

5.0 NEED AND ALTERNATIVES

A1 Chapter Alterations

A1.1 This chapter of the ES Addendum updates the ES with respect to the following:

- Further clarification on how the primary and secondary search areas were defined and the role this played in site selection.
- Explanation of the relocation of the access to the well pad further south to avoid the badger zone.
- Clarification of the a parameters based approach adopted in the assessments as set out in Chapter 4A Project Description.

Introduction

5.1 The first part of this Chapter assesses the need for the Proposed Development which primarily arises from:

- Depleting domestic reserves of oil and gas and a growing dependency on foreign imports; and
- A national energy strategy which seeks to maximise the economic production of the UK's domestic energy sources.

5.2 The demand for, and supply of hydrocarbons in the UK and the increasingly important contribution that onshore oil and gas production makes to the national energy market and economy, is also addressed. The second part of the Chapter describes the main alternatives to the Proposed Development which have been considered by the Applicant. Under the EIA Regulations, an ES is required to provide;

“an outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for the choice,

taking into account the environmental effects.”

- 5.3 A detailed Alternative Sites Assessment Report has also been prepared as part of the planning application for the Proposed Development, and can be read for a more in depth review of the alternative sites considered (**Appendix 5.1**).

National Governance on Energy

The Department of Energy and Climate Change

- 5.4 Under powers granted by the Petroleum Act 1998, DECC is responsible for issuing licences for onshore oil and gas exploration which are referred to as Petroleum Exploration and Development Licences (PEDL), and is also responsible for regulating field development and pipeline activities. Licences take the form of a deed which binds the licensee to obey the conditions of the licence and DECC expects companies to work their licences.
- 5.5 In recent years a number of rights and areas of acreage have been left untouched and unexploited limiting the economic recovery of oil and gas. Licences confer rights to the oil and gas company to pursue a range of oil and gas exploration and development activities and to “search for, bore for and get hydrocarbons” within a geographical area covered by the Licence. The issuance of a Licence, the duty to fulfil the associated conditions and the rights conferred by the Licence all support the need for oil and gas exploration in the UK at a national level.

National Energy Policy

The Energy White Paper: “Meeting the Energy Challenge” (2007) (Ref: 5.1)

- 5.6 The Energy White Paper was published by the former DTI in May 2007. It sets out the Government’s international and domestic energy strategy in response to growing evidence of the impact of climate change and the need to cut greenhouse gases, rising

fuel prices, a growing awareness of the risks of relying upon oil and gas imports from a small concentration of countries, and the need for the market to make substantial new investment in power stations, the electricity grid and gas infrastructure.

5.7 The need to reduce carbon emissions whilst ensuring secure energy supplies means that for now, the UK cannot rely on renewable energy sources alone. In terms of promoting a diverse energy mix it is stressed by the White Paper that fossil fuels will continue to play an essential role in the UK's energy system for the foreseeable future. To ensure 'security of the supply' a crucial element of the Government's energy strategy is to maximise the economic production of our domestic energy sources which, together with the UK's energy saving measures, will help reduce our dependence on energy imports.

Overarching National Policy Statement for Energy (EN-1) (2011) (Ref: 5.2)

5.8 On 18th July 2011 the House of Commons debated and approved the six National Policy Statements for Energy (NPS). The energy NPS's set out national policy against which proposals for major energy projects will be assessed. Whilst the proposed development is not classed as a major energy project, EN-1 adds context to the national overarching energy strategy.

5.9 In terms of future energy supply the Government states at page 30 of EN-1, that fossil fuels play a vital role in providing reliable electricity supplies and;

'....provide diversity in our energy mix. They will continue to play an important role in our energy mix as the UK makes the transition to a low carbon economy, and Government policy is that they must be constructed, and operate, in line with increasingly demanding climate change goals'.

5.10 In regard to the need for further infrastructure, in particular gas related development, Government policy states at page 38 that:

‘whilst the gas market is largely robust to a range of adverse events, the risk of shortfalls in supply cannot be ruled out, nor the risk that there may need to be significant rises in wholesale gas prices in order to balance the market. Further infrastructure – beyond that which exists or is under construction at present – will be needed in future in order to reduce supply or price risks to consumers’.

The Energy Act (2011) (Ref: 5.3)

- 5.11 On 18 October 2011, the Energy Bill received Royal Assent and became the Energy Act 2011. The Energy Act is part of a step change from the Coalition Government to make energy more efficient for homes and businesses, and improve our energy framework to enable energy supplies from secure low carbon technology, and fair competition in energy markets.
- 5.12 Part 2 of the Act is entitled “Security of Energy Supplies” and Chapter 1, Part 79 sets out legislation for Ofgem to provide an Annual Report on “future demand for, and supply of, electricity in Great Britain” and under Part 80 what “electricity supply capacity is required”. The first of these Annual Reports was published in 2010 and is considered below. Chapter 3 of the Act deals with “Upstream Petroleum Infrastructure” and Part 82 acknowledges that the Secretary of State should take into consideration “(f) the need to maintain security and regularity of supplies of petroleum”.

Annual Energy Statement (2010) (Ref: 5.4)

- 5.13 The Annual Energy Statement (AES) published in 2010 acknowledges the mission of the Government to “support the transition to a secure, safe, low-carbon, affordable energy system in the UK”. The AES at page 2, acknowledges the following;

“Demand for fossil fuels is set to increase with the huge rise in population and wealth of emerging economies. In parallel, as recent events in the Gulf of Mexico have shown, the costs and risks of extracting fossil fuels from more remote locations are rising. With the UK’s own oil and gas resources declining, unless we act now, we will become more vulnerable to high and volatile oil and gas prices”.

- 5.14 In securing oil and gas supplies, the Government acknowledges the use of new sources of gas (including shale gas) and notes that in light of the Deepwater Horizon incident, there is a need for “the highest standards of safety management and tough environmental standards” rather than a moratorium against such developments. The AES states that recent gas disputes in Europe only underline the importance of the need to improve our energy security, develop low carbon sources of supply while also reducing energy consumption. The AES notes that the UK’s own indigenous supplies of oil and gas remain important and “we must maximise economic production while applying effective environmental and safety regulations” (page 9).
- 5.15 As a point of action (Action 11, page 10) the AES states that the forthcoming Energy Security and Green Economy Bill will seek to ensure that access to UK oil and gas infrastructure is available to all companies. The AES states that “this will help the exploitation of smaller and more difficult oil and gas fields, allowing us to make the most of our natural resources”.

The Annual Energy Statement (2011) (Ref: 5.5)

- 5.16 The Annual Energy Statement (AES) was delivered by the former energy minister Chris Huhne, to Parliament on 23 November 2011, and describes the progress of the Coalition Government on their energy policies and emerging initiatives including the Green Deal. The AES reflects a crucial part of DECC’s strategy to reduce the amount of energy we use. In respect of electricity, DECC are “working to secure Britain’s energy supplies” and the

AES notes that the UK needs “significant new investment in power plants and infrastructure to meet future demand”. The 2011 White Paper on electricity market reforms aims to attract infrastructure investment for a diverse mix of energy sources including “renewables, new nuclear and fossil fuels – including carbon capture and storage”. Each of these energy sources is considered as being “important” and over the past year, the Government has “introduced a range of policies to support them”.

- 5.17 In respect of technologies, the AES (2011) again highlights that “fossil fuels will remain important” and that “gas will continue to feature strongly in our energy mix” with Government policies being “designed to allow new gas plant to be built”. The AES also recognises that from 2001 to 2009, fuel poverty doubled due to the increasing cost of fuel. The AES states that the energy sector also makes a significant contribution to employment and the economy, providing more than half of our industrial development. The AES concludes that the UK “must secure huge investment in our energy sector” to build the power plants that will fuel our prosperity and the infrastructure that will deliver it.

The Annual Energy Statement (2012) (Ref: 5.6)

- 5.18 The 2012 AES identifies “two immediate priorities for UK energy policy: upgrading our energy infrastructure in order to rebuild our economy, and putting households back in control of their energy bills” (page 6). The AES acknowledges that there is a cautious investment climate but that “energy projects represent the largest infrastructure investment opportunity in the UK and make up nearly half the total infrastructure investment pipeline in the UK”. In 2011, the energy industry “contributed 4.4% to UK GDP” and around £12.7 billion of investment and 22,800 jobs in the UK from 1 April 2011 to 31 July 2012 (page 7).
- 5.19 In respect of oil and gas, at page 7 the AES states that “the Government continues to offer new licences and develop the fiscal regime to encourage investment in indigenous oil and gas production for the economy and security of supply”. Moreover, the AES

continues that;

“DECC will also support new ways of tapping our indigenous resources, where this proves economic, and subject to ensuring, through robust regulatory controls, that extraction can be carried out safely and with full regard for protection of the environment”.

5.20 The policy framework set out in the AES (2012) combined with other key strategic documents will show how the Government “will deliver a balanced energy policy acting to bring forward investment in every aspect of our energy infrastructure”. This includes investment in “new gas power plants, in maintaining UK oil and gas production” and “gas infrastructure” amongst other opportunities (page 8).

The National Planning Policy Framework (2012) (Ref: 5.7)

5.21 The National Planning Policy Framework (NPPF) was published in March 2012 and recognises that minerals “are essential to support sustainable economic growth and our quality of life”. In this regard, the NPPF also states at paragraph 142 that;

“it is therefore important that there is a sufficient supply of material to provide the infrastructure, buildings, energy and goods that the country needs”.

5.22 At a national level, the need for modern energy infrastructure and the development of indigenous supplies is clearly supported through policy. This is further evidenced by a number of Government reports and research on energy mix, security of supply and demand which has been considered herein.

5.23 Recent government documents identified above promote the development of renewable energy sources but also accept that fossil fuels will remain a significant part of our energy mix for the foreseeable future. The UK government promotes the development

of our domestic fossil fuels to maintain security of supply, minimise our reliance on imports and vulnerability to shortages and high prices, and to support the economy particularly the oil and gas supply chain in respect of employment as well as tax revenues.

- 5.24 The government shows significant support for the development of new energy infrastructure especially for gas, and more recent publications and guidance make specific reference to emerging health and safety or environmental controls. Gas and oil supply also plays a role in supporting the development of renewable energy sources, and in particular wind power. The need for additional fossil fuel infrastructure is recognised in the following national policy documents.
- 5.25 National energy policy clearly identifies the need for additional oil and gas infrastructure in the UK, in order to improve energy security and market efficiency. The need for additional energy infrastructure and supplies is urgent, and this is recognised in the preceding national policy.

The “No Development” Alternative

- 5.26 The “No Development” Alternative is the option of retaining the Application Site in its current use rather than carrying out the Proposed Development. The “no development” alternative would see the Application Site continuing in agricultural use with no corresponding effects arising from landscape and visual impact, ecology, noise, traffic, lighting and socio-economics associated with the construction, operation and restoration or retention of the Proposed Development.
- 5.27 The Department for Energy and Climate Change (DECC) is responsible for making sure “the UK has secure, clean, affordable energy supplies”, and is responsible for issuing Petroleum Exploration and Development Licences (PEDL) for onshore oil and gas exploration. Licences take the form of a deed, binding the licensee to obey the conditions of the licence which DECC expect the operator to work (DECC website, 2013). The issuance of a Licence, the duty to fulfil the associated conditions and the rights

conferred by the Licence all support the need for oil and gas exploration in the UK at a national level.

- 5.28 National Energy Policy set out in the Energy White Paper seeks to reduce the risks associated with relying on oil and gas imports from a small concentration of companies but acknowledges the need to reduce carbon emissions and ensure security of supply. On this basis national energy policy accepts that for now the UK cannot rely on renewables alone and promotes energy saving measures through the Energy Act (2011). The White Paper also advocates a diverse energy mix with fossil fuels being an important part of that mix for the foreseeable future and this is supported more recently by the National Policy Statement for Energy (EN-1) 2011.
- 5.29 Ofgem's Annual Energy Statements (AES) acknowledge that without action the UK will become susceptible to high and volatile oil and gas prices. In securing our supplies, the 2010 AES recommends high standards of safety and environmental management rather than moratoriums on development. DECC's strategy is to reduce energy usage whilst also making the best use of our domestic oil and gas resources including shale, and the 2011 AES acknowledges that the UK needs significant new investment in energy infrastructure to meet future demand.
- 5.30 With fuel poverty having doubled from 2001 to 2009 due to the increasing cost of fuel and with the energy sector making a significant contribution to employment and the economy, the Government recognises the positive socio-economic aspects associated with energy developments. The 2012 AES notes that in 2011, the energy industry contributed 4.4% to UK GDP, around £12.7 billion of investment and 22,800 jobs in the UK. The UK planning strategy supports the Government's energy strategy and the NPPF recognises that minerals are essential to support sustainable economic growth and our quality of life. Therefore ensuring sufficient supply is essential.
- 5.31 The Proposed Development aims to establish if there is oil or gas present within this area of the Central Weald Basin and secondly to establish the unconventional potential, if any. By not developing the proposed well site and exploring the Basin within PEDL 243,

the Applicant would be in breach of the Conditions of their Licence and would not be in compliance with the national strategy on energy. Exploration is just the first step in establishing new domestic resources which if discovered and producible, would increase our security of supply and reduce our dependency on other countries for fuel. In turn, a successful discovery could reduce the UK's susceptibility to volatile price rises whilst also providing socio-economic benefits including employment, reduced energy prices, investment and tax contributions.

5.32 The accompanying Environmental Statement (ES) concludes that all but one of the effects is temporary whilst the single permanent effect can be suitably mitigated from a moderate to negligible effect. The significance of the temporary effects range from moderate adverse to moderate/minor beneficial with mitigation being proposed as such that the residual effects are reduced to negligible, minor adverse or moderate/minor beneficial. The only exception to this is Landscape and Visual Impact where the significance of effects were considered to be more adverse in comparison to the other disciplines and ranged from major/moderate to minor adverse. With mitigation the residual impacts are reduced to mostly moderate and minor adverse with two major adverse effects relating to landscape character during operation although these are all temporary effects.

5.33 Whilst the residual environmental impacts in the vicinity of the Application Site are expected to be temporary and mostly negligible or minor adverse with the exceptions identified above, the "no development" alternative would result in adverse socio-economic effects. It would also be contrary to national energy and planning guidance on the development of our domestic onshore oil and gas resources. These adverse socio-economic impacts outweigh any beneficial impacts that would arise from the "no development" alternative.

Assessment of Alternative Sites

5.34 Having established a need for the development of hydrocarbon supplies in order to meet growing demands, this part of the Chapter provides an overview of the Alternatives

which were assessed as part of the site selection and design process. A full copy of the Alternative Sites Assessment accompanies this planning application submission and provides a more comprehensive review of the process undertaken (**Appendix 5.1**).

Search Area

- 5.35 The search area is defined following the collection and evaluation of geological and seismic data, and the identification of a structure or “target reservoir” within the geological basin which in this case is the Central Weald Basin. The target reservoir is the area that the Applicant will seek to explore and evaluate by drilling an exploratory borehole. Having undertaken a review of the data within Petroleum Exploration Development Licence (PEDL) 234, the Applicant and their team of geologists and drilling engineer, identified a target reservoir for exploration within the Central Weald Basin. Using seismic and geological data, the Applicant defined a primary and secondary search area around the target reservoir where the Basin is at its greatest depth and maturity, therefore increasing the chances of encountering hydrocarbons and proving the concept of the geological play i.e. that there are hydrocarbons present.

Geographical Location

- 5.36 The search area is generally located in between the villages of Ifold to the north, Wisborough Green to the south east and Kirdford to the south west, and bound by the B2133 to the east and Plaistow Road to the west. The search area is approximately 4km in length and 2.5km in width but does not encompass any of the local towns and villages. The search area covers a number of farmsteads and agricultural land, and falls within the parishes of Loxwood, Wisborough Green, Plaistow and Kirdford.
- 5.37 The A272 is located to the south east of the search area near the village of Wisborough Green providing a main vehicular route. The B2133, Skiff Lane and Plaistow Road run in a north to south direction through the search area with Loxwood Road and Kirdford Road running in an east to west alignment along the northern and southern boundaries of the search area. Boxal Brook runs through Kirdford and Wisborough Green, and the South

Downs National Park in the southern part of the search area.

Methodology

5.38 The identification of potential sites begins by marking out the primary and secondary target search areas which are based on geological and seismic data, using Geographical Information Systems (GIS). The primary search area represents the deepest part of the Basin within this part of the subsurface and the preferred area for drilling. The environmental constraints within these two search areas and the immediate surrounding vicinity are then layered onto the map using the same software. Finally, a 400m radius is plotted around all known residential buildings to represent a suitable “buffer zone” between residential properties and the development of any potential hydrocarbon well sites, to limit noise intrusion prior to the carrying out of a full noise assessment and the identification of any necessary mitigation measures.

5.38a The area selected was based upon the requirement to explore a subsurface location where the purest limestone beds (the reservoir) and the most thermally mature and organic rich clays (source rock) of the Kimmeridge Clay Formation are to be found. Both these requirements are met by drilling the deepest part of the Jurassic basin. In addition to intersecting the deepest part it is also beneficial to drill this at its present day deepest depth to make use of any increased pressure to assist in the flow of hydrocarbons to the surface.

5.38b The “Primary Search Area” is the surface expression of where the centre of the original source of the hydrocarbons is found at its deepest position today. Drilling a well in the “Primary Search Area” allows a vertical well to be drilled. The proposed subsurface location can also be reached from the “Secondary Search Area”, however, this well will have an extensive coring programme which is necessary to properly evaluate these formations in this area. This coring programme is best done in a vertical well from both a technical and safety point of view. A vertical well will also provide the most suitable platform if we need to drill the lateral well.

5.38c Reservoir - The primary reservoir target of the Wisborough Green Well is the Kimmeridge Limestone Beds. These beds occur across the basin, but towards the margin of the basin they are contaminated by influxes of clay which reduce the porosity and permeability, and therefore reduce the suitability of the area for hydrocarbon exploration. The best reservoir quality will be encountered in the centre of the basin. This change from relatively high porosity and permeability in the centre of the basin to low porosity and permeability at the margins of the basin creates a trap. The prospect is that oil generating Kimmeridge clays source the intervening limestones, the oil migrates into the porous limestone and then migrates updip through the limestone until the permeability reduces to such low levels that the oil can no longer move and thus is trapped. Similar limestone reservoirs are recognised in the Great Oolite and the Lias and the well would be drilled to intersect these horizons as secondary targets.

5.38d Source Rock - The oil generating capacity of the Kimmeridge Clay is based on a number of criteria, the total organic content and the maturity of the source rock. Total organic content is recognised to be at its highest in the centre of the basin where it was preserved at deposition due to low oxygen conditions and where it is concentrated. Towards the margins of the basin the organic matter is diluted. Maturity, or oil expulsion from the source rock, increases with increase in temperature and pressure, temperature and pressure increase with depth and thus the deeper the burial the more mature the source rock and the more hydrocarbons are generated. In addition to the Kimmeridge Clay oil generating capacity is also recognised in the Oxford Clay and the Liassic Clay and these may source the Great Oolite and the Liassic limestone reservoirs in the same manner as described for the Kimmeridge.

5.38e In order to determine where the centre of the Jurassic Basin was the effects of historic seismic uplift activities had to be determined. This was done by determining the historic stratigraphy above the Base Upper Chalk – in effect, replacing in theory, the rock that had been eroded by the uplift. After this restoration had been achieved and checked against seismic velocities, a depth map was created showing the historic rock strata. Once the deepest part of the Jurassic basin had been identified it was then

analysed against the present day Top Upper Kimmeridgian depth map to determine where the two deepest parts intersected. Where they intersected is expressed at the surface by the “Primary Search Area”.

- 5.39 On the Constraints Plan, the parcels of land within the search area that are left unaffected by any of these constraints are the first to be appraised against planning policies and guidance in terms of suitability for a well site. These parcels of land may constitute several fields and when numbered on the plan, do not indicate the location of the site itself but an area within which a site might be accommodated.
- 5.40 There is a degree of flexibility with this Methodology as well as some limitations which should be taken into consideration:
- The 400m buffer zone process can sometimes identify non-residential buildings such as barns, garages and other outbuildings. Where a residential building appears to be an anomaly i.e. in a remote location or small in size, clarification over the building use can usually be obtained through the Council’s Public Access website or through a site visit. This can, however, be time consuming and will only be carried out where without this building may be otherwise suitable for development i.e. there are no other buildings or environmental constraints, or where there is established natural screening;
 - The 400m buffer zone can be reduced to 300m where no suitable sites are identified in the first instance. The industry standard for limiting noise intrusion is considered to be approximately 300m from the source although this distance can be decreased further with additional mitigation. Whilst our Methodology proposes 400m as a preferable distance, there are instances where it is acceptable or necessary to reduce this distance due to the significance of constraints. This is particularly the case where a site has other merits such as high tree cover, an existing access or is located on level ground;

- It is important that the Constraints Plan is read in conjunction with the adopted Local Plan and Proposals Map, and applied separately where applicable.

5.41 The site selection methodology adopted is considered to provide a robust and systematic process for identifying suitable sites.

Sites Identified

5.42 Using the Methodology as outlined above, a total of eleven potential sites were identified within the primary and secondary search areas. The potential Sites were identified from **1-11** in no order of preference, and a brief summary of the findings for each Site including the Application Site is provided below.

Site 1

5.43 The location around **Site 1** was discounted on the basis that vehicular access to the locality was heavily restricted, and a new access road would have long term and likely significant landscape and visual impacts. A new access road would need to be long to connect the Site to either Skiff Lane or Plaistow Road and this would extend works and disruption associated with the Proposed Development. Moreover, this would require trees to be felled and hedgerows to be removed which would have a more significant impact on the landscape and ecology whilst also causing visual impacts particularly to users of the Estate road leading up to the historic house.

Site 2

5.44 **Site 2** was considered to have some potential for development if a suitable vehicular access could be identified and providing that screening to the surrounding residential properties could be achieved. Any long term production site would require further landscaping to enhance views particularly from the south and south east, where landscaping exists only on the field boundary and not the Site boundary. Investigations into ecology and drainage would also need to be undertaken early due to the location of watercourses and the reservoirs, as well as the designation of Ancient Woodland.

Site 3

- 5.45 There was considered to be limited potential to develop a well site in this location because of the significant access, flood risk and topography issues. The positives of the Site are that it benefits from some screening, is located away from densely populated areas and is in the primary search area. The surrounding woodland at Hookhurst Copse, Naldretts Copse and Bittles Wood is all designated an Ancient Woodland and there is insufficient clearing within Hookhurst Copse to develop a well site when applying the RPA's. **Site 3** was therefore discounted.

Site 4

- 5.46 **Site 4** was discounted on the basis that there was limited land available to accommodate a well site and associated infrastructure at a suitable distance from surrounding properties and without extensive felling or disruption to field boundaries. In addition, the limited number of roads which lead towards the Site are rural - being narrow and tree lined, and would not be suitable for HGV access. The proximity of the Site to a number of watercourses, limited highway access with a new access road likely to require substantial tree and hedgerow removal, and the use of existing roads likely to cause disruption to a number of villages.

Site 5

- 5.47 The main field marked **Site 5** on the Constraints Plan was considered to have potential for development because it is well screened although views north to Dounhurst Farm may need enhancements through landscaping in the long term. The Site is also in the primary search area and outside of the SDNP. It would require only a small access road, albeit following the path of a PROW, into the southern part of the field and vehicles could reach the site using the A272 to the south which is a main road through the local area. The land is relatively flat and would provide sufficient acreage to accommodate a well site whilst also respecting the RPA's.

Site 6

5.48 **Site 6** was considered to have potential for development because of its vehicular access and proximity to the A272 – a main transport route, natural screening provided by the surrounding mature woodland and the suitable distances from residential properties. The existing pylons are around 80m high and therefore vertical structures are already present in this field of a greater height than a drill rig but at a sufficient distance from the site. It is not affected by PROW and does not fall within the SDNP. Falling within the primary search area and on a level topography the site was also considered suitable from a geology and engineering perspective. The site was unlikely to require substantial, if any, tree or hedgerow removal and therefore it would be unlikely to result in long term or likely significant landscape impacts as some of the other sites which were considered would have.

Site 7

5.49 **Site 7** is located to the south of **Site 6** within the same agricultural field but falls on the boundary of the South Downs National Park and on the edge of the primary search area. The Site was considered to be less favourable in comparison to **Site 6** because it was in greater proximity to the National Park and the environmental designations associated with The Mens. A Site in this southern part of the field would also need a longer access road, be in greater proximity to watercourses to the south and would need to pass under the electricity pylons. The Site was therefore quickly discounted from any further consideration as a potential well site location with **Site 6** offering greater potential for development in comparison.

Reducing the 400m buffer zone

5.50 Having identified 7 Sites using the 400m buffer around residential properties, for completeness, the buffer was reduced to 300m to see if this identified any other locations which may be suitable notwithstanding the merit of **Sites 2, 5 and 6** which had already been identified. A further four potential sites (**Sites 8-11**) were identified.

Site 8

5.51 The existing trees provide good natural screening to the Site from the road and surrounding area but the development would be limited to the small field marked as **Site 8** on the Constraints Plan. Taking into consideration the tree RPA's it would not be possible to locate a well site including HGV turning circle and passing places, and all the ancillary infrastructure including parking and bunds in this field without felling trees and changing field boundaries. This would have long term visual, landscape, drainage, heritage and ecology impacts as a result of material changes to the existing landscape. **Site 8** was therefore discounted for the reasons identified above.

Site 9

5.52 Due to the limited size of the field it would not be possible to accommodate a well site at **Site 9**. There is insufficient space within the field unless trees are felled and field boundaries are realigned and the PROW moved. The development in this location would also front directly onto the Wephurst Estate road which as previously discussed not suitable for HGV access as there are limited opportunities to widen the road. A development here would have long term visual, landscape, heritage and ecology impacts as a result of material changes to the existing landscape, and was therefore discounted.

Site 10

5.53 **Site 10** is limited in size which would constrain development and require changes to field boundaries, tree felling or hedgerow removal to accommodate the well site which would have long term impacts on the landscape, visual amenity, ecology and heritage. The field provides a maximum size of approximately 90m x 130m but tree root protection zones would reduce this size by a maximum of 15m on all boundaries with trees rendering the site unsuitable for development.

Site 11

5.54 The Site is in proximity to the South Downs National Park and other associated designations including The Mens SSSI and SAC. The Site was discounted relatively quickly

considering the open landscape at a road junction, the proximity of sensitive environmental designations and residential properties, and because more favourable Sites had been identified as part of the original site search exercise.

Results of the initial desk based assessment

- 5.55 The initial site search exercise identified 11 sites including four in the primary search area and seven in the secondary search area. The exercise concluded that eight of these sites (**Sites 1, 3 and 4, and 7-11**) should be discounted whilst the remaining three locations were worthy of further investigation (**Sites 2, 5 and 6**).
- 5.56 The site recommendations were reviewed by the Applicant's operations manager, drilling supervisor and geologists. A fault line to the north of **Site 5** determined that this site should be discounted and for the same reason **Sites 8 and 9** were deemed to be less geologically suitable in comparison to **Sites 2 and 6**. The operations manager and drilling supervisor confirmed that drilling from within the primary search area was preferable and that preference was to investigate **Site 6** further with **Site 2** as a secondary preference although the highway constraints in particular, were noted.

Site Visits

- 5.57 A site visit by the Applicant's planning consultant and drilling engineer in October 2012 concluded that the results of the desk based exercise were accurate with the search area being significantly constrained particularly in respect of highway access, topography and the need to minimise impacts on villages. It also concluded that Site 6 was the preferred option with Site 2 being a secondary option although highway access was likely to have significant constraints and greater environmental impacts. **Site 8** was given some further consideration because of its proximity to the road and natural screening although concerns about site size and geological suitability remained. It was also noted that the land was for sale at the time.
- 5.58 The site visit concluded that **Site 6** was the most suitable option for development with

very limited potential at **Site 2**. With such limited potential for development prior to even speaking with the landowners, it was decided that as the land at **Site 8** was for sale an approach would be made to the landowner for optionality.

Discussions with landowners

- 5.59 The landowners of the three potential well site locations were identified using the Land Registry. The landowner for **Site 2** which is managed by a Trust, did not want to enter into negotiations leaving only Sites 6 and 8 with any potential for development with the latter unlikely to be suitable. The landowner for **Site 8** was not in a position to enter into negotiations on the site because they were uncertain about the future of the land and its ownership. The Site was discounted on the basis of the information identified earlier in this report, and because the future ownership of the land was uncertain and the landowner unwilling.
- 5.60 **Site 6** was the preferred and only option for development following the desk based report and discussions with the other landowners. Having discussed the proposals with the landowner for **Site 6** who was interested in the development, an onsite meeting was organised to discuss matters further.

Site visit with the landowner and project team

- 5.61 A site visit to **Site 6** was undertaken in November 2012 and was attended by the Applicant's planning consultant, drilling manager, civil engineer and land agent along with the landowner. This site visit allowed a full on site review of the proposed site and face to face discussions on planning, engineering and land issues including topography, visual impact, access arrangements, and the design and location of the well site.
- 5.62 The site visit concluded that **Site 6** would be a suitable location for the development of a well site in respect of planning, environmental and engineering requirements subject to further specialist studies and mitigation measures including a full Environmental Impact Assessment. The proposals would provide significant economic benefits to the farm

diversity which would help support the farm's core agricultural workings.

Site Selection Summary

- 5.63 The Alternative Sites Assessment exercise concluded that **Site 6** was the only suitable location for the development of an exploratory well site in light of landowner, geology, planning, environmental and drilling constraints. Having assessed the site through a desk based appraisal and on site with the relevant specialists, it was considered that pre-application discussions should be held with the Planning Authority in this case West Sussex County Council (WSCC), to discuss the proposals.

Pre-Application Discussions with WSCC

- 5.64 A pre-application submission was made to WSCC in February 2013 and a meeting was held with the Planning Officer on 4 March 2013 with a site visit on 17 May 2013. Written advice was provided by WSCC on 3 July 2013. This advice has fed into the preparation of the ES.

Site Selection Summary

- 5.65 **Site 6** represents the Application Site and was identified following a robust and comprehensive assessment of the existing geological strata, technical limitations, planning policy and environmental designations and constraints within the search area. The identification of baseline conditions and the assessment of the identified sites including the Application Site, were carried out using a number of information sources;

- Geological and seismic data collection and evaluation;
- Geographical Information Systems (GIS);
- Desk based research on planning policy, environmental designations and landowner constraints;
- On site investigations and site visits;

- Discussions with landowners;
- Pre-application discussions with WSCC; and
- Preliminary discussions with environmental experts on transport, landscaping and ecology.

5.66 The use of a variety of sources illustrates the comprehensive nature of the Alternative Sites Assessment, and supports the conclusion which has been drawn that **Site 6** is the most suitable Site to accommodate the Proposed Development. In summary, the reasons for choosing **Site 6** as the Application Site are;

- Suitable vehicular access from the A272 and Kirdford Road including an existing access gate and track into the field;
- Natural screening provided by existing woodland in the local and wider vicinity;
- Non-designated woodland between the Site and Northup Copse;
- The distance of the Application Site from existing residential properties and other viewpoints;
- There are no Scheduled Monuments or listed buildings immediately adjacent to the site and it is outside of the National Park;
- Field boundaries are not affected;
- The predominantly flat topography of the field;
- Its location away from open watercourses and areas of flood risk;
- The technical and geological suitability of the subsurface including its location in the primary search area;
- The availability of a willing landowner.

5.67 If no development were taken forward at **Site 6**, the next best option would have been **Site 2**. The landowner did not want to progress with negotiations in this location but discussing hypothetically the implications of developing a proposal at **Site 2**, there would have been more significant impacts for the environment, residents and visitors in comparison to **Site 6**.

- 5.68 The field itself is an open landscape with mostly hedgerows and trees on the field boundaries but no vegetation that would screen the well site compound itself but for the woodland to the north, leaving the site itself largely exposed. The field boundaries to **Site 2** consist of bridleways on the east and west, a PROW to the south, and ancient woodland including a watercourse to the north. Users of the rights of way (walkers, tourists and riders) would therefore be exposed to views of the site through gaps in the trees and hedgerow. It is likely that the surrounding farms – Fountain's, Walthurst, and Dounhurst, would be subject to views due to the limited screening and with the latter two farms being on higher ground.
- 5.69 The nearest main vehicular route is the A272 east of Wisborough Green with the A285, A29 and A264 being further away and requiring the use of smaller rural roads to access the site through a number of villages which would cause significant disruption for a more significant number of people. Use of the A272 would require going through Wisborough Green and Kirdford whereas the use of **Site 6** only requires going through Wisborough Green. Vehicular access into the field itself would require the use and extension of an existing private access road off Plaistow Road or the creation of a new road which would require the felling of trees and hedgerows, the loss of field boundaries, and significant environmental impacts on the landscape and ecology.
- 5.70 Depending on the position, a new access road would also need to cross watercourses and drains, or rights of way. The site is part of a Catchment Sensitive Farming Delivery Initiative scheme which seeks to protect and boost the health of watercourses and streams from agricultural pollution through improved infrastructure. Culverting or crossing drains or watercourse in this location may detract from the purpose of this scheme.
- 5.71 It is clear that **Site 2** would create more significant environmental impacts in comparison to **Site 6** for a number of reasons outlined in this Chapter and the Alternative Sites Assessment. Locating the Proposed Development outside of **Site 6** would result in far greater environmental and social impacts.

Alternative Site Layouts

- 5.72 Originally the site layout placed the access road and well site immediately adjacent to the area of woodland south of Boxal Bridge which is designated as ancient but not part of the SNCI. The original layout can be seen in **Figure 5.1** with the proposed layout shown on the accompanying planning application drawings. Following discussions with the Applicant's consultant ecologist and arboriculturalist, part of the access road and well site were moved so that there was a 15m distance from the woodland edge to enable protection of the tree roots and to provide a buffer between the Proposed Development and the woodland including its ecology. An additional benefit was that the Proposed Development was now also further from the designated ancient woodland.
- 5.73 The site layout during testing was also changed with the storage tanks being moved away from the flare pit for health and safety reasons. The original location of the tanks during testing can be seen in **Figure 5.2** with the proposed layout shown on the accompanying planning application drawings.
- 5.74 Originally it was proposed that a 1.2m high post and wire fence would be erected around the edge of the access road and the well site compound to protect livestock. However following security threats to other well sites in West Sussex, the proposals were amended to include a 2m high wire mesh security fence around the well site compound, and a security gate between the access road and car parking area. The original layout which excludes the gate and shows only a 1.2m high fence around part of the site can be seen in **Figure 5.3**.

5.74a The access to the well pad has been moved further south to avoid the badger zone. See Chapter 7A Ecology for the updated assessment.

Alternative Design and Technology

- 5.75 The technology that is deployed will be fit for purpose both technically and geologically, and will meet and comply with all necessary health and safety requirements. There is no opportunity to change the design of the drill rig and associated equipment. The rig must be chosen on the basis of the depth that will be drilled because different rigs are designed to drill to different depths depending on the length of the drill string.
- 5.76 The drill string is formed by lengths of drill pipe which is a hollow, thick walled steel pipe that connects the surface rig equipment with the drill bit (the tool used to cut the rock). The drill string sends drilling fluid via the mud pumps and torque via the top drive, to the drill bit. A 350 horsepower rig is designed to drill to 3,500ft and may only have a 20m high mast as it is designed to rack back the drill pipe in single lengths. A 750 horsepower rig is designed to drill to around 8,000ft and will have around a 30m high mast so it can rack back the drill pipe in doubles, whilst a triples rig has a 60m high mast so it can rack back the drill pipe in triple lengths and can drill to around +15,000ft.
- 5.77 The Applicant is proposing to drill to around 8,750ft and therefore initially a “triples rig” with a 60m high mast was considered for use at Wisborough Green. However, it was considered that a “doubles rig” could drill to the required depth thus helping to mitigate the visual impact of the rig by reducing the height of the mast by around a third from 60m to 40m (excluding the 5m substructure).

5.77a For the purposes of the ES, a parameters based approach to assess the ‘worst case scenario’ of potential rig specifications has been adopted, as set out in Chapter 4A Project Description.

References (Ref)

- 5.1 The Energy White Paper: "Meeting the Energy Challenge", DTI (2007)
- 5.2 Overarching National Policy Statement for Energy (EN-1), DECC (2011)
- 5.3 The Energy Act (2011)
- 5.4 Annual Energy Statement, DECC (2010)
- 5.5 Annual Energy Statement, DECC (2011)
- 5.6 Annual Energy Statement, DECC (2012)
- 5.7 The National Planning Policy Framework, DCLG (2012)