatus;

“commence” has the same meaning as in paragraph 1 of Schedule 9 (requirements);

“functions” includes powers and duties;

“in” in a context referring to apparatus or alternative apparatus in land includes a reference to apparatus or alternative apparatus under, over, across, along or upon land;

“plan” includes a section and description of the works to be executed;

“promoter” means the undertaker as defined in article 2 of this Order;

“undertaker” means—
(a) any licence holder within the meaning of Part 1 of the Electricity Act 1989;
(b) a gas transporter within the meaning of Part 1 of the Gas Act 1986(c);

(a) 1989 c. 29.
(b) 1991 c. 56.
(c) 1986 c. 44.
(c) a water undertaker within the meaning of the Water Industry Act 1991; and
(d) a sewerage undertaker within the meaning of Part 1 of the Water Industry Act 1991.

“United Utilities” means United Utilities PLC (company number 02366616 ) whose registered address is Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP.

3. This part of this Schedule does not apply to apparatus in respect of which the relations between the promoter and the undertaker are regulated by the provisions of Part 3 of the 1991 Act.

Temporarily stopped up streets

4. Notwithstanding the temporary stopping up or diversion of any highway under the powers of article 12 (temporary stopping up of streets and rights of way), an undertaker shall be at liberty at all times to execute and do all such works and things in, upon or under any such highway as may be reasonably necessary or desirable to enable it to maintain, renew or use any apparatus which at the time of the stopping up or diversion was in that highway.

Protective works to buildings

5.—(1) The promoter, in the case of the powers conferred by article 16 (protective work to buildings), shall, so far as is reasonably practicable, so exercise those powers as not to obstruct or render less convenient the access to any apparatus and, if by reason of the exercise of those powers any damage to any apparatus (other than apparatus the repair of which is not reasonably necessary in view of its intended removal or abandonment) or property of any undertaker or any interruption in the supply of electricity, gas or water, as the case may be, by the undertaker is caused, the promoter shall bear and pay the cost reasonably incurred by that undertaker in making good such damage or restoring the supply; and, subject to sub-paragraph (2), shall—

(a) make reasonable compensation to the undertaker for any loss sustained by it; and
(b) indemnify the undertaker against all claims, demands, proceedings, costs, damages and expenses which may be made or taken against or recovered from or incurred by that undertaker, by reason of any such damage or interruption.

(2) Nothing in this paragraph shall impose any liability on the promoter with respect to any damage or interruption to the extent that such damage or interruption is attributable to the act, neglect or default of an undertaker or its contractors or workmen; and the undertaker shall give to the promoter reasonable notice of any claim or demand as aforesaid and no settlement or compromise thereof shall be made without the prior consent of the promoter.

Acquisition of land

6. Regardless of any provision in this Order or anything shown on the land plans, the promoter shall not acquire any apparatus otherwise than by agreement.

Removal of apparatus

7.—(1) If, in the exercise of the powers conferred by this Order, the promoter acquires any interest in any land in which any apparatus is placed, that apparatus shall not be removed under this part of this Schedule and any right of an undertaker to maintain that apparatus in that land shall not be extinguished until alternative apparatus has been constructed and is in operation to the reasonable satisfaction of the undertaker in question.

(2) If, for the purpose of executing any works in, on or under any land purchased, held, appropriated or used under this Order, the promoter requires the removal of any apparatus placed in that land, it shall give to the undertaker in question written notice of that requirement, together with a plan of the work proposed, and of the proposed position of the alternative apparatus to be provided or constructed and in that case (or if in consequence of the exercise of any of the powers conferred by this Order an undertaker reasonably needs to remove any of its apparatus) the promoter shall, subject to sub-paragraph (3), afford to the undertaker the necessary

(a) facilities and rights for the construction of alternative apparatus in other land of the promoter; and
(b) subsequently for the maintenance of that apparatus.
(3) If alternative apparatus or any part of such apparatus is to be constructed elsewhere than in other land of the promoter, or the promoter is unable to afford such facilities and rights as are mentioned in sub-paragraph (2), in the land in which the alternative apparatus or part of such apparatus is to be constructed, the undertaker in question shall, on receipt of a written notice to that effect from the promoter, as soon as reasonably possible use its best endeavours to obtain the necessary facilities and rights in the land in which the alternative apparatus is to be constructed.

(4) Any alternative apparatus to be constructed in land of the promoter under this part of this Schedule shall be constructed in such manner and in such line or situation as may be agreed between the undertaker in question and the promoter or in default of agreement settled by arbitration in accordance with article 41 (arbitration).

(5) The undertaker in question shall, after the alternative apparatus to be provided or constructed has been agreed or settled by arbitration in accordance with article 41 (arbitration), and after the grant to the undertaker of any such facilities and rights as are referred to in sub-paragraph (2) or (3), proceed without unnecessary delay to construct and bring into operation the alternative apparatus and subsequently to remove any apparatus required by the promoter to be removed under the provisions of this part of this Schedule.

(6) Regardless of anything in sub-paragraph (5), if the promoter gives notice in writing to the undertaker in question that it desires itself to execute any work, or part of any work in connection with the construction or removal of apparatus in any land of the promoter, that work, instead of being executed by the undertaker, shall be executed by the promoter without unnecessary delay under the superintendence, if given, and to the reasonable satisfaction of the undertaker.

(7) Nothing in sub-paragraph (6) shall authorise the promoter to execute the placing, installation, bedding, packing, removal, connection or disconnection of any apparatus, or execute any filling around the apparatus (where the apparatus is laid in a trench) within 300 millimetres of the apparatus.

Facilities and rights for alternative apparatus

8.—(1) Where, in accordance with the provisions of this part of this Schedule, the promoter affords to an undertaker facilities and rights for the construction, use, maintenance, renewal and inspection in land of the promoter of alternative apparatus in substitution for apparatus to be removed, those facilities and rights shall be granted upon such terms and conditions as may be agreed between the promoter and the undertaker in question or in default of agreement settled by arbitration in accordance with article 41 (arbitration).

(2) In settling the terms and conditions mentioned in respect of alternative apparatus to be constructed in the authorised development, the arbitrator shall—

(a) give effect to all reasonable requirements of the promoter for ensuring the safety and efficient operation of the authorised development and for securing any subsequent alterations or adaptations of the alternative apparatus which may be required to prevent interference with the authorised development, its safety or its efficient operation; and

(b) so far as it may be reasonable and practicable to do so in the circumstances of the particular case, give effect to the terms and conditions (if any) applicable to the apparatus constructed in the authorised development for which the alternative apparatus is to be substituted.

(3) If the facilities and rights to be afforded by the promoter in respect of any alternative apparatus, and the terms and conditions subject to which those facilities and rights are to be granted, are in the opinion of the arbitrator more or less favourable on the whole to the undertaking in question than the facilities and rights enjoyed by it in respect of the apparatus to be removed and the terms and conditions to which those facilities and rights are subject, the arbitrator shall make such provision for the payment of compensation to or by the promoter by or to that undertaker as appears to the arbitrator to be reasonable having regard to all the circumstances of the particular case.

Retained apparatus: protection

9.—(1) Not less than 28 days before starting the execution of any works of the type referred to in paragraph 7(2) that are near to, or will or may affect, any apparatus the removal of which has
not been required by the promoter under paragraph 7(2), the promoter shall submit to the 
undertaker in question a plan.

(2) In relation to works which will or may be situated over or within 15 metres measured in any 
direction of, or (wherever situated) impose any load directly upon any sewer, the plan to be 
submitted to the undertaker under sub-paragraph (1) shall be detailed describing—

(a) the exact position of the works;
(b) the level at which these are proposed to be constructed or renewed;
(c) the manner of their construction or renewal;
(d) the position of all sewers within 15 metres of the works or upon which the works will 
impose a load; and
(e) by way of detailed drawings, every alteration proposed to be made to any such sewer.

(3) The promoter shall not commence the construction or renewal of any works to which sub-
paragraph (2) applies until the undertaker has given written approval of the plan so submitted.

(4) Any approval of the undertaker required under sub-paragraph (2)—

(a) may be given subject to reasonable conditions for any purpose mentioned in sub-
paragraph (5); 
(b) shall not be unreasonably withheld; and 
(c) shall be deemed to have been given if it is neither given nor refused within 56 days of the 
submission of plans for approval.

(5) In relation to a work to which sub-paragraph (2) applies, the specified undertaker may require 
such modifications to be made to the plans as may be reasonably necessary for the purpose of 
securing its sewerage system against interference or risk of damage or for the purpose of providing 
or securing proper and convenient means of access to any sewer.

(6) Works of the type referred to in paragraph 7(2) shall be executed only in accordance with the 
plan, submitted under sub-paragraph (1) (and in the case of a plan relating to sewers, in accordance 
with the plan approved or deemed to have been approved under sub-paragraph (4) or settled by 
arbitration in accordance with article 41 (arbitration), as amended from time to time by agreement 
between the promoter and the undertaker) and in accordance with such reasonable requirements as 
may be made in accordance with sub-paragraph (7) by the undertaker for the alteration or otherwise 
for the protection of the apparatus, or for securing access to it, and the undertaker shall be entitled to 
watch and inspect the execution of those works.

(7) Any requirements made by an undertaker under sub-paragraph (6) shall be made within a 
period of 21 days beginning with the date on which a plan under sub-paragraph (1) is submitted to it.

(8) If an undertaker in accordance with sub-paragraph (7) and in consequence of the works 
proposed by the promoter, reasonably requires the removal of any apparatus and gives written notice 
to the promoter of that requirement, paragraphs 1 to 3 and 5 to 8 shall apply as if the removal of the 
apparatus had been required by the promoter under paragraph 7(2).

(9) Nothing in this paragraph shall preclude the promoter from submitting at any time or from 
time to time, but in no case less than 28 days before commencing the execution of any works, a new 
plan, instead of the plan previously submitted, and having done so the provisions of this paragraph 
shall apply to and in respect of the new plan.

(10) The promoter shall not be required to comply with sub-paragraph (1) in a case of emergency 
but in that case it shall give to the undertaker in question notice as soon as is reasonably practicable 
and a plan of those works as soon as reasonably practicable thereafter and shall comply with sub-
paragraph (6) insofar as is reasonably practicable in the circumstances.

**Expenses**

10.—(1) Subject to the following provisions of this paragraph, the promoter shall repay to an 
undertaker the reasonable expenses incurred by that undertaker in, or in connection with, the 
inspection, removal, alteration or protection of any apparatus or the construction of any new 
apparatus which may be required in consequence of the execution of any such works as are 
referred to in paragraph 7(2).
(2) There shall be deducted from any sum payable under sub-paragraph (1) the value of any apparatus removed under the provisions of this Schedule, that value being calculated after removal.

(3) If in accordance with the provisions of this part of this Schedule—

(a) apparatus of better type, of greater capacity or of greater dimensions is placed in substitution for existing apparatus of worse type, of smaller capacity or of smaller dimensions; or

(b) apparatus (whether existing apparatus or apparatus substituted for existing apparatus) is placed at a depth greater than the depth at which the existing apparatus was situated,

and the placing of apparatus of that type or capacity or of those dimensions or the placing of apparatus at that depth, as the case may be, is not agreed by the promoter or, in default of agreement, is not determined by arbitration in accordance with article 41 (arbitration) to be necessary, then, if such placing involves cost in the construction of works under this part of this Schedule exceeding that which would have been involved if the apparatus placed had been of the existing type, capacity or dimensions, or at the existing depth, as the case may be, the amount which apart from this sub-paragraph would be payable to the undertaker in question by virtue of sub-paragraph (1) shall be reduced by the amount of that excess.

(4) For the purposes of sub-paragraph (3)—

(a) an extension of apparatus to a length greater than the length of existing apparatus shall not be treated as a placing of apparatus of greater dimensions than those of the existing apparatus; and

(b) where the provision of a joint in a pipe or cable is agreed, or is determined to be necessary, the consequential provision of a jointing chamber or of a manhole shall be treated as if it also had been agreed or had been so determined.

(5) An amount which apart from this sub-paragraph would be payable to an undertaker in respect of works by virtue of sub-paragraph (1) shall, if the works include the placing of apparatus provided in substitution for apparatus placed more than 7 years and 6 months earlier so as to confer on the undertaker any financial benefit by deferment of the time for renewal of the apparatus in the ordinary course, be reduced by the amount which represents that benefit.

Indemnity

11.—(1) Subject to sub-paragraphs (2) and (3), if by reason or in consequence of the construction of any such works referred to in paragraph 7(2), any damage is caused to any apparatus (other than apparatus the repair of which is not reasonably necessary in view of its intended removal for the purposes of those works) or property of an undertaker, or there is any interruption in any service provided, or in the supply of any goods, by any undertaker, the promoter shall—

(a) bear and pay the cost reasonably incurred by that undertaker in making good such damage or restoring the supply; and

(b) make reasonable compensation to that undertaker for any other expenses, loss, damages, penalty or costs incurred by the undertaker, by reason or in consequence of any such damage or interruption.

(2) Nothing in sub-paragraph (1) shall impose any liability on the promoter with respect to any damage or interruption to the extent that it is attributable to the act, neglect or default of an undertaker, its officers, servants, contractors or agents.

(3) An undertaker shall give the promoter reasonable notice of any such claim or demand and no settlement or compromise shall be made without the consent of the promoter which, if it withholds such consent, shall have the sole conduct of any settlement or compromise or of any proceedings necessary to resist the claim or demand.

Ground subsidence monitoring scheme in respect of United Utilities’ apparatus

12.—(1) No works comprised in Work No. 1A in Schedule 1 (authorised development) shall commence until a scheme for monitoring ground subsidence (“referred to in this paragraph as the monitoring scheme”) which is capable of interfering with or risking damage to United Utilities’
apparatus has been submitted to and approved by United Utilities, such approval not to be unreasonably withheld or delayed.

(2) The ground subsidence monitoring scheme described in sub-paragraph (1) shall set out—
(a) the apparatus of United Utilities which is to be subject to such monitoring;
(b) the extent of land to be monitored;
(c) the manner in which ground levels are to be monitored;
(d) the timescales of any monitoring activities; and
(e) the extent of ground subsidence which, if exceeded, shall require the promoter to submit for United Utilities’ approval a ground subsidence mitigation scheme in respect of such subsidence in accordance with sub-paragraph (3).

(3) The monitoring scheme must be implemented as approved, unless otherwise agreed in writing with United Utilities.

(4) As soon as reasonably practicable after any ground subsidence identified by the monitoring activities set out in the monitoring scheme has exceeded the level described in sub-paragraph (2)(e), a scheme setting out necessary mitigation measures (if any) for such ground subsidence (referred to in this paragraph as a “mitigation scheme”) shall be submitted to United Utilities for approval, such approval not to be unreasonably withheld or delayed; and any mitigation scheme must be implemented as approved, unless otherwise agreed in writing with United Utilities.

(5) If the monitoring scheme or mitigation scheme would conflict with any aspect of any ground subsidence monitoring scheme or ground subsidence mitigation scheme approved by the relevant planning authority pursuant to paragraph 35 of Schedule 9 (requirements) Halite may submit a revised monitoring scheme or mitigation scheme to United Utilities for its approval, such approval not to be unreasonably withheld or delayed; and the revised monitoring scheme or mitigation scheme must be implemented as approved, unless otherwise agreed in writing with United Utilities.

Enactments and agreements

13. Nothing in this part of this Schedule shall affect the provisions of any enactment or agreement regulating the relations between the promoter and an undertaker in respect of any apparatus laid or erected in land belonging to the promoter on the date on which this Order is made.

Co-operation

14. Where in consequence of the proposed construction of any of the authorised development, the promoter or an undertaker requires the removal of apparatus under paragraph 7(2) or a specified undertaker makes requirements for the protection or alteration of apparatus under paragraph 9(2), the promoter shall use its best endeavours to co-ordinate the execution of the works in the interests of safety and the efficient and economic execution of the authorised development and each specified undertaker shall use its best endeavours to co-operate with the undertaker for that purpose.

Access

15. If in consequence of the exercise of the powers of this Order the access to any apparatus is materially obstructed, the promoter shall provide such alternative means of access to such apparatus as will, so far as reasonably practicable, enable the undertaker to maintain or use the apparatus no less effectively than was possible before such obstruction.

Arbitration

16. Any difference or dispute arising between the promoter and an undertaker under this Schedule shall, unless otherwise agreed in writing between the promoter and that undertaker, be determined by arbitration in accordance with article 41 (arbitration).
PART 2
FOR THE PROTECTION OF OPERATORS OF ELECTRONIC COMMUNICATIONS CODE NETWORKS

1. For the protection of any operator, the following provisions shall, unless otherwise agreed in writing between the promoter (as defined in Part 1 of this Schedule) and the operator, have effect.

2. In this part of this Schedule—
   “the 2003 Act” means the Communications Act 2003(b);
   “conduit system” has the same meaning as in the electronic communications code and references to providing a conduit system shall be construed in accordance with paragraph 1(3A) of that code;
   “electronic communications apparatus” has the same meaning as in the electronic communications code;
   “the electronic communications code” has the same meaning as in Chapter 1 of Part 2 of the 2003 Act(b);
   “electronic communications code network” means—
   (a) so much of an electronic communications network or conduit system provided by an electronic communications code operator as is not excluded from the application of the electronic communications code by a direction under section 106 of the 2003 Act; and
   (b) an electronic communications network which the Secretary of State is providing or proposing to provide;
   “electronic communications code operator” means a person in whose case the electronic communications code is applied by a direction under section 106 of the 2003 Act; and
   “operator” means the operator of an electronic communications code network.

3. The exercise of the powers of article 29 (statutory undertakers) are subject to paragraph 23 of Schedule 2 to the Telecommunication Act 1984(c).

4.—(1) Subject to sub-paragraphs (2) to (4), if as the result of the authorised development or their construction, or of any subsidence resulting from any of those works—
   (a) any damage is caused to any electronic communications apparatus belonging to an operator (other than apparatus the repair of which is not reasonably necessary in view of its intended removal for the purposes of those works, or other property of an operator); or
   (b) there is any interruption in the supply of the service provided by an operator, the promoter shall bear and pay the cost reasonably incurred by the operator in making good such damage or restoring the supply and shall—
      (i) make reasonable compensation to an operator for loss sustained by it; and
      (ii) indemnify an operator against claims, demands, proceedings, costs, damages and expenses which may be made or taken against, or recovered from, or incurred by, an operator by reason, or in consequence of, any such damage or interruption.

   (2) Nothing in sub-paragraph (1) shall impose any liability on the promoter with respect to any damage or interruption to the extent that it is attributable to the act, neglect or default of an operator, its officers, servants, contractors or agents.

   (3) The operator shall give the promoter reasonable notice of any such claim or demand and no settlement or compromise of the claim or demand shall be made without the consent of the promoter which, if it withholds such consent, shall have the sole conduct of any settlement or compromise or of any proceedings necessary to resist the claim or demand.

(a) 2003 c. 21.
(b) See section 106.
(c) 1984 c. 12.
(4) This part of this Schedule shall not apply to—

(a) any apparatus in respect of which the relations between the promoter and an operator are regulated by the provisions of Part 3 of the 1991 Act; or

(b) any damages, or any interruptions, caused by electro-magnetic interference arising from the construction or use of the authorised development.

(5) Nothing in this part of this Schedule shall affect the provisions of any enactment or agreement regulating the relations between the promoter and an undertaker in respect of any apparatus laid or erected in land belonging to the promoter on the date on which this Order is made.

5. The temporary stopping up or diversion of any highway under article 12 (temporary stopping up of streets and rights of way) shall not affect any right of the operator under paragraph 9 of the electronic communications code to maintain any apparatus which, at the time of the stopping up or diversion, is in that highway.

6. Any difference or dispute arising between the promoter and an operator under this Part of this Schedule shall, unless otherwise agreed in writing between the promoter and that operator, be referred to and settled by arbitration under article 41 (arbitration).

PART 3
FOR THE PROTECTION OF BLACKPOOL BOROUGH COUNCIL

Application and interpretation

1.—(1) For the protection of Blackpool Borough Council and the operator the following provisions shall, unless otherwise agreed in writing between the promoter (as defined in Part 1 of this Schedule) and Blackpool Borough Council, have effect.

2.—(1) The promoter shall not in the exercise of the powers of this Order prevent pedestrian or vehicular access to any tramway property, unless preventing such access is with the consent of the engineer.
(2) The consent of the engineer under sub-paragraph (1) above shall not be unreasonably withheld or delayed but may be given subject to reasonable conditions.

Approval of plans

3. The promoter shall, before commencing the construction of any part of the specified works, furnish to the engineer such proper and sufficient plans relevant to the part of the specified works concerned as may be reasonably required by the engineer; and the promoter shall not commence those specified works until the plans have been approved in writing by the engineer or settled by arbitration under article 41 (arbitration).

4. The engineer’s approval under paragraph 3 shall not be unreasonably withheld and any question of whether it has been unreasonably withheld shall in the absence of agreement be settled by arbitration under article 41 (arbitration).

Protective works

5.—(1) Upon signifying his approval or disapproval of the plans submitted pursuant to paragraph 3 the engineer may notify the promoter in writing of any protective works, whether temporary or permanent, which in his reasonable opinion should be carried out before the commencement of the construction of the specified works to ensure the stability of tramway property, or the continuation of the safe and effective operation of the tram rails of Blackpool Borough Council; and such protective works as may be reasonably necessary for those purposes shall be constructed by Blackpool Borough Council and the Operator with all reasonable dispatch or, if engineer so notifies the promoter, such protective works shall be carried out by the promoter (in either case at the expense of the promoter).

(2) The promoter shall not commence the construction of the specified works until the engineer has notified the promoter that the protective works referred to in sub-paragraph (1) above have been completed to his reasonable satisfaction.

Notice of works and maintenance

6. The promoter shall give to the engineer not less than 28 days' notice of its intention to—

(a) commence the construction of any of the specified works; and

(b) (save in the event of an emergency in which case it shall give such notice as may be reasonably practicable in the circumstances) carry out any maintenance of the specified works in so far as such maintenance adversely affects tramway property.

Manner of carrying out specified and protective works

7. The construction by the promoter of the specified works, any protective works described in paragraph 5 and any alterations and additions to such specified works and protective works shall, when commenced, be carried out—

(a) with all reasonable dispatch in accordance with the plans approved under paragraph 3 or settled under article 41 (arbitration);

(b) under the supervision (where appropriate and if given) and to the reasonable satisfaction of the engineer; and

(c) in such manner as to cause;

(i) as little damage as reasonably practicable to tramway property;

(ii) as little interference as is reasonably practicable with the conduct of traffic on the tram lines of Blackpool Borough Council and the use by passengers of tramway property,

and if any such damage or interference shall be caused by the promoter carrying out the specified works or any protective works, the promoter shall, notwithstanding any approval given under paragraph 3 or settled under article 41 (arbitration), make good such damage and shall pay to Blackpool Borough Council and/or the operator (as appropriate) all reasonable expenses to which Blackpool Borough Council and/or the operator (as appropriate) may be put and compensation for any loss which Blackpool Borough Council and/or the operator (as appropriate) may sustain by reason of any such damage or interference.
8. Nothing in paragraph 7 shall impose any liability on the promoter with respect to any
damage, cost, expense or loss which is attributable to the act, neglect or default of Blackpool
Borough Council or the operator or any person in either of their employ or of either of their
contractors or agents; and any liability of the promoter under paragraph 7 shall be reduced
proportionately to the extent to which any damage, cost, expense or loss is attributable to the act,
neglect or default of Blackpool Borough Council or the operator or any person in either of their
employ or of either of their contractors or agents.

Access for the carrying out of works in compliance with this Part of this Schedule

9. The promoter shall at all times afford reasonable facilities to the engineer for access to the
specified works during their construction and the construction of any protective works carried out
by the promoter pursuant to the provisions of paragraph 5 and shall supply him with all such
information as he may reasonably require with regard to the specified works or any such
protective works or to the method of their construction.

10.—(1) During the construction of any works by Blackpool Borough Council or the operator
under this Part of this Schedule Blackpool Borough Council and the operator shall at all times
afford reasonable facilities to the promoter and its agents for access to those works, and shall
supply the promoter with such information as the promoter reasonably requires with regard to
such works or the method of construction of such works.

(2) During the construction of the specified works Blackpool Borough Council and the operator
shall at all reasonable times subject to the prior written approval of the engineer afford reasonable
facilities to the promoter and its agents for access to tramway property and shall supply the promoter
with such information as the promoter reasonably requires with regard to tramway property as is
reasonably necessary to enable the promoter to comply with sub-paragraphs 7(a) to 7(c) of
paragraph 7;

(3) During the carrying out of maintenance of the specified works under paragraph 12 Blackpool
Borough Council and the operator shall at all reasonable times subject to the prior written approval
of the engineer afford reasonable facilities to the promoter and its agents for access to tramway
property and shall supply the promoter with such information as the promoter reasonably requires
with regard to tramway property as is reasonably necessary to enable the promoter to comply with
paragraph 12.

Expenses

11. The promoter shall repay to Blackpool Borough Council and/or the operator (as
appropriate) all reasonable costs, charges and expenses reasonably incurred by Blackpool
Borough Council and/or the operator (as appropriate)—

(a) in constructing any protective works under the provisions of paragraph 5, including, in
respect of any permanent protective works, a capitalised sum representing the cost which
may be expected to be reasonably incurred by Blackpool Borough Council and/or the
operator (as appropriate) in maintaining and renewing such works (such sum in the
absence of agreement to be settled by arbitration under article 41 (arbitration)); and

(b) in respect of the approval of plans and any supervision by the engineer of the construction
of the specified works.

Right to require maintenance of specified works

12. If at any time after the completion of a specified work, (unless that specified work is vested
in Blackpool Borough Council) the engineer gives notice to the promoter informing it that the
state of repair of the specified work appears to be such that it adversely affects the safe and
effective operation of tramway property, the promoter shall, on receipt of such a notice, take such
steps as are reasonably necessary to put that specified work in a state of repair such that it no
longer adversely affects tramway property.

Indemnity

13. The promoter shall be responsible to Blackpool Borough Council and/or the operator (as
appropriate) for all reasonable costs, charges, damages and expenses not otherwise provided for
in paragraph 11 which may be occasioned to, or reasonably incurred by, Blackpool Borough Council and/or the operator (as appropriate) —

(a) by reason of the construction or maintenance of the specified works or the failure of the specified works; or

(b) by reason of any act or omission of the promoter or of any person in its employ or of its contractors whilst engaged in the construction or maintenance of the specified works,

and the promoter shall indemnify Blackpool Borough Council and the operator from and against all claims and demands arising out of or in connection with the construction of the specified works or any such failure, act or omission; and the fact that any act or thing has been done in accordance with any requirement of the engineer or under his supervision shall not (unless it was done as a result of negligence on the part of Blackpool Borough Council or the operator or any person in either of their employ or of either of their contractors or agents) excuse the promoter from any liability under the provisions of this paragraph.

14.—(1) Any liability of the promoter under paragraph 13 shall be reduced proportionately to the extent to which any costs, charges, damages and expenses are attributable to the act, neglect or default of Blackpool Borough Council or the operator or any person in either of their employ or of either of their contractors or agents.

(2) The engineer shall give to the promoter immediate notice of any claim or demand described in paragraph 13 and no settlement or compromise of the claim or demand shall be made without the consent of the promoter which, if it withholds such consent, shall have the sole conduct of any settlement or compromise or of any proceedings necessary to resist the claim or demand.

(3) In the assessment of any sums payable to Blackpool Borough Council or the operator under this Part of this Schedule there shall not be taken into account any increase in the sums claimed that is attributable to any action taken by or any agreement entered into by Blackpool Borough Council or the operator if that action or agreement was not reasonably necessary and was taken or entered into with a view to obtaining the payment of those sums by the promoter under this Part of this Schedule or increasing the sums so payable.

(4) The engineer shall, on receipt of a request from the promoter, from time to time provide the promoter free of charge with written estimates of the costs, charges, expenses and other liabilities for which the undertaker is or will become liable under this part of this Schedule and with such information as may reasonably enable the promoter to assess the reasonableness of any such estimate or claim made or to be made pursuant to this part of this Schedule.

Appraisals and arbitration

15.—(1) Where any consent, approval or expression of satisfaction is sought under this Part of this Schedule from Blackpool Borough Council or the operator it shall not be unreasonably withheld or delayed.

(2) Any difference or dispute arising between the promoter and Blackpool Borough Council or the operator under this Part of this Schedule shall be referred to and settled by arbitration under article 41 (arbitration).
Interpretation

1. In this Schedule—
   “the 1999 Regulations” means the Control of Major Accident Hazards Regulations 1999(a);
   “the 2010 Regulations” means the Conservation of Habitats and Species Regulations 2010(b);
   “132kv electrical circuits” means the works described in Work Nos. 17A to 17C of Schedule 1 to this Order;
   “aftercare” means monitoring, maintenance and management of land within the Order limits following its restoration;
   “approved development plans” mean the plans listed below and certified as the approved development plans by the Secretary of State for the purposes of this Order—

   A-9000-016 Rev.C (application boundary index plan); A-9100-006 Rev.C (application boundary sheet 1 of 9); A-9100-007 Rev.B (application boundary sheet 2 of 9); A-9100-008 Rev.B (application boundary sheet 3 of 9); A-9100-009 Rev.B (application boundary sheet 4 of 9); A-9100-010 Rev.B (application boundary sheet 5 of 9); A-9100-011 Rev.B (application boundary sheet 6 of 9); A-9100-012 Rev.B (application boundary sheet 7 of 9); A-9100-013 Rev.B (application boundary sheet 8 of 9); A-9100-014 Rev.B (application boundary sheet 9 of 9); A-5000-001 Rev.B (seawater pump station site location plan); A-5000-002 Rev.B (seawater pump station site plan); A-5000-003 Rev.B (seawater pump station ground floor plan); A-5000-004 Rev.B (seawater pump station elevations, cross section); A-6000-001 Rev.B (booster pump station and control centre location plan); A-6000-002 Rev.B (booster pump station site and location plan); A-6000-003 Rev.B (booster pump station ground floor plan and section); A-6000-004 Rev.B (booster pump station elevations); A-7000-001 Rev.B (booster pump station elevations); A-7000-002 Rev.B (entrance facilities site and location plans); A-7000-002 Rev.B (entrance facilities proposed barn rebuild); A-7000-003 Rev.B (entrance facilities gatehouse and farmhouse); A-2000-001 Rev.B (compressor station & electrical sub-station locations); A-2000-002 Rev.B (gas compressor compound site plan); A-2000-003 Rev.B (compressor compound floor plans); A-2000-004 Rev.B (gas compressor compound sectional elevations); A-2000-005 Rev.C (gas compressor compound equipment elevations); A-2000-006 Rev.B (gas compressor compound indicative planting); A-1000-001 Rev.C (wellhead compounds location plan); A-1000-030 Rev.B (cavern development); A-9100-015 Rev.C (temporary construction compounds index plan); A-9100-016 Rev.C (temporary construction compounds - sheet 1 of 5); A-9100-017 Rev.B (temporary construction compounds - sheet 2 of 5); A-9100-018 Rev.B (temporary construction compounds - sheet 3 of 5); A-9100-019 Rev.B (temporary construction compounds - sheet 4 of 5); A-9100-020 Rev.B (temporary construction compounds - sheet 5 of 5); MMD-277663-D-DR-00-XX-0100 (proposed access road - sheet 1 of 3); MMD-277663-D-DR-00-XX-0101(proposed access road - sheet 2 of 3); 277663-D-DR-00-XX-0103 (proposed access road - sheet 3 of 3); C.01117.X03 (location of outfall os map); C.01121.X03 (concrete diffuser); A-9000-032 Rev.C (seawall crossing site location plan); 4726/05 Rev.B (proposed sea wall crossing of brine outfall pipe); A-9000-001 Rev.C (master plan overall); A-9000-002 Rev.C (fleetwood master plan); A-9000-003 (Preesall master plan); A-9000-005 Rev.B (master plan/metering station); A9000-014 Rev.C (master site location plan-reference drawing); A-9000-033 Rev.C (nts master plan); A-3000-010 Rev.B (metering station location plan); A-3000-001 Rev.B

(a) S.I. 1999/743.  
(b) S.I. 2010/490.
(plan and elevation metering station); and 14.10-WX40004-02 (landscape and ecological management strategy plan);
“brine discharge pipeline” means the works described in Work Nos. 16A to 16L of Schedule 1 to this Order;
“competent authority” means the Health and Safety Executive and Environment Agency acting jointly;
“commence” means beginning to carry out any material operation (as defined in section 155 of the 2008 Act) other than operations consisting of site clearance, demolition work, archaeological investigations, investigations for the purpose of assessing ground and geological conditions, remedial work in respect of any contamination or other adverse ground conditions, diversion and laying of services, erection of any temporary means of enclosure, the temporary display of site notices or advertisements and “commencement” and “commenced” shall be construed accordingly;
“construction phase” means the period during which works to construct the authorised development are carried out;
“construction work” means construction works undertaken during the construction phase;
“decommissioned cavern” means an operational cavern decommissioned pursuant to paragraphs 32 or 33 of this Schedule 9;
“decommissioning” means the decommissioning of operational caverns, structures, hoardings and other infrastructure comprised in the authorised development when it is no longer required for operational use or, as the case may be, upon the permanent cessation of operation of the authorised development;
“decommissioning phase” means the period during which the authorised development is decommissioned following permanent cessation of operation of the authorised development;
“environmental statement” means the document certified as the environmental statement by the Secretary of State for the purposes of this Order;
“European protected species” has the same meaning as in regulation 40 of the 2010 Regulations;
“European site” has the same meaning as it has in regulation 8(1) of the 2010 Regulations and includes the Morecambe Bay site designated under The Convention on Wetlands of International Importance especially as Waterfowl Habitat, signed in Ramsar, Iran in 1971, ratified by the United Kingdom in 1976 and known as the “Ramsar Convention”;
“existing mineworking” means a mineworking which existed prior to the making of this Order;
“Flints Caravan Park plan” means the drawing dated September 2012 and given drawing reference A-9100-4001 certified as the Flints Caravan Park plan by the Secretary of State for the purposes of this Order;
“geology summary report” means the document entitled the geology summary report and certified as the geology summary report by the Secretary of State for the purposes of this Order;
“Harbour Village plan” means the drawing dated September 2012 and given drawing reference A-9100-4003 certified as the Harbour Village plan by the Secretary of State for the purposes of this Order;
“Kneps Farm Holiday Park plan” means the drawing dated September 2012 and given drawing reference A-9100-4002 certified as the Kneps Farm Holiday Park plan by the Secretary of State for the purposes of this Order;
“the landscape and ecological management strategy plan” means the document entitled the landscape and ecological management strategy plan with drawing reference 14.10V2-WX40004-02 dated May 2012 and certified as the landscape and ecological management strategy plan by the Secretary of State for the purposes of this Order;
“mudstone” means the members of the Kirkham Mudstone formation known as the Coat Walls Mudstone Member (above the Preesall halite deposit) and the Thornton Mudstone Member (beneath the Preesall halite deposit), belonging to the Mercia Mudstone Group, characterised by a distinctive sequence of alternately red-brown and grey-green well bedded mudstones with many thin intercalations of siltstone and dolomitic siltstone and more particularly described on the Geological Survey of Great Britain (England and Wales) Sheet 66, 1:50,000 Series, Solid and Drift Edition, of the British Geological Survey Classification entitled “The Geology of the country around Blackpool” dated 1990 and further described in the accompanying British Geological Survey Sheet Memoir 66;

“NTS interconnector pipeline” means the works described in Work Nos. 20A to 20H of Schedule 1 (authorised development) of this Order;

“operational phase” means the period during which the authorised development is in operational use as an underground gas storage facility;

“permanent cessation” means—
(a) where it is referred to in the context of a part of the authorised development the cessation of operation of that part in circumstances that at the time of such cessation it is the undertaker’s understanding and expectation that that part of the authorised development will not be returned to operational use at some point in the future; and
(b) where it is referred to in the context of the authorised development as a whole the cessation of operation of the authorised development in circumstances that at the time of such cessation it is the undertaker’s understanding and expectation that the authorised development as a whole will not be returned to operational use at some point in the future;

“Preesall site” means that part of the authorised development situated to the east of the River Wyre and shown shaded green on the Preesall site plan;

“Preesall site plan” means the drawing dated 4 November 2011 and given drawing reference D-9000-032 certified as the Preesall site plan by the Secretary of State for the purposes of this Order;

“reaming” means the process used to increase a pilot hole to the required size;

“restoration” means the restoration of land within the Order limits for future use after permanent cessation of the operation of the authorised development;

“stage” means a defined section or part of the authorised development, the extent of which is shown in a scheme submitted to and approved by the relevant planning authority pursuant to paragraph 3 (stages of authorised development);

“wet rockhead areas” means those parts of the subsoil of the Order limits shown on Figure 5.7 (Distribution of known wet rockhead (BGS data)) in the geology summary report where what was formerly the Preesall halite deposit has been dissolved by groundwater circulation such that mudstone strata overlying what was formerly the Preesall halite deposit have collapsed into it.

Time limits

2. The authorised development must be begun within five years of the date of this Order.

Stages of authorised development

3. No authorised development shall commence until a written scheme setting out all the stages of the authorised development has, after consultation with the highway authority, been submitted to and approved by the relevant planning authority.

Detailed design approval

4.—(1) The authorised development shall not be carried out otherwise than in accordance with the approved development plans.

(2) Notwithstanding sub-paragraph (1), no works to the sea wall crossing and observation platform comprising part of Work No. 16J of Schedule 1 (authorised development) shall commence until
details of the layout, scale, external appearance and means of access of the sea wall and crossing and observation platform have been submitted to and approved by the relevant planning authority. Works to the sea wall crossing and observation platform must be carried out in accordance with the approved details.

(3) Notwithstanding sub-paragraph (1), no construction of a wellhead compound area (comprised in Work Nos. 2A to 2G (inclusive) of Schedule 1 (authorised development)) shown on the approved development plans shall commence until the following details for that wellhead compound area have been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority—

(a) details of the siting and size of each wellhead compound area;
(b) details of the design and external appearance of any buildings, structures or equipment to be provided;
(c) means of access and details of the construction of each access;
(d) details of the construction of the surface of each wellhead compound area including the stripping and stockpiling of soils, the location and the storage of such, and the materials to be used in the construction of each wellhead compound area;
(e) details of any fencing to be erected; and
(f) details of any floodlighting to illuminate the wellhead compound area including the number, height and location of any stanchions to be erected or mobile floodlighting units to be used, the number of floodlights, their lux levels, angles of luminance and extent of light distribution.

(4) The details submitted pursuant to sub-paragraph (3) shall include the development of earth bunds and temporary screening to reduce visual disturbance to birds using the designated European sites and adjacent farmland, consistent with the principles of the landscape and ecological management strategy plan and environmental statement (Chapter 9 of Volume 1A).

(5) Each wellhead compound area shall be constructed in accordance with the details approved pursuant to sub-paragraph (3) for that wellhead compound area; and any approved temporary screening at a wellhead compound area shall be retained until the completion of construction from that wellhead compound area.

(6) Notwithstanding sub-paragraph (1), the construction of any underground pipe between any wellhead compound area (comprised in Work Nos. 2A to 2G (inclusive) of Schedule 1 (authorised development)) and any existing brine well shall not commence until details of the route, depth and design of such underground pipe have been submitted to and approved by the relevant planning authority; and the underground pipe shall be constructed in accordance with the approved details.

External materials approval

5. No stage of the authorised development shall commence until details of the external materials for any building within that stage have been submitted to and approved by the relevant planning authority.

Details of operational cavern layout and design

6.—(1) No stage of the authorised development shall commence until:

(a) a geological survey of the “area for cavern development” shown on the approved development plan with reference A-1000-030 Rev B has been carried out to confirm the top and bottom levels of the Preesall halite deposit and the presence of any faulting to a confidence limit of ± 5 metres;

(b) the working capacity of Work No 1A has been calculated taking account of the results of the geological survey and sub-paragraph 4 (a) to (h) of this requirement; and

(c) the results of the geological survey and the working capacity calculation have been submitted to and agreed by Lancashire County Council.
(2) No authorised development shall be carried out if the working capacity of Work No 1A as agreed by Lancashire County Council pursuant to sub-paragraph 1 (c) is less than 300 million standard cubic metres at the standard temperature and pressure.

(3) No more than 19 operational caverns, with a total storage capacity of up to 900 million standard cubic metres and working capacity of up to 600 million standard cubic metres, both specified at the standard temperature and pressure, shall be constructed within the “area for cavern development” shown on the approved development plan with reference A-1000-030 Rev B.

(4) Unless the safety reports (to be submitted pursuant to Regulations 7(1), 7(5) and 8 of the 1999 Regulations), following communication of the competent authority’s conclusions of its examination of those reports pursuant to Regulation 17 of the 1999 Regulations (and directions if any), allow otherwise—

(a) in this paragraph, where an operational cavern is not of a constant radius, reference to the radius of that operational cavern shall mean the largest radius for that operational cavern; and the maximum radius of any operational cavern shall not exceed approximately 50 metres;

(b) the thickness of the remaining salt between the operational cavern roof and the upper surface of the Preesall halite deposit shall be not less than the radius of each operational cavern;

(c) a minimum thickness of 20% of the radius of the operational cavern shall be maintained between the deepest point of the operational cavern and the basal surface of the Preesall halite deposit;

(d) wall to wall separation of proposed operational caverns, operational caverns, proposed decommissioned caverns or decommissioned caverns of equal diameter shall be no less than three times the radius of the proposed operational caverns, operational caverns, proposed decommissioned caverns or decommissioned caverns; wall to wall separation of proposed operational caverns, operational caverns, proposed decommissioned caverns or decommissioned caverns of unequal diameter shall be no less than the sum of one and a half times the radius of the smaller proposed operational cavern, operational cavern, proposed decommissioned cavern or decommissioned cavern plus one and a half times the radius of the larger proposed operational cavern, operational cavern, proposed decommissioned cavern or decommissioned cavern;

(e) the minimum distance between any operational cavern and the Burn Naze fault or any intra-grabinal fault shall be no less than three times the radius of that operational cavern;

(f) the minimum distance between any operational cavern and any existing brine cavern or existing mineworking shall be no less than four times the radius of that operational cavern (save that where the size of an existing brine cavern is not known the minimum separation distance between an operational cavern and the well head of that existing brine cavern shall be five times the radius of that operational cavern);

(g) the minimum distance between any operational cavern and any exploratory borehole drilled into the Preesall halite deposit shall be no less than twice the radius of that operational cavern;

(h) the minimum distance between any operational cavern and wet rockhead areas shall be four times the radius of that operational cavern.

European protected species

7.—(1) No stage of the authorised development shall commence until further survey work (if required by Natural England) has been carried out to establish whether a European protected species is present—

(a) on any of the land affected, or likely to be affected, by that stage of the authorised development; or

(b) in any of the trees to be lopped or felled or in buildings to be demolished during that stage of the authorised development.
(2) Where a European protected species is shown to be present by such further survey work, that stage of the authorised development shall not commence until a scheme of protection and mitigation measures has been submitted to the relevant planning authority and, after consultation with Natural England and the Secretary of State for the Environment, Food and Rural Affairs, has been approved by the relevant planning authority. That stage of the authorised development shall be carried out in accordance with the approved scheme.

Ecological management scheme

8.—(1) No stage of the authorised development shall commence until an ecological management strategy scheme for that stage, reflecting the survey results and ecological mitigation and enhancement measures included in the environmental statement (chapter 9 of Volume 1A and Appendices 9.4 – 9.16 of Volume 1B), and including details of working methods, means of mitigation and restoration, has been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority.

(2) The ecological management strategy scheme shall include an implementation timetable and give effect to the landscape and ecological management strategy plan where the landscape and ecological management plan is applicable to that stage of the authorised development; and must be carried out as approved.

Landscape scheme

9.—(1) No stage of the authorised development shall commence until a landscape scheme for that stage has been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority. The scheme shall set out the long term design objectives, management responsibilities and maintenance schedules for all relevant landscape areas relating to that stage together with details of all proposed hard and soft landscaping works, including—

(a) location, number, species, size and planting density of any proposed planting;
(b) cultivation, importing of materials and other operations to ensure plant establishment;
(c) proposed finished ground levels;
(d) hard surfacing materials;
(e) vehicular and pedestrian access, parking and circulation areas;
(f) minor structures, such as furniture, refuse or other storage units, signs and lighting;
(g) proposed and existing functional services above and below ground, including drainage, power and communications cables and pipelines, manholes and supports;
(h) details of existing trees to be retained, with measures for their protection during the construction phase; and
(i) programme and implementation timetable for all landscaping works.

(2) The landscape scheme shall give effect to the landscape and ecological management strategy plan where the landscape and ecological management strategy plan is applicable to that stage of the authorised development.

Implementation and maintenance of landscaping

10.—(1) All landscaping works must be carried out in accordance with any relevant landscape scheme approved under paragraph 9 (landscape scheme) and to a reasonable standard in accordance with the relevant recommendations of appropriate British Standards or other recognised codes of good practice.

(2) The landscaping works must be carried out in accordance with implementation timetables approved under paragraph 9 (landscape scheme).

(3) Any tree or shrub planted as part of an approved landscape scheme that, within a period of five years after planting, is removed, dies or becomes, in the opinion of the relevant planning authority, seriously damaged or diseased, must be replaced in the first available planting season with a
specimen of the same species and size as that originally planted, unless otherwise approved by the relevant planning authority.

**Highway accesses**

11.—(1) No stage of the authorised development shall commence until for that stage, written details of the siting, design and layout of any new permanent or temporary means of access to a highway to be used vehicular traffic, or any alteration to an existing means of access to a highway used by vehicular traffic, has, after consultation with the highway authority, been submitted to and approved by the relevant planning authority.

(2) The highway accesses must be constructed in accordance with the approved details.

(3) No stage of the authorised development shall be begun until for that stage, a written access management scheme has, after consultation with the highway authority, been submitted to and approved by the relevant planning authority.

(4) The access management scheme must be carried out in accordance with the approved details.

**Limits on heavy goods vehicle movements**

12.—(1) The maximum number of heavy goods vehicle movements to and from the Preesall site during the construction phase, operational phase and decommissioning phase shall not exceed 62 per day (31 in and 31 out).

(2) The number of heavy goods vehicles which enter the Preesall site shall be recorded by the site operator. These records shall be available for inspection at the site office and a copy of these records shall be submitted to the relevant planning authority every six months, or within five working days of such records being requested by the relevant planning authority.

**Covered heavy goods vehicles**

13. During the construction phase, operational phase and decommissioning phase the loads of all heavy goods vehicles carrying friable bulk materials or waste shall be covered on route to and from the Order limits unless the load is otherwise enclosed or an incoming load is being uncovered for the purposes of inspection.

**Wheel cleaning facilities**

14.—(1) Following construction of the access from the A588 comprised in Work No. 6 of Schedule 1 (authorised development) to base course level, wheel-cleaning facilities shall be provided at a location to be agreed with the relevant planning authority in writing.

(2) Unless otherwise agreed with the relevant planning authority in writing, the wheel-cleaning facilities installed shall remain available for use, and shall be maintained in full working order, at all times during the construction phase, and be used so as to ensure that no debris from any work site is deposited by vehicle wheels upon the public highway.

**Internal roads**

15. The access road between the wheel-cleaning facilities referred to in paragraph 14 (wheel cleaning facilities) and the boundary of the Preesall site shall, during the construction phase, be metalled and drained and kept clear of debris along its entire length at all times.

**Temporary access routes**

16.—(1) Upon completion of construction of the authorised development, all temporary access routes onto the public highway shall be closed, except for those to the gas compressor compound forming part of Work No. 3 in Schedule 1 (authorised development), to the booster pump station forming part of Work No. 4 in Schedule 1 (authorised development) and to the well head compound areas forming part of Work Nos. 2A to 2G in Schedule 1 (authorised development).

(2) All verges and field boundaries that will be affected by temporary access routes shall be restored in accordance with details to be first agreed in writing by the relevant planning authority and thereafter shall be maintained for a period of five years.
Fencing and other means of enclosure

17. —(1) No stage of the authorised development shall commence until written details of all temporary fences or other means of enclosure for the construction of that stage have been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority.

(2) Any construction sites required for a stage of the authorised development must remain securely fenced at all times during the construction phase of that stage.

(3) Any temporary fencing must be removed on completion of the authorised development.

(4) No stage of the authorised development shall commence until written details of all permanent fences for that stage have been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority.

(5) Any approved permanent fencing around works comprised in a stage of the authorised development must be completed before those works are brought into use.

Ground/ surface water and pollution prevention

18. —(1) No stage of the authorised development shall commence until for that stage, written details of the surface and foul water drainage system (including means of pollution control) have, after consultation with the sewerage and drainage authority, been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority. The surface and foul water drainage system must be constructed in accordance with the details approved under this sub-paragraph.

(2) No stage of the authorised development involving the diversion of any stream or watercourse shall commence until a scheme and programme (including a timescale) for its diversion has been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites and with the Environment Agency) approved in writing by the relevant planning authority. The stream or watercourse must be diverted in accordance with the approved scheme and programme.

(3) Unless otherwise permitted under sub-paragraphs (1) and (2) above, throughout the construction phase, operational phase, and decommissioning phase, all ditches, watercourses, field drainage systems and culverts shall be maintained such that the flow of water is not impaired or the drainage onto and from adjoining land rendered less effective.

(4) All oil, diesel oil and lubricants stored within the authorised development for any purpose shall be stored on a base impervious to both oil and water and surrounded by an impermeable bund wall. The bunded area shall be capable of containing 110% of the largest tank’s capacity and all drain pipes, fill pipes and sight gauges shall be enclosed within its curtilage.

(5) All drilling mud shall be stored in a bunded area with an impermeable liner within the drilling compound prior to disposal in accordance with a scheme to be agreed with the relevant planning authority.

(6) All drilling cuttings shall be removed from each drilling compound for use in the landscape scheme or for disposal in accordance with a scheme to be agreed with the relevant planning authority.

Archaeology

19. — (1) No stage of the authorised development shall commence until for that stage, a written scheme for the investigation of areas of archaeological interest as identified in the environmental statement (Chapter 7 of Volume 1A) has been submitted to and approved by the relevant planning authority.

(2) The written scheme of investigation shall identify areas where a programme of archaeological investigation is required, and the measures to be taken to protect, record or preserve any significant archaeological remains that may be found.
Any archaeological works or watching brief carried out under the archaeological scheme must be by a suitably qualified person or body approved by the relevant planning authority.

Any archaeological works or watching brief must be carried out in accordance with the approved archaeological scheme.

**External lighting**

20. —(1) No stage of the authorised development shall commence until written details of any external lighting to be installed—

(a) temporarily at any of the construction sites within that stage during the construction phase; and/or

(b) permanently during the operational phase at any site within that stage,

including measures to prevent light spillage, have, after consultation with the highway authority, been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority; and any approved means of lighting must subsequently be installed and retained for the duration of the construction phase and/or operational phase as approved.

**Construction hours**

21. —(1) Except in the event of an emergency, construction work (other than cavern drilling and cavern washing activities and, in relation to Work Nos. 12, 13, 14, 17B and 17C of Schedule 1, other than reaming activities) shall not take place other than between the hours of 08:00 and 18:00 hours Monday to Friday and 08:00 and 13:00 hours on Saturdays; and, unless otherwise agreed in writing with the local planning authority, except in the event of an emergency no construction work (other than cavern drilling and cavern washing activities) shall take place on Sundays and public holidays).

(2) Nothing in sub-paragraph (1) precludes—

(a) a start-up period from 07:30 to 08:00 and a shut-down period from 18:00 to 18:30 Monday to Friday; and

(b) a start-up period from 07:30 to 08:00 and a shut-down period from 13:00 to 13:30 on Saturdays.

(3) Unless otherwise agreed in writing by the relevant planning authority, no heavy goods vehicles shall, in the course of construction of the authorised development, enter or leave the Order land other than between the hours of 08:00 and 18:00 hours Monday to Friday and 08:00 and 13:00 hours on Saturdays (excluding public holidays); and in the course of construction of the authorised development, no heavy goods vehicles shall enter or leave the Order land on Sundays and public holidays, unless otherwise agreed in writing by the relevant planning authority.

**Construction of and drilling operations in wellhead compound areas**

22. —(1) Wellhead compound areas (including the erection of associated bunds and temporary screening) shall not be constructed other than during the months of May to August (inclusive) in the same calendar year.

(2) Drilling operations within wellhead compound areas shall take place at no more than one wellhead compound area at any one time.

**Code of construction practice**

23. —(1) No stage of the authorised development shall commence until a code of construction practice has been submitted to and approved by the relevant planning authority.

(2) All construction works shall be undertaken in accordance with the approved code of construction practice, unless otherwise agreed by the relevant planning authority.
Construction worker travel plan

24.—(1) No stage of the authorised development shall commence until a construction worker travel plan relating to the construction phase has been submitted to and approved by the relevant planning authority.

(2) The construction worker travel plan shall be implemented during the construction phase.

Disposal of filtered material

25. All filtered material resulting from solution mining shall be disposed of on-site unless otherwise agreed in writing with the relevant planning authority.

Control of noise during construction and maintenance

26. —(1) No stage of the authorised development shall commence until a written scheme for noise management during construction and maintenance of that stage has been submitted to and approved by the relevant planning authority.

(2) The scheme shall set out the particulars of—

(a) the works, and the method by which they are to be carried out;
(b) the noise attenuation measures to be taken to minimise noise resulting from the works, including any noise limits;
(c) a scheme for monitoring the noise during the works to ensure compliance with the noise limits and the effectiveness of the attenuation measures;
(d) noise attenuation measures required to avoid significant disturbance to birds associated with the designated European sites; and
(e) a scheme for the handling of complaints in respect of noise resulting from the works, including a designated point of contact to which such complaints may be submitted.

(3) The approved noise management scheme must be implemented before and maintained during construction and maintenance of the relevant stage of the authorised development.

(4) The construction and maintenance works must be undertaken in accordance with the approved noise management scheme.

(5) All plant, equipment and machinery used in the construction, operation and maintenance of the authorised development shall be equipped with effective silencing equipment or sound proofing equipment to the standard of design set out in the manufacturer’s specification and shall be maintained in accordance with that specification at all times during the construction, operation and maintenance of the authorised development.

(6) Notwithstanding sub-paragraph (1), and subject to sub-paragraph (8), during drilling under the river Wyre comprised in Work Nos. 12, 13 and 14 of Schedule 1 (authorised development), noise levels at the nearest occupied residential property at Harbour Village shall not exceed—

(a) 60dB LAeq,1h between the hours of 07:00 and 19:00;
(b) 55dB LAeq,1h between the hours of 19:00 and 23:00; and
(c) 42dB LAeq,1h between the hours of 23:00 and 07:00,

and in this sub-paragraph “Harbour Village” means the land edged red on the Harbour Village plan.

(7) Notwithstanding sub-paragraph (1), and subject to sub-paragraph (8), during drilling under the river Wyre comprised in Work Nos. 17B and 17C of Schedule 1 (authorised development), noise levels at the nearest occupied caravan at Knepps Farm Holiday Park and at the nearest occupied caravan at Flints Caravan Park shall not exceed—

(a) 60dB LAeq,1h between the hours of 07:00 and 19:00;
(b) 55dB LAeq,1h between the hours of 19:00 and 23:00; and
(c) 42dB LAeq,1h between the hours of 23:00 and 07:00,
and in this sub-paragraph “Kneps Farm Holiday Park” means the land edged red on the Kneps Farm Holiday Park plan and “Flints Caravan Park” means the land edged red on the Flints Caravan Park plan.

(8) The noise level restrictions set out in sub-paragraphs (6) and (7) shall not apply—

(a) where to facilitate the effective and expeditious carrying out of specified construction activities it is necessary to undertake works between 19:00 and 7:00, in which case the noise level of such works shall not exceed 55dB LAeq,1h, and any such works must be agreed in writing by the relevant planning authority (such agreement not to be unreasonably withheld or delayed); and

(b) in respect of construction or demolition activities of short duration, in which case the noise level of such activities shall not exceed 70dB LAeq,1hr; and such activities and their duration shall be agreed with the relevant planning authority (such agreement not to be unreasonably withheld or delayed) no less than 48 hours before such activities are undertaken.

(9) In respect of agreement sought from the relevant planning authority pursuant to sub-paragraph (8)(a)—

(a) it shall not be reasonable for the relevant planning authority to withhold its agreement if it has been demonstrated to its reasonable satisfaction that the works would facilitate the effective and expeditious carrying out of specified construction activities;

(b) in determining whether to provide such agreement the relevant planning authority may have regard to the number of requests made for such agreement and the duration of the works which are the subject of requests.

Control of noise during operational phase

27. —(1) No stage of the authorised development shall commence operation until a written scheme for noise management of works comprised in that stage, including monitoring and attenuation for the use of works comprised in that stage of the authorised development, has been submitted to and approved by the relevant planning authority.

(2) The noise management scheme must be implemented as approved and maintained for the duration of use of the authorised development.

Control of dust emissions

28.—(1) No stage of the authorised development shall commence until a written scheme for the management and mitigation of dust emissions for that stage has been submitted to and approved by the relevant planning authority.

(2) The approved scheme for the management and mitigation of dust emissions must be implemented before and maintained during the construction phase, operational phase and decommissioning phase (as appropriate) of the relevant stage of the authorised development.

Protection of agricultural practice

29. All topsoil and subsoil storage mounds arising from the authorised development shall be kept free from noxious weeds.

Soil stripping, handling and storage

30.—(1) No stage of the authorised development involving the stripping of soil shall commence until a scheme setting out the method, handling, storage, re-instatement and programme of works related to the stripping of soil (if any) comprised in that stage has been submitted to and approved by the relevant planning authority.

(2) Soil stripping must be carried out in accordance with the approved scheme.
Decommissioning, restoration and aftercare scheme for submission prior to commencement of the authorised development

31.—(1) No stage of the authorised development shall commence until a scheme of decommissioning, restoration and aftercare for that stage has been submitted to and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) approved by the relevant planning authority.

(2) The scheme (so far as relevant to that stage) shall include proposals for—

(a) decommissioning of the operational caverns following permanent cessation of such operational caverns;

(b) decommissioning of the pipelines comprised in the authorised development;

(c) what above-ground structures, buildings and other parts of the authorised development are to be demolished, removed or retained and the means of any demolition;

(d) the phasing (if any) of any decommissioning, demolition and/or removal proposed in sub-paragraphs (a) to (c);

(e) the means of removal of decommissioning materials and demolition waste arising from the activities listed in sub-paragraphs (a) to (c);

(f) the restoration and aftercare of land on which works comprised in that stage of the authorised development are located.

Decommissioning of individual operational caverns during operational phase

32.—(1) Following the completion of all solution mining works relating to the creation of a proposed operational cavern pursuant to the powers granted in this Order, if that proposed operational cavern is determined during testing to be unsuitable for the storage of gas and after a period of 24 months from the date of that determination it is still deemed unsuitable for storage of gas, then a scheme detailing the decommissioning of that proposed operational cavern (referred to hereafter in this paragraph as a “redundant cavern”) and infrastructure related to that redundant cavern not required for the remainder of the authorised development shall be submitted to the relevant planning authority for approval.

(2) The scheme referred to at sub-paragraph (1) shall also set out proposals for—

(a) the long term management of the redundant cavern;

(b) the monitoring of the redundant cavern;

(c) a risk management plan setting out measures to be taken in appropriate circumstances to minimise risk in respect of the redundant cavern; and

(d) a timetable for implementation of the scheme.

(3) Following written approval by the relevant planning authority, the scheme referred to at sub-paragraph (1) shall be implemented.

Decommissioning, restoration and aftercare scheme after permanent cessation of operations

33.—(1) Six months prior to the permanent cessation of operation of the authorised development, a scheme of decommissioning, restoration and aftercare of the authorised development shall be submitted for approval in writing by the relevant planning authority, who shall consult with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites.

(2) The scheme shall include proposals for—

(a) future uses of the operational caverns following permanent cessation of such operational caverns or (if none) the means of decommissioning such operational caverns;

(b) future uses of the pipelines comprised in the authorised development or (if none) the means of decommissioning of such pipelines;
(c) what above-ground structures, buildings and other parts of the authorised development
are to be demolished or retained and the means of any demolition;
(d) the phasing of any decommissioning, demolition and/or removal proposed in sub-
paragraphs (a) to (c);
(e) the means of removal of decommissioning materials and demolition waste arising from
the activities listed in sub-paragraphs (a) to (c);
(f) works for the restoration of land within the Order limits on which the authorised
development is located and the phasing of such restoration works;
(g) aftercare of the authorised development, having regard to any future uses of elements of
the authorised development, including the long term monitoring and management of the
decommissioned caverns;
(h) a risk management plan setting out measures to be taken in appropriate circumstances to
minimise risk in respect of the authorised development following permanent cessation of
operation of the authorised development; and
(i) a timetable for implementation of the scheme.

(3) The scheme shall be implemented as approved following the permanent cessation of the
operation of the authorised development.

Maintenance of brine discharge pipeline, 132kv electrical circuits and NTS interconnector
pipeline

34.—(1) Save in the case of emergency (which shall include but not be limited to works
necessitated by safety and/or production requirements) 28 days’ written notice shall be given to
the relevant planning authority prior to the implementation of any maintenance works relating to
the brine discharge pipeline, the 132kv electrical circuits and NTS interconnector pipeline. The
notice shall set out the extent of the maintenance works and their timing.

(2) Save in the case of emergency (which shall include but not be limited to works necessitated by
safety and/or production requirements) or unless otherwise agreed in writing with the relevant
planning authority all maintenance works to the brine discharge pipeline, the 132kv electrical
circuits and NTS interconnector pipeline shall not be carried out other than between the hours of
07:00 and 18:00 (Monday to Saturday) and no such maintenance work shall be carried out on a
Sunday, bank holiday or public holiday.

(3) The maintenance works described at sub-paragraphs (1) and (2) shall be carried out and the
land related to such maintenance works shall be reinstated as expeditiously as reasonably
practicable.

Ground subsidence monitoring scheme

35.—(1) That part of the interconnector gas pipeline between Work No. 3 in Schedule 1
(authorised development) and Back Lane, comprised in Work No. 20A in that Schedule, shall not
be commenced until a ground subsidence monitoring scheme relating to the Preesall site has been
submitted to and approved by the relevant planning authority. The scheme shall include details
of—

(a) how ground levels are to be monitored; and
(b) the extent within the Preesall site and timescales of any monitoring activities.

(2) Within 6 months of any ground subsidence being identified by the monitoring activities set out
in the ground subsidence monitoring scheme, a scheme setting out necessary mitigation measures (if
any) for such ground subsidence (a “ground subsidence mitigation scheme”) shall be submitted to
the relevant planning authority for approval.

(3) The ground subsidence monitoring scheme and ground subsidence mitigation scheme shall be
implemented as approved, unless otherwise agreed in writing with the relevant planning authority.

Signals

36. The undertaker shall in the course of construction of the works authorised under the marine
licence set out at Schedule 7 (deemed marine licence under Part 4 (marine licensing) of the
Marine and Coastal Access Act 2009) ensure that any jack up barges or vessels utilised, when jacked up, shall exhibit signals in accordance with the UK standard marking schedule for offshore installations(a).

River Wyre crossings

37. —(1) All works in respect of pipelines and cables comprised in the authorised development which cross the river Wyre (including the creation of compounds associated with such works (referred to in this paragraph only as “compounds”))—

(a) shall be carried out in such a way as to ensure that there is no encroachment on or damage to habitats within the designated European sites; and

(b) shall not be carried out other than during the months of May to August (inclusive) in the same calendar year save that any excavation and drilling operations comprised in such works may only be undertaken during the months of May to July (inclusive) in the same calendar year and save that the creation of compounds may only be undertaken during the months of April to August (inclusive) in the same calendar year.

(2) Compounds shall not be created until details of the siting of such compounds have been submitted to the relevant planning authority and (after consultation by the relevant planning authority with Natural England in relation to measures necessary to avoid or mitigate significant effects on designated European sites) have been approved by the relevant planning authority; and the compounds shall be created in accordance with the approved details.

Dedication agreement

38. The works described in Schedule 3 (streets subject to alteration of layout) shall not be commenced until a written agreement has been entered into with the highway authority (which shall not unreasonably withhold or delay its entry into such an agreement) which provides for—

(a) completion of those works to the reasonable satisfaction of the highway authority;

(b) dedication of those works as public highway upon such completion;

(c) agreement by the highway authority to adopt the works as highway maintainable at the public expense following—

(i) such completion; and

(ii) the expiry of a maintenance period of 12 months during which time any necessary remedial works shall be undertaken by the undertaker at its own expense; and

(d) such other matters reasonably required by the highway authority in respect of sub-paragraphs (a) to (c) which are usually and reasonably included in such written agreements with highway authorities.

Requirement for written approval

39. Where under any of the above requirements the approval or agreement of the relevant planning authority or another person is required, that approval or agreement must be given in writing.

Amendments to approved details

40. With respect to any requirement which requires the authorised development to be carried out in accordance with details approved by the relevant planning authority, the approved details shall be taken to include any amendments that may subsequently be approved in writing by the relevant planning authority.

(a) Obtainable by post from the Department of Energy & Climate Change, OED - EDU, Environment Management Team, 4th Floor, Atholl House, 86-88 Guild Street, Aberdeen, AB11 6AR (telephone 01224 254050; email EMT@berr.gsi.gov.uk).
EXPLANATORY NOTE
(This note is not part of the Order)

The Order

This Order authorises Halite Energy Group Limited (referred to as “the undertaker”) to construct and operate an underground gas storage facility and associated infrastructure at Preesall, Lancashire.

The Order permits the undertaker to acquire, compulsorily or by agreement, land and rights in land and to use land for this purpose. The Order also makes provision in connection with the maintenance of the facility.

A copy of the Order plans and the book of reference mentioned in this Order and certified in accordance with article 39 of this Order (certification of plans, etc.) may be inspected free of charge during working hours at the Planning Reception Desk, Wyre Borough Council, Civic Centre, Breck Road, Poulton-le-Fylde, Lancashire, FY6 7PU.

The deemed marine licence

Informative: To the extent that an activity comprised in the maintenance of the licensed works authorised under the marine licence at Schedule 7 (deemed marine licence under Part 4 (marine licensing) of the Marine and Coastal Access Act 2009) requires a marine licence under the 2009 Act, the undertaker must submit an application to the MMO for such a licence in respect of such an activity.
201[●] No. [●]

INFRASTRUCTURE PLANNING

ENERGY

The Preesall (Underground Gas Storage Facility) Development Consent Order 201[●]

BERWIN LEIGHTON PAISNER LLP
Adelaide House
London Bridge
London EC4R 9HA
Solicitors
## APPENDIX E – ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAP</td>
<td>Area Action Plan</td>
</tr>
<tr>
<td>(the) Act</td>
<td>(the) Planning Act 2008</td>
</tr>
<tr>
<td>AP</td>
<td>Affected Party</td>
</tr>
<tr>
<td>APP(1)</td>
<td>Application document (number 1)</td>
</tr>
<tr>
<td>bar</td>
<td>bar, unit of pressure (1 bar is atmospheric pressure)</td>
</tr>
<tr>
<td>BGS</td>
<td>British Geological Survey</td>
</tr>
<tr>
<td>BPM</td>
<td>Best Practicable Means</td>
</tr>
<tr>
<td>BS</td>
<td>British Standard</td>
</tr>
<tr>
<td>BW</td>
<td>Brinewell</td>
</tr>
<tr>
<td>CA (hearing)</td>
<td>Compulsory acquisition (hearing)</td>
</tr>
<tr>
<td>CA Land</td>
<td>The plots of land identified in the Book of Reference</td>
</tr>
<tr>
<td>CA Plan</td>
<td>The Land Plan (APP6)</td>
</tr>
<tr>
<td>CGS</td>
<td>Canatxx Gas Storage Ltd</td>
</tr>
<tr>
<td>CRW</td>
<td>Countryside and Rights of Way Act 2000</td>
</tr>
<tr>
<td>cSAC</td>
<td>candidate Special Area of Conservation</td>
</tr>
<tr>
<td>Competent Authority</td>
<td>competent authority in the context of the COMAH Regulations (HSE and EA)</td>
</tr>
<tr>
<td>competent authority</td>
<td>competent authority in the context of HRA (Secretary of State)</td>
</tr>
<tr>
<td>COMAH</td>
<td>Control of Major Accident Hazards</td>
</tr>
<tr>
<td>dB</td>
<td>Decibels, unit of sound pressure</td>
</tr>
<tr>
<td>DCO</td>
<td>Development Consent Order</td>
</tr>
<tr>
<td>DPD</td>
<td>Development Plan Document</td>
</tr>
<tr>
<td>Drg no</td>
<td>Drawing number</td>
</tr>
<tr>
<td>EA</td>
<td>Environment Agency</td>
</tr>
<tr>
<td>EM</td>
<td>Explanatory memorandum</td>
</tr>
<tr>
<td>EN-1</td>
<td>Overarching National Policy Statement for Energy</td>
</tr>
<tr>
<td>EN-4</td>
<td>National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines</td>
</tr>
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<td>ENWL</td>
<td>Electricity North-West Limited</td>
</tr>
<tr>
<td>EPS</td>
<td>European protected species</td>
</tr>
<tr>
<td>ES</td>
<td>Environmental Statement</td>
</tr>
<tr>
<td>et seq</td>
<td>and the following</td>
</tr>
<tr>
<td>ExA</td>
<td>Examining authority</td>
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<tr>
<td>FTE</td>
<td>Full time equivalent (used in people equivalents)</td>
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<td>FRA</td>
<td>Flood Risk Assessment</td>
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<td>GC81-336</td>
<td>Seismic line, 1981</td>
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<tr>
<td>GC86-DU371</td>
<td>Seismic line, 1986</td>
</tr>
<tr>
<td>GCC</td>
<td>Gas compressor compound</td>
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<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
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<tr>
<td>GSR</td>
<td>Geological Summary Report</td>
</tr>
<tr>
<td>ha</td>
<td>hectare</td>
</tr>
<tr>
<td>HA</td>
<td>Highways Agency</td>
</tr>
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<td>HGV(s)</td>
<td>heavy goods vehicle(s)</td>
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<td>HIA</td>
<td>Health Impact Assessment</td>
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<tr>
<td>HRA</td>
<td>Habitat Regulations Assessment</td>
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<tr>
<td>HSC</td>
<td>Hazardous Substances Consent</td>
</tr>
<tr>
<td>HSE</td>
<td>Health and Safety Executive</td>
</tr>
<tr>
<td>ibid</td>
<td>in the same passage</td>
</tr>
<tr>
<td>IELP</td>
<td>Seismic line, 1999</td>
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<tr>
<td>IP</td>
<td>Interested Party</td>
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<td>IPC</td>
<td>Infrastructure Planning Commission</td>
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<tr>
<td>IS (hearing)</td>
<td>Issue specific (hearing)</td>
</tr>
<tr>
<td>KEGC</td>
<td>Knott End Golf Club</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
</tr>
<tr>
<td>km²</td>
<td>square kilometres</td>
</tr>
<tr>
<td>kv</td>
<td>Kilovolt, unit of electricity</td>
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<tr>
<td>LAeq,1h</td>
<td>Equivalent continuous A-weighted sound pressure level (in dB) determined over a period of 1 hour</td>
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<tr>
<td>LCC</td>
<td>Lancashire County Council</td>
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<tr>
<td>LDF</td>
<td>Local Development Framework</td>
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<tr>
<td>LEMSP</td>
<td>Landscape and Ecological Management Strategy Plan</td>
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<tr>
<td>LIR</td>
<td>Local Impact Report</td>
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<tr>
<td>LPS</td>
<td>Local Planning Authority</td>
</tr>
<tr>
<td>l/s</td>
<td>Litres per second</td>
</tr>
<tr>
<td>m</td>
<td>metres</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetres</td>
</tr>
<tr>
<td>Mcm</td>
<td>million standard cubic metres specified at standard temperature and pressure</td>
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<tr>
<td>MMO</td>
<td>Marine Management Organisation</td>
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<tr>
<td>NE</td>
<td>Natural England</td>
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<tr>
<td>NPS</td>
<td>National Policy Statement</td>
</tr>
<tr>
<td>NSIP</td>
<td>Nationally Significant Infrastructure Project</td>
</tr>
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<td>NTS</td>
<td>National Transmission System</td>
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<td>OF (hearing)</td>
<td>Open floor (hearing)</td>
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<td>PADHI</td>
<td>Planning Advice for Development near Hazardous Installations</td>
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<td>PD(1)</td>
<td>Procedural decision (number 1)</td>
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<td>PESL</td>
<td>Preesall Energy Services Ltd</td>
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<td>PIZ</td>
<td>Public Information Zone</td>
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<tr>
<td>Abbreviation</td>
<td>Description</td>
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<td>--------------</td>
<td>-------------</td>
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<tr>
<td>PA 2008</td>
<td>Planning Act 2008 (as amended)</td>
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<td>PPG</td>
<td>Planning Policy Guidance</td>
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<td>PPS</td>
<td>Planning Policy Statement</td>
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<tr>
<td>psu</td>
<td>unit of salinity</td>
</tr>
<tr>
<td>PWG</td>
<td>Protect Wyre Group, an umbrella group representing seven local opposition groups and 10,852 residents</td>
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<td>R</td>
<td>Radius of UGS cavern</td>
</tr>
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<td>RA</td>
<td>Risk Assessment</td>
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<td>Representation Document (number1)</td>
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<td>RSS</td>
<td>Regional Spatial Strategy</td>
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<td>s</td>
<td>Section (in an Act or similar)</td>
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<td>SAC</td>
<td>Special Area of Conservation</td>
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<tr>
<td>SCI</td>
<td>Site of Community Importance</td>
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<tr>
<td>SoCG</td>
<td>Statement of Common Ground</td>
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<tr>
<td>SPA</td>
<td>Special Protection Area</td>
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<tr>
<td>SSSI</td>
<td>Site of Special Scientific Interest</td>
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<td>STW</td>
<td>Sewage Treatment Works</td>
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<tr>
<td>TCPA</td>
<td>Town and Country Planning Act 1990</td>
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<tr>
<td>UGS</td>
<td>Underground Gas Storage</td>
</tr>
<tr>
<td>UU</td>
<td>United Utilities</td>
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<td>WBC</td>
<td>Wyre Borough Council</td>
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<tr>
<td>WH</td>
<td>Wellhead</td>
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<tr>
<td>WwTW</td>
<td>Waste Water Treatment Works</td>
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