

10.0 TRANSPORT AND ACCESS

Introduction

- 10.1 This chapter assesses potential environmental effects on and in the vicinity of the Assessment Site which are attributable to changes in predicted travel patterns associated with the Proposed Development
- 10.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Assessment Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset significant adverse effects; and the likely residual effects after these measures have been employed. This chapter has been prepared by Royal HaskoningDHV.
- 10.3 The assessment has been scoped with and undertaken in liaison with officers at West Sussex County Council.

Planning Policy Context

National Planning Policy Framework (Ref. 10.1)

- 10.4 The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied.
- 10.5 Section 13 deals with facilitating the sustainable use of materials and at the 6th bullet of paragraph 143 identifies that local planning authorities should:

“Set out environmental criteria, in line with the policies in this Framework, against which planning applications will be assessed so as to ensure that permitted operations do not have unacceptable adverse impacts on[inter alia]traffic”

West Sussex Transport Plan 2011-2026 (Ref. 10.2)

- 10.6 The West Sussex Transport Plan (TP) sets out West Sussex County Council's (WSCC) strategy for managing movement within the County as well as the integrity of its transport assets over the next 15 years. It recognises that the main movement of freight is through road haulage, and this will continue to be the case through the lifetime of the TP.
- 10.7 Whilst supporting freight movement the TP seeks to manage movements in order to mitigate the consequences of noise, emissions and rat running.
- 10.8 The key aspects of the County's approach to freight management include, inter alia:
- Lorry Route Network – maintaining and promoting a lorry route network for main lorry movements in the County; and
 - Minimising Construction Traffic – identifying and assessing lorry routes for construction traffic and sites which require high levels of Heavy Vehicle (HV) movements such as mineral extraction and waste sites.
- 10.9 This policy sets a clear requirement to maintain freight movements on specified routes as far as possible. A copy of the Advisory Lorry Routes map prepared by WSCC is provided at **Appendix 10.1**.

Assessment Methodology*Approach*

- 10.10 The assessment process comprises three main activities:
- i. Determination of baseline conditions;
 - ii. Determination of baseline conditions with the Proposed Development; and
 - iii. Determination of baseline conditions with the Proposed Development and cumulatively with other planned developments.

10.11 The outcome of activities (i.) and (ii.) in comparison provide an indication of the net potential environmental transport effects of the Proposed Development and therefore the extent to which mitigation measures may be required. The outcome of activities (i.) and (iii.) in comparison determine the extent to which the Proposed Development will integrate with other developments planned for the area and any further design or mitigation measures which may be required to achieve this.

Assessment Criteria

10.12 The assessment of environmental effects has been carried out in accordance with the “Guidelines for the Environmental Assessment of Road Traffic” published by the Institute of Environmental Assessment (IEA) (now Institute of Environmental Management and Assessment) (Ref. 10.3). Reference has also been made to Volume 11 of the Design Manual for Roads and Bridges (DMRB), published by the former DETR, now Department for Transport (DfT) (Ref. 10.4). These are recommended tools for the appraisal of environmental effects of transport and they identify appropriate standards for assessment. Reference has also been made to the “Guidance on Transport Assessment” March 2007 published by the Department for Transport (Ref. 10.5)

Methodology

10.13 The approach to determining the nature and extent of effects from the Proposed Development focuses on five main components:

1. Forecast travel demand arising from the Proposed Development for the morning and evening weekday peak hours and over a 24-hour period in the assessment year which is 2014;
2. Transport Modelling to determine changes in travel demand on key movement corridors arising from the Proposed Development in the assessment year;
3. Capacity Assessments where necessary to examine the extent of effects arising from the changes in travel demand on key links;
4. Development of Mitigation Measures which involves the examination of the

effects identified and, where these are considered necessary, the development and testing of mitigation measures; and

5. Identification of Residual Effects which remain after mitigation; their quantification and recommendations on possible further measures to minimise these.

10.14 The five components set out above, in combination, provide a robust assessment of the Proposed Development in terms of transport related environmental effects.

Assessment Years

10.15 The Proposed Development is temporary in nature and is therefore most likely to commence and be completed in 2014. Traffic surveys on the roads approaching the Assessment Site have been surveyed in 2012 / 2013. It has been assumed that traffic growth between the survey dates and 2014 will be negligible. Should further works be undertaken at the Assessment Site then these would be the subject of a separate planning application and EIA, if required.

Potential Transport Effects

10.16 The main potential transport effects of the construction and operational phases arise from changes in traffic volumes, or the proportion of HV traffic, on routes in the vicinity of the Assessment Site, as a direct consequence of the Proposed Development. Changes in traffic volumes could give rise to the following impacts:

- Landscape and Visual (these have been separately assessed in Chapter 8.0: Landscape and Visual Assessment);
- Air Pollution (see Air Quality Statement submitted in support of the planning application);
- Noise (this has been separately assessed in Chapter 9.0: Noise);
- Severance;
- Driver delay;

- Pedestrian delay and amenity;
- Fear and intimidation;
- Accidents and road safety; and
- Hazardous Loads (no hazardous loads are expected).

10.17 In considering whether effects arising from changes in traffic or HV volumes are likely to be significant and therefore should be investigated in greater detail, the IEA Guidelines suggest that the following screening tests should be applied:

- Test 1: include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Test 2: include any other specifically sensitive areas where traffic flows have increased by 10% or more.

10.18 The above guidance is based upon knowledge and experience of environmental effects of traffic and acknowledges that traffic forecasting is not an exact science. The 30% threshold value is based upon this research and experience, with a less than 30% increase generally resulting in imperceptible changes in the environmental effects of traffic. The Guidance considers that projected changes in traffic flow of less than 10% create no discernible environmental effect, hence the second threshold as set out in Test 2. Sensitive receptors to road traffic would include people at home, people in work places, sensitive groups (for example children, elderly and disabled) or sensitive locations (including hospitals, churches, schools, historical buildings). For the purposes of this assessment, Test 1 will be applied.

10.19 Other potential transport effects which are specifically related to the activities proposed include the trafficking of mud onto the public highway and slow moving heavy vehicles which would cause disturbance at a local level. These effects could lead to driver delay and accident and road safety impacts.

10.20 There may also be the need for abnormal loads to be delivered to the Assessment Site again leading to potential driver delay and accident and road safety impacts.

Magnitude and Significance

10.21 Where the screening test outlined above identifies that transport effects are likely to be significant, the assessment applies a standard approach to expressing the magnitude of these based on guidance contained in DMRB. Environmental effects can be either adverse or beneficial and a description of the magnitude of significance is provided below in **Table 10.1**.

Table 10.1: Magnitude of Significance

Significance	Description
Negligible	No significant effects
Minor	Not noteworthy or material – effects are of low magnitude and frequency and will not exceed relevant quality standards, residual effects will be negligible
Moderate	Noteworthy, material – effects are of moderate magnitude and frequency. Relevant quality standards may be exceeded to limited extent. Possible secondary impacts, residual effects will be minimal.
Major	Effects are likely to be of a high magnitude and frequency with quality standards being exceeded, at times considerably. There may be secondary effects of some magnitude, residual effects will be of some significance.
Substantial	Effects will be of a consistently high magnitude and frequency with Standards exceeded by a significant margin. Secondary impacts also likely to have a high magnitude and frequency. Significant residual effects.

Source: Ref. 10.4 HA205/08 Table 2.2

Baseline Conditions

Walking

10.22 The importance of walking in contributing towards sustainable travel patterns has been, and continues to be, a central focus of government policy at all levels. The most recent National Travel Survey (Ref. 10.6) reports in table NTS0306 that the average walking trip length is 0.7 miles.

10.23 There is a public right of way (PROW) running broadly east-west in direction located to the north of the Assessment Site which connects the village of Kirdford in the west to

Kirdford Road to the east of Boxal Bridge. The PROW is approximately 200m from the Assessment Site at its nearest point. A further PROW is located approximately 500m west of the Assessment Site which commences on Kirdford Road and, running north-south via Barkfold Farmhouse, connects with the east-west running PROW to the north. Both being located to the north of Kirdford Road, neither PROW would be affected by the Proposed Development.

- 10.24 In terms of walking therefore, the location of the Assessment Site relative to existing centres of activity would tend to limit the use of this mode. Furthermore there is limited infrastructure in place to enable journeys to be safely made by foot.

Cycling

- 10.25 The importance of cycling in contributing towards sustainable travel patterns has been, and continues to be, a central focus of government policy at all levels. The most recent National Travel Survey (Ref. 10.6) reports in table NTS0306 that the average cycle trip length is 2.8 miles. There are a number of settlements within a 2.8 mile cycle ride to the Assessment Site.
- 10.26 There are no dedicated on or off road cycle routes in the vicinity of the Assessment Site. However, there is an extensive rural network of roads in the vicinity of the Assessment Site with low traffic flows, making them suitable for use by cyclists.
- 10.27 In terms of cycling therefore, the location of the Assessment Site relative to existing centres of activity including Wisborough Green and Kirdford would provide some limited opportunity for cycling to offer a reasonable alternative to travelling by private car for some people.

Public Transport

- 10.28 The nearest public transport opportunity is Boxal Bridge which lies within 400m of the Assessment Site on Kirdford Road as illustrated on **Figure 10.1**. Bus services operating

from Boxal Bridge are provided by Compass Bus. **Table 10.2** below provides a summary of these services.

Table 10.2: Public Transport

Service no.	Route	Weekday Frequency		
		Morning (07:00-09:00)	Evening (16:00-18:00)	Daily
74/74A/75	Petworth – Billingshurst - Coolham – Barnes Green - Horsham	1 per hour (direction Billingshurst)	1 (direction Kirdford)	4 (direction Billingshurst)
		1 (direction Kirdford)		4 (direction Kirdford)
64	Loxwood – Wisborough Green – Billingshurst – Broadbridge Heath Tesco - Horsham	-	-	1 service daily each direction Mondays and Thursdays only
69	Alford – Loxwood – Billingshurst – Pulborough – Arundel - Worthing	-	-	1 service daily each direction Tuesdays only

10.29 **Table 10.2** shows that during the weekday peak hours of 08:00 - 09:00 and 17:00 - 18:00 there is one service (service 75) per hour connecting the Assessment Site to Kirdford (and on to Petworth). Neither the service 64 nor the service 69 operates on a daily basis and both operate off-peak. Given the limited access to the Assessment Site by public transport, it is considered unlikely that many journeys would be made by this mode. However given the nature of the activities which form the Proposed Development, it is expected that the majority of journeys will need to be made by private vehicles carrying plant, equipment and / or materials and would therefore not lend themselves to be made by public transport.

Highway Network

10.30 The main local vehicular access routes identified in relation to the Assessment Site are illustrated on **Figure 10.1**.

- 10.31 The Assessment Site is currently directly accessed from Kirdford Road which is a single carriageway road that connects Wisborough Green / A272 to the south with Kirdford to the west. The route continues westwards after Kirdford to connect with Petworth. Kirdford Road in the vicinity of the Assessment Site is rural in nature being derestricted and unlit. It is generally between 4m and 6m wide. RHDHV has corresponded with WSCC regarding weight restrictions on Kirdford Road. WSCC have confirmed that there are no weight restrictions on Kirdford Road including at Boxal Bridge.
- 10.32 Within Wisborough Green, there are a number of side roads accessed from Kirdford Road together with residential frontage and driveway accesses. The speed restriction is 30mph with limited street lighting. As Kirdford Road enters Wisborough Green it skirts the north of a cricket ground. At this point footways are provided which, when combined with footpaths within Wisborough Green, provide continuous segregated facilities for pedestrians throughout the majority of Wisborough Green.
- 10.33 Kirdford Road meets Durbans Road and Newpound Lane to form a crossroads within Wisborough Green. At this point Kirdford Road ends. The route to the A272 to the south of Wisborough Green continues along Durbans Road which connects the A272 in the south to the B2133 to the north. Durbans Road within Wisborough Green is of a similar standard as Kirdford Road. There is a parking layby on the western side of Durbans Road extending between its junction with Kirdford Road and the A272. This enables vehicles to be parked safely off the main carriageway along this section.
- 10.34 The A272 is the main east-west route through West Sussex and the wider region. In the local context it connects Petworth, Petersfield and the A3 to the west of the Assessment Site with Billingshurst, Haywards Heath and the A23 and A24 to the east of the Assessment Site. The A272 is a single carriageway road with one lane in each direction. It is predominantly rural in nature being generally derestricted and unlit. There are no continuous footways along the route.
- 10.35 Beyond these routes, other roads in the area are rural in nature being predominantly unlit, derestricted and of varying widths up to 6m.

10.36 To determine baseline traffic volumes Automatic Traffic Count (ATC) surveys were obtained for the following locations:

- the A272 adjacent to Wisborough Green (June 2012); and
- Kirdford Road adjacent to the Assessment Site (March 2013).

10.37 The data comprises volume and classification of traffic over a 24 hour period and are presented below in **Table 10.3**.

Table 10.3: Baseline Traffic Flows

Location	Time period	Two-way Traffic Volumes		
		Total	LV ² (<1.5t)	HV ³ (>1.5t)
A272 adjacent to Wisborough Green.	AM Peak (08:00-09:00)	589	530	59 ⁴
	PM Peak (17:00-18:00)	622	560	62 ⁴
	24-hour (AAWT) ¹	7089	6380	709 ⁴
Kirdford Road adjacent to the Assessment Site.	AM Peak (08:00-09:00)	113	98	14
	PM Peak (17:00-18:00)	121	105	16
	24-hour (AAWT) ¹	1396	1214	183

Note 1: Annual Average Weekday Traffic

Note 2: Light Vehicle

Note 3: Heavy Vehicle

Note 4: HV content estimated based on advice in DMRB TA46/97 (Ref. 10.4)

10.38 During the morning the busiest hour is 08:00 – 09:00. Two-way traffic flows along Kirdford Road in the vicinity of the Assessment Site, during the morning peak hour reach up to 113 vehicles. There were 14 heavy vehicles (HVs) observed on Kirdford Road during this period. During this period on the A272 there were 589 vehicles observed of which 59 were HVs.

10.39 During the evening the busiest hour is 17:00 – 18:00. During this peak period, two-way traffic flows along Kirdford Road in the vicinity of the Assessment Site reached up to 121 vehicles. There were 16 heavy vehicles (HVs) observed on Kirdford Road during this period. During this period on the A272 there were 622 vehicles observed of which 62 were HVs.

10.40 Over the 24 hour weekday average, two-way traffic flows along Kirdford Road in the vicinity of the Assessment Site reached up to 1396 vehicles of which 183 were HVs. During this period on the A272 a total of 7089 vehicles were observed of which 709 were HVs.

Accidents

10.41 Personal Injury Collision (PIC) data was obtained from the Sussex Safer Roads Partnership for the adjoining highway network for the most recent five year period available, 1st January 2008 to 31st December 2012. The study area includes:

- the A272 for the extent of the built up areas of Wisborough Green;
- Durbans Road from its junction with the A272 to Kirdford Road; and
- Kirdford Road from its junction with Durban Road to a point 500m west of the Assessment Site access.

10.42 A plot of accidents with their location and severity is provided at **Appendix 10.2**.

10.43 During the five year study period, there were a total of 11 PICs in the vicinity of the Assessment Site, seven of which resulted in slight injury and three in serious injury. There was one fatal collision that involved the death of a car passenger and serious injury to the remaining passengers and driver.

10.44 The fatality recorded within the study area occurred at the junction of Durbans Road and Kirdford Road and involved a vehicle turning into Kirdford Road losing control and colliding with a HGV.

10.45 Of the 11 PICs five involved a single vehicle loss of control type collision of which one involved a motorcycle. Two collisions involved the loss of control of a vehicle resulting in a second vehicle being struck or having to take avoiding action. The remaining four collisions involved a car reversing into a pedestrian, a car hitting the rear of a turning car, two cars clipping wing mirrors and a car hitting a second car when pulling out of a layby.

10.46 In terms of collision clusters which might indicate a deficiency in the highway network which increased traffic volumes might be expected to disproportionately effect, there were no clusters identified within the study area.

Likely Significant Effects

10.47 The main transport effects of the Proposed Development are additional traffic (especially HV movements) on roads leading to the Assessment Site. Details of expected operations and traffic volumes are provided at **Appendix 10.3**. Parking at the Assessment Site will be limited to 11 spaces. This is considered appropriate to accommodate the number of workers expected at the Assessment Site at the busiest time.

Access route

10.48 WSCC's approach to freight management is to keep lorries on the routes identified in their Advisory Lorry Routes' network for as long as possible. In the vicinity of the Assessment Site, it is only the A272 which forms part of the Advisory Lorry Route network.

10.49 Between the A272 and the Assessment Site, three alternative routes have been considered comprising:

- Route 1 - Directly via Durbans Road / Kirdford Road;
- Route 2 – via B2133 and Skiff Lane; and
- Route 3 – Kirdford Road from its junction with the A283 at Petworth.

10.50 Route 3 has longest travel distance from the A272 of the three routes and is effectively an alternative route to the A272 between Petworth and Wisborough Green. It is however a much lower standard of highway with a number of substandard features and passes through a number of settlements including Kirdford, Balls Cross and Gunther's

Bridge. In this context, and given that the A272 is identified by the local highway authority as the appropriate route for lorries, Route 3 is not considered further.

10.51 An analysis of Routes 1 and 2 is summarised in **Table 10.4** below.

Table 10.4: Summary of alternative access routes

Route 1	Route 2
<ul style="list-style-type: none"> • Route length from A272 to site = approx. 2km. • 2 way single carriageway of appropriate width to accommodate additional truck movements. • Kirdford Road already serves as a bus route. • 3 Personal Injury Collisions recorded along this route within data provided (3 years up to 31/05/13 - provided at Appendix 10.4). • One HGV (goods >7.5t) occurred between Skiff Lane and site, section common to both access routes. • No accommodation works required. • A272 / Durbans Road is subject to a 30mph speed restriction, representing a safer environment for HGV's pulling out onto A272. 	<ul style="list-style-type: none"> • Route length from A272 to site = approx. 9.4km. • B2133 2 way single carriageway of appropriate width to accommodate additional truck movements. • Skiff Lane is a 2 way single carriageway. Accommodation works will be required to safely handle additional HGV movements, in particular alteration to the junction with B2133 which currently cannot accommodate turning HGV traffic. • 9 Personal Injury Collisions recorded along this route within data provided (3 years up to 31/05/13 - provided at Appendix 10.4). • One HGV accident (goods >7.5t) occurred between Skiff Lane and site, section common to both access routes. • Avoids impact on Wisborough Green village centre, although impacts on a number of residential properties along its total length. • Personal Injury Collision data provided indicates more collisions occur along this route, exposing HGV's and other drivers to increased risk of collision. • Visibility of B2133 / A272 junction is restricted due to bend in the road, overhanging landscaping and no street lighting, however there are no reported PIC's at this location. • B2133 / A272 junction is subject to national speed restriction. Impacts of slow moving HGV's egressing B2133 should be considered.

10.52 **Table 10.4** demonstrates that Route 1 is considerably shorter than Route 2. The highway standard for Route 1 is suitable for the type and volume of construction traffic proposed. The highway standard for Route 2 is generally suitable for the type and volume of construction traffic proposed. However accommodation works would be needed at the junction of Skiff Lane / B2133 to enable northbound traffic to turn left into Skiff Lane safely, and also at the junction of Skiff Lane and Kirdford Road. Accommodation works may also be required at the junction of the B2133 and A272.

10.53 Notwithstanding the analysis set out in **Table 10.4**; noting that Route 1 passes through the village of Wisborough Green, an independent route safety audit has commissioned (provided at **Appendix 10.5**). The report concludes:

“It is concluded, taking into account existing traffic flows, additional flows and collision data, that the risk of collisions along the proposed haul route over the limited period, as proposed, will not increase more than marginally. The implementation of the recommendations in Paragraph 4 above would ameliorate the marginal increase.”

10.54 Having regard to the County’s approach to freight management which requires lorries to be kept on main routes for as long as possible, combined with the summary set out above and the independent safety audit, it is proposed that all construction traffic, including HVs and abnormal loads, will route to the Assessment Site via the A272 and then Durbans Road / Kirdford Road. The assessment set out in this section therefore focuses on the A272 and Kirdford Road.

Impact Assessment

10.55 The Proposed Development would comprise four phases which are:

- Phase 1 - Construction of access road and well site
- Phase 2 - Mobilisation and drilling
- Phase 3a – Testing (gas) / Phase 3b - Testing (oil)
- Phase 4a – Retention / Phase 4b - Restoration

10.56 A comprehensive Project Description is provided in Chapter 4 of the ES.

10.57 The Socio-Economic chapter sets out the forecast number of jobs that would arise as a consequence of the Proposed Development during each Phase. Based on this forecast, details of expected operations and traffic volumes are provided at **Appendix 10.3**. A car occupancy factor of 1.5 per car has been applied for construction workers which is a

typical occupancy rate for construction sites. For the purposes of this Chapter, the job forecasts in the Socio-Economic chapter have been rounded up in order to assess a worse case traffic scenario,

- 10.58 The Proposed Development comprises the drilling of a vertical exploration well followed by the drilling of a lateral exploration well although the latter is contingent on the success of Phase 2 or 3 of the vertical exploration well. The contingent lateral exploration well will involve the repetition of Phase 2 (mobilisation and drilling) and Phase 3 (testing) if hydrocarbons are discovered in the initial lateral exploration well, and further exploration and data collection in the lateral structures is considered viable. If hydrocarbons are not encountered during the initial vertical exploration well, the lateral exploration well will not be drilled and Phase 4a (restoration) will apply.
- 10.59 The daily traffic volumes for the contingent lateral exploration well will not differ from those proposed for the other phases set out above and which are assessed in this chapter, albeit the duration of the works would be extended should the contingent lateral exploration well go ahead. The Phases associated with the contingent lateral exploration well are therefore not assessed separately in this chapter.
- 10.60 The likely significant effects of each of the four phases described above are discussed in more detail below.

Phase 1 - Construction of access road and well site

- 10.61 **Table 10.5** below sets out the forecast construction traffic associated with Phase 1 of the Proposed Development together with an assessment of the change in traffic volumes on the A272 and Kirdford Road.

Table 10.5: Likely Significant Effects of Phase 1

Phase 1: Construction of access road and well site	Time Period	Two-way Traffic Volumes		
		Total	LV (<1.5te)	HV (>1.5te)
Forecast traffic associated with Phase 1 of the Proposed Development	AM Peak (08:00-09:00)	9	7	2
	PM Peak (17:00-18:00)	2	0	2
	24-hour (AAWT) ¹	35	13	22
Percentage change in vehicle movements on A272	AM Peak (08:00-09:00)	1.53%	1.32%	3.40%
	PM Peak (17:00-18:00)	0.32%	0.00%	3.21%
	24-hour (AAWT) ¹	0.49%	0.20%	3.10%
Percentage change in vehicle movements on Kirdford Road	AM Peak (08:00-09:00)	7.99%	7.13%	13.89%
	PM Peak (17:00-18:00)	1.65%	0.00%	12.20%
	24-hour (AAWT) ¹	2.51%	1.07%	12.05%

10.62 **Table 10.5** shows that the maximum expected number of daily two-way HV movements is expected to be 22 HVs with the corresponding maximum daily two-way Light Vehicle (LV) movements at 13. During the peak hours, two-way HV movements are not expected to exceed three with two-way LV movements not exceeding 13.

10.63 **Table 10.5** demonstrates that during Phase 1, over a 24-hour weekday period on both routes, there would be a less than 30% increase in traffic volumes compared to baseline traffic volumes. In terms of HV traffic, it is expected that there would be less than a 30% increase in HV volumes compared to the baseline HV volumes.

10.64 The IEA guidance states that changes in traffic volumes of this magnitude would result in imperceptible changes in the environmental effects of traffic. On this basis, it is concluded that so far as changes in traffic volumes and the HV element of those traffic volumes on the A272 and Kirdford Road are concerned, the Phase 1 operations would lead to a negligible impact in terms of changes in road traffic volumes. No further detailed traffic impact analysis is therefore considered necessary.

Phase 2 - Mobilisation and drilling

10.65 **Table 10.6** below sets out the forecast construction traffic associated with Phase 2 of the Proposed Development together with an assessment of the change in traffic volumes on

the A272 and Kirdford Road. It should be noted that this presents a worst case scenario as the calculations are based on 8 water tankers accessing and aggrissing the Application Site for 3 days, then 2 per day thereafter. It is actually anticipated that only 4 water tankers would be required for the first 3 days, then reducing to between 1 and 2 per day.

Table 10.6: Likely Significant Effects of Phase 2

Phase 2 - Mobilisation of Drill Rig - set up, drilling mode and dismantling	Time Period	Two-way Traffic Volumes		
		Total	LV (<1.5te)	HV (>1.5te)
Forecast traffic associated with Phase 2 of the Proposed Development	AM Peak (08:00-09:00)	14	20	2
	PM Peak (17:00-18:00)	1	0	2
	24-hour (AAWT) ¹	68	40	28
Percentage change in vehicle movements on A272	AM Peak (08:00-09:00)	2.38%	3.78%	3.40%
	PM Peak (17:00-18:00)	0.16%	0.00%	3.21%
	24-hour (AAWT) ¹	0.96%	0.63%	3.95%
Percentage change in vehicle movements on Kirdford Road	AM Peak (08:00-09:00)	12.43%	20.37%	13.89%
	PM Peak (17:00-18:00)	0.83%	0.00%	12.20%
	24-hour (AAWT) ¹	4.87%	3.30%	15.33%

10.66 **Table 10.6** shows that the maximum expected number of daily two-way HV movements is expected to be 28 HVs (this corresponds to the first four days only) with the corresponding maximum daily two-way Light Vehicle (LV) movements at 40. During the peak hours, two-way HV movements are not expected to exceed 2 with two-way LV movements not exceeding 20.

10.67 **Table 10.6** demonstrates that during Phase 2, over a 24-hour weekday period on both routes, there would be a less than 30% increase in traffic volumes compared to baseline traffic volumes. In terms of HV traffic, it is expected that there would be less than a 30% increase in HV volumes compared to the baseline HV volumes.

10.68 The IEA guidance states that changes in traffic volumes of this magnitude would result in imperceptible changes in the environmental effects of traffic. On this basis, it is concluded that so far as changes in traffic volumes and the HV element of those traffic volumes on the A272 and Kirdford Road are concerned, the Phase 2 operations would lead to a negligible impact in terms of changes in road traffic volumes. No further detailed traffic impact analysis is therefore considered necessary.

Phase 3a/3b – Testing (gas or oil)

10.69 Both Phase 3a and Phase 3b are expected to result in similar daily traffic volumes during peak activities. **Table 10.7** below sets out the forecast construction traffic associated with Phase 3a and Phase 3b of the Proposed Development together with an assessment of the change in traffic volumes on the A272 and Kirdford Road.

Table 10.7: Likely Significant Effects of Phases 3a and 3b

Phase 3a/3b - Short term test and evaluation programme	Time Period	Two-way Traffic Volumes		
		Total	LV (<1.5te)	HV (>1.5te)
Forecast traffic associated with Phases 3a/3b of the Proposed Development	AM Peak (08:00-09:00)	3	2	1
	PM Peak (17:00-18:00)	0	0	0
	24-hour (AAWT) ¹	6	4	2
Percentage change in vehicle movements on A272	AM Peak (08:00-09:00)	0.51%	0.38%	1.70%
	PM Peak (17:00-18:00)	0.00%	0.00%	0.00%
	24-hour (AAWT) ¹	0.08%	0.06%	0.28%
Percentage change in vehicle movements on Kirdford Road	AM Peak (08:00-09:00)	2.66%	2.04%	6.94%
	PM Peak (17:00-18:00)	0.00%	0.00%	0.00%
	24-hour (AAWT) ¹	0.43%	0.33%	1.10%

10.70 **Table 10.7** shows that the maximum expected number of daily two-way HV movements is expected to be 2 HVs with the corresponding maximum daily two-way Light Vehicle (LV) movements at 4. During the peak hours, two-way HV movements are not expected to exceed 1 with two-way LV movements not exceeding 2.

10.71 **Table 10.7** demonstrates that during Phase 3a and Phase 3b, over a 24-hour weekday period on both routes, there would be a less than 30% increase in traffic volumes compared to baseline traffic volumes. In terms of HV traffic, it is expected that there would be less than a 30% increase in HV volumes compared to the baseline HV volumes.

10.72 The IEA guidance states that changes in traffic volumes of this magnitude would result in imperceptible changes in the environmental effects of traffic. On this basis, it is concluded that so far as changes in traffic volumes and the HV element of those traffic volumes on the A272 and Kirdford Road are concerned, the Phase 3a and Phase 3b operations would lead to a negligible impact in terms of changes in road traffic volumes. No further detailed traffic impact analysis is therefore considered necessary.

Phase 4a/4b - Restoration/Retention

- 10.73 If hydrocarbons are discovered during Phase 2 then these will be tested during Phase 3 to determine if they are commercially viable. If no hydrocarbons are discovered or the hydrocarbons are shown not to be commercially viable, then the site will be restored (Phase 4a). However, should the hydrocarbons prove to be commercially viable the site will be retained (Phase 4b) pending planning permission for appraisal or production. Restoration works (Phase 4a) are expected to last circa 6 weeks. However the main traffic movements are expected to occur during a 1 month period during which time the Assessment Site would be kept secure.
- 10.74 **Table 10.8** below sets out the forecast construction traffic associated with Phase 4a and Phase 4b of the Proposed Development together with an assessment of the change in traffic volumes on the A272 and Kirdford Road.

Table 10.8: Likely Significant Effects of Phases 4a/4b

Phase 4a / 4b - Restoration / Retention	Time Period	Two-way Traffic Volumes		
		Total	LV (<1.5te)	HV (>1.5te)
Forecast traffic associated with Phase 4a/4b of the Proposed Development	AM Peak (08:00-09:00)	9	7	2
	PM Peak (17:00-18:00)	3	0	3
	24-hour (AAWT) ¹	35	13	22
Percentage change in vehicle movements on A272	AM Peak (08:00-09:00)	1.53%	1.32%	3.40%
	PM Peak (17:00-18:00)	0.48%	0.00%	4.82%
	24-hour (AAWT) ¹	0.49%	0.20%	3.10%
Percentage change in vehicle movements on Kirdford Road	AM Peak (08:00-09:00)	7.99%	7.13%	13.89%
	PM Peak (17:00-18:00)	2.48%	0.00%	18.29%
	24-hour (AAWT) ¹	2.51%	1.07%	12.05%

- 10.75 **Table 10.8** shows that the maximum expected number of daily two-way HV movements is expected to be 22 HVs with the corresponding maximum daily two-way Light Vehicle (LV) movements at 13. During the peak hours, two-way HV movements are not expected to exceed 3 with two-way LV movements not exceeding 7.
- 10.76 **Table 10.8** demonstrates that during Phase 4a and Phase 4b, over a 24-hour weekday period on both routes, there would be a less than 30% increase in traffic volumes

compared to baseline traffic volumes. In terms of HV traffic, it is expected that there would be less than a 30% increase in HV volumes compared to the baseline HV volumes.

- 10.77 The IEA guidance states that changes in traffic volumes of this magnitude would result in imperceptible changes in the environmental effects of traffic. On this basis, it is concluded that so far as changes in traffic volumes and the HV element of those traffic volumes on the A272 and Kirdford Road are concerned, the Phase 4a / 4b operations would lead to a negligible impact in terms of changes in road traffic volumes. No further detailed traffic impact analysis is therefore considered necessary.

Assessment of Abnormal Loads

- 10.78 There are no abnormal loads anticipated to be delivered to the Assessment Site however there may be some loads which need police escort during the mobilisation or demobilisation of the rig. In the absence of suitable mitigation measures, the Proposed Development would lead to a temporary minor adverse effect. Mitigation procedures for this will be set out in a Traffic Management Plan prepared for the Proposed Development (see below for further details).

Assessment of Disturbance

- 10.79 In terms of disturbance arising from construction traffic, it is anticipated that In the absence of suitable mitigation measures, the Proposed Development would lead to a temporary minor adverse effect. Mitigation procedures for this will be set out in a Traffic Management Plan prepared for the Proposed Development (see below for further details).

Cumulative Effects

- 10.80 There are not considered to be any projects in the area that need to be assessed cumulatively with this development.

Mitigation Measures

Access - All Phases

10.81 It is proposed to make modifications to the existing field access for the duration of the construction period. The modified access is illustrated on drawing number 3582P18A which is provided at **Appendix 10.6**. The access is designed to safely accommodate the conventional and unconventional Heavy Goods Vehicle (HV) traffic associated with construction works. A Stage Road Safety Audit has been undertaken and this is provided at **Appendix 10.7**.

Construction Management Plan - All Phases

10.82 Notwithstanding the relatively low volumes of traffic movements forecast for the Proposed Development, a Traffic Management Plan (TMP) would be prepared with the focus of minimising disturbance which could potentially arise from construction traffic. The key elements of the TMP would include:

- Where identified as necessary for unconventional HV traffic, police presence and assistance with traffic control will be arranged;
- Routing traffic to the Assessment Site in order to maintain HV traffic on WSCC's advisory lorry route network for as long as possible and thereby minimise the impact of construction traffic on local communities;
- Provision of a hardstanding area within the Assessment Site in order to stagger vehicle arrivals and departures and therefore prevent queuing on the highway at the site entrance;
- Scheduling of construction traffic movements (equipment and materials), when possible, to avoid the peak traffic periods at the beginning and end of each day and other sensitive periods, in order to minimise any potential disturbance to local traffic or safety impacts at junctions;
- Provision of information to parish councils relating to the construction period, including any unconventional HV traffic which may be scheduled;
- Signage to identify access routes and to inform motorists that the local roads are

accommodating construction traffic; and

- Wheel washing on site and road sweeping carried out to keep the local highway clear of mud and debris.

10.83 It is proposed that the preparation of the TMP would be a planning condition and that the TMP would be prepared and agreed with the Highway Authority prior to commencing activities on site.

Residual Effects

All Phases

10.84 Following the implementation of the mitigation measures outlined in this chapter, residual Transport and Access effects are assessed as being negligible.

Cumulative Effects

10.85 **Table 10.9** identifies the planned developments which are considered as having the potential to lead to cumulative transport effects in combination with the Proposed Development.

Table 10.9: Cumulative Effects

Planning Application Number	Proposals	Status	RHDHV Transport response
13/00593/EIA	Screening for 31ha solar farm – was screened in previous year for a 20ha solar farm.	EIA required (as with previous Screening Request in 2012 for 20ha).	<p>No information is provided regarding means of access for the solar farm. The Applicant's Agent indicates that Crouchlands Farm may be used as a storage point for materials.</p> <p>A review of the local highway network suggests that access to Crouchlands Farm would most likely be via the B2133 / Plaistow Road / Fox Lane / Rickman's Lane. This would mean that traffic associated with the Wisborough Green site and this site would use different routes.</p> <p>There is therefore unlikely to be a cumulative impact.</p>

13/01190/EIA	EIA Screening for 30 houses on land south of Petworth Road opposite Meadowbank, Wisborough Green	Response sent 26 June 2013 – ES not required	<p>No information is provided regarding means of access or vehicle numbers. Given its location, the vehicular access for the residential development would be taken from the A272 and the A272 would form the direct access road for construction and operational traffic associated with the dwellings. The A272 forms the main access route for lorry deliveries accessing the Application Site. There is therefore a potential cumulative impact between the Proposed Development and this proposal if both developments are delivered in the same timescale – there is no indication of when an application will be submitted for the residential site. It is expected that any cumulative impacts would be most noticeable during the construction phase of the residential development combination with Phase 1 of the Proposed Development. Lorry numbers associated with both proposals in this event, even in combination, are expected to be low in comparison to lorry numbers already on the A272.</p> <p>The potential for cumulative effects between the Application Site and this proposal could be reduced or avoided by coordination between the two developments to stagger peak construction times at the two sites if necessary. A Construction Traffic Management Plan will be prepared for the Application Site and this is a mechanism whereby the local highway authority could coordinate construction activities.</p>
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Summary

10.86 This chapter has assessed the potential environmental effects on and in the vicinity of the Assessment Site which are attributable to changes in predicted travel patterns associated with the Proposed Development.

10.87 The assessment has been carried out in accordance with the “Guidelines for the Environmental Assessment of Road Traffic” published by the IEA (now Institute of Environmental Management and Assessment). Reference has also been made to Volume 11 of the DMRB, published by the former DETR, now DfT. These are recommended tools for the appraisal of environmental effects of transport and they identify appropriate standards for assessment.

- 10.88 Transport policy recognises that the main movement of freight is through road haulage, and this will continue to be the case into the foreseeable future. However there is a need to manage movements in order to mitigate the consequences of noise, emissions and rat running.
- 10.89 Construction traffic would access the Assessment Site via modifications to an existing field access for the duration of the works. The access meets appropriate highway standards with respect to layout and safety. Construction traffic would amount to less than 30% of total daily traffic volumes on the identified construction traffic access routes. No significant transport effects are therefore expected to arise as a consequence of traffic volumes.
- 10.90 There is the potential for minor adverse impacts to arise as a consequence of disturbance and the delivery of unconventional loads during construction. A Traffic Management Plan (TMP) would be prepared to mitigate this.
- 10.91 With mitigation measures in place, there are no residual effects identified in relation to Transport and Access during the temporary period of the Proposed Development. A summary of the transport and access related effects are provided in **Table 10.10**.

Table 10.10: Table of Significance – Transport and Access

Potential Effect	Nature of Effect (Permanent/Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Phase 1: Construction of the access road and well site											
Changes in traffic volumes	Temporary	Negligible	None required							L	Negligible
Abnormal Loads	Temporary	Minor adverse	Traffic Management Plan							L	Negligible
Changes in HV volumes	Temporary	Negligible	None required							L	Negligible
Phase 2: Mobilisation and drilling											
Changes in traffic volumes	Temporary	Negligible	None required							L	Negligible
Changes in HV volumes	Temporary	Negligible	None required							L	Negligible
Phase 3a/3b: Testing (gas and oil)											
Changes in traffic volumes	Temporary	Negligible	None required							L	Negligible
Changes in HV volumes	Temporary	Negligible	None required							L	Negligible
Phase 4a/4b: Restoration or Retention											
Changes in traffic volumes	Temporary	Negligible	None required							L	Negligible
Changes in HV volumes	Temporary	Negligible	None required							L	Negligible
Abnormal Loads	Temporary	Minor adverse	Traffic Management Plan							L	Negligible
All Phases											
Disturbance	Temporary	Minor adverse	Traffic Management Plan							L	Negligible
* Geographical Level of Importance											
I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local											

REFERENCES (Ref)

- 10.1 Department for Communities and Local Government (2012) National Planning Policy Framework
- 10.2 West Sussex County Council (2011) *West Sussex Transport Plan 2011-2026*
- 10.3 The Institute of Environmental Assessment (1994) *“Guidelines for the Environmental Assessment of Road Traffic”*
- 10.4 Department for Transport (Various) *the Design Manual for Roads and Bridges*
- 10.5 Department for Transport (2007) *Guidance on Transport Assessment*
- 10.6 Department for Transport (2011) National Travel Survey.

11.0 GROUND AND GROUNDWATER PROTECTION

Introduction

- 11.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of ground and groundwater protection and is supported by **Appendix 11.1**.
- 11.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Assessment Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.
- 11.3 This chapter has been prepared by Hydrock Consultants.

Legislation and Policy Context

European Policy

Water Framework Directive (Ref.11.1)

- 11.4 Historically, groundwater protection was ensured by implementation of the Groundwater Directive (80/68/EEC) which differentiated between List I and List II substances. Entry of List I substances to groundwater was required to be prevented entirely and List II discouraged but allowed if a permit applied.
- 11.5 This Directive, which in UK was implemented via the 1998 Groundwater Regulations, is set to be repealed in 2013 through implementation of the Water Framework Directive (2000/60/EC) which includes a Daughter Directive (2006/118/EC) that provides similar controls as the original Groundwater Directive.

- 11.6 The notion of List I and List II substances has been replaced by that of ‘hazardous’ and ‘non-hazardous’ substances, the emission of which, to groundwater, is to be prevented or limited.
- 11.7 The Water Framework Directive commits EU member states to achieve good qualitative and quantitative status of all water bodies by 2015. Under the Directive, management units for groundwater referred to as Groundwater Bodies are defined, with a requirement to classify them as ‘Good’ or ‘Poor’ depending quality attributable to human intervention. Control regimes are to apply to ensure that quality does not deteriorate.
- 11.8 According to the Environment Agency website neither groundwater in the superficial deposits that underlie the site nor groundwater in the bedrock is classified as a groundwater body. This position is in keeping with the low water resources value of both units as described in Section 11.38 below.

National Policy

Water Resources Act, 1991 (Ref. 11.3)

- 11.9 Under the Water Resources Act of 1991, “causing or knowingly permitting” poisonous or noxious matter to enter controlled waters is a criminal offence. More recently, the concept of ‘significance’ has been introduced into the application of legislation relating land contamination to the pollution of controlled waters.

DCLG, National Planning Policy Framework, 2012 (Ref. 11.2)

- 11.10 The 2012 National Planning Policy Framework requires that development plans should minimise pollution and other adverse effects on the local and natural environment. Pollution is defined as ‘anything that affects the quality of land, ...water or soils’.

Local Policy

West Sussex County Council Minerals Local Plan, 2003 (Ref. 11.4)

- 11.11 This document sets out the County Council's vision, objectives and strategy for mineral land-use planning in West Sussex and provides a detailed policy framework for determining mineral planning applications.
- 11.12 At 6.13 of the Plan there is a general requirement to produce an Environmental Statement within which the significant environmental effects of the development are to be assessed. The document also includes a brief description of the geology and hydrogeology, noting that the deeper geology (1500m-2100m depth) may contain hydrocarbons.
- 11.13 Policies 15 and 16 of the Plan relate to the protection of the water environment. Policy 15 concerns effects on groundwater levels (and consequential effects on surface waters) and Policy 16 concerns protection of water quality. Whilst the principles are applicable to the Proposed Development, the policy is written with sand and gravel workings in mind.

Chichester District Council Local Plan, 1999 (Ref. 11.5)

- 11.14 The Chichester Local Plan is the document that currently guides development in the district. A stated objective of the plan is to secure the protection and enhancement of the natural physical environment.
- 11.15 There is limited local policy on groundwater protection with Policy RE27 "Protection of Surface and Groundwater Resources" having not been saved in the Local Plan. However, Policy BE5 which deals with business, industry and warehousing in the rural area states that new proposals should not "generate unacceptable levels of soil, water or air pollution".

Local Governance

- 11.16 In addition to the above policy statements it is expected that CDC's Contaminated Land Officer (the CLO) and the Environment Agency will be consultees to the application as part of the planning process.
- 11.17 The Environment Agency will require assurance that the proposed works will not cause Pollution of Controlled Waters, be they either surface waters or groundwater. Similarly, the CLO will need to be assured that the works will not result in land contamination and there is a clear and obvious link between these two issues. Specific conditions may be included in the permission to ensure that appropriate action is taken.

Assessment Methodology

General

- 11.18 In the context of an assessment of effects on controlled waters, the area under consideration is the Assessment Site (as defined in **Chapter 3**). Primarily it is proposed to drill a vertical well at the location indicated with the well terminating at a point directly beneath the start position at the surface (**Figure 11.1**).
- 11.19 However as explained in **Chapter 4** (Project Description) there is a contingency proposal to drill a lateral well at the same location, in which case, a lateral hole will be formed at approximately 515 m depth and will progress in a north westerly direction (50°) for a distance of 5000 ft. (1524 m). This lateral hole will mostly be formed in the Lower Kimmeridge Limestone (reference **Table 11.1**). At its point of termination (**Figure 11.1**) the lateral well will be approximately 1400m below ground level. The lateral well configuration is shown in **Figure 11.2** in a geological context.
- 11.20 The assessment process is one of acquiring published and unpublished information pertaining to the geology, hydrology, and hydrogeology of the Assessment Site and then using it to formulate a conceptual model of current conditions. All aspects of the drilling

works, both surface and subsurface, are then reviewed and their potential impact on existing conditions is assessed. Where significant and/or adverse change is anticipated, appropriate mitigation measures are described.

11.21 Additional issues to consider are the water-related effect on any protected areas that are potentially affected by activities at Assessment Site.

Conceptual Model

11.22 The formulation of a Conceptual Model is a key part of the standard way of assessing the effects of a proposed development on controlled waters and any protected sites that depend on such waters.

11.23 The conceptual model for this Assessment Site is presented below in the form of a source-pathway-receptor 'pollution linkage' relationship to identify linkages that may be considered to be plausible. Further consideration may subsequently show them not to connect so as to form a 'significant' pollution linkage, that is, one that causes pollution of controlled waters.

11.24 The principal potential sources of contamination are:

- materials stored at the surface in the well site area;
- substances present in the drilling mud used in the drilling process;
- hydrocarbons and other contaminants present in formations encountered; and
- hydrocarbons stored on site in the event that the borehole is productive.

11.25 The potential pathways are:

- leakage of substances stored at the surface and their downward migration to contaminate groundwater in water bearing horizons;
- as above, directly via entry into the drilled borehole;

- the release of contaminants to surface water via contaminated runoff; and
- the upward escape of hydrocarbons or other contaminants to contaminate aquifers present above their point of origin:
 - during drilling;
 - during a potential production phase; and
 - post-abandonment.

11.26 The principal receptors are:

- groundwater resources in underlying aquifers;
- the off-site surface water system; and
- surface waters in hydraulic continuity with either of the above aquifers.

Baseline Conditions

Site History

11.27 The historical maps showing the Application Site area are included at **Appendix 11.1**. The land has never been other than undeveloped farmland since the earliest Ordnance Survey map of 1876.

Hydrology and Drainage

11.28 The northern boundary of the Assessment site is located approximately 50m south of Boxal Brook, which flows south-eastwards to join the River Kird at Skiff Copse. The intervening land slopes generally northwards towards the river.

11.29 Under the Water Framework Directive the Environment Agency does not classify Boxal Brook but notes the River Kird as being of Poor Ecological Quality ecologically. The chemical quality of the River Kird is unclassified.

Protected Sites

11.30 The site is in a Nitrate Vulnerable Zone and there are protected sites less than 1km from the Assessment Site. The protected sites are woodland, collectively known as The Mens, which include SSSI and Special Areas of Conservation.

Geology

Geological Setting

11.31 The Assessment Site is located on the southern side of the Weald Basin. The geological conditions are illustrated on **Figure 11.3**, which has been compiled from the British Geological Survey (BGS) 1:50,000 sheet 301 (Haslemere) and 317/332 (Chichester and Bognor) (Ref 11.7). Local geological information is provided in the Geology section of the *Envirocheck* report presented at **Appendix 11.1**.

11.32 In summary, it is an area where Lower Cretaceous Wealden Beds dip southwards towards the South Downs where they become overlain by younger Lower Greensand and Chalk sequences. Arun Terrace Deposits are present in patches to the south and south-east of the Assessment Site with 'Arun Terrace Deposits 3 Member' mapped as underlying the extreme south east corner of the Assessment Site itself. Also, there is a thin strip of alluvium associated with Boxhall Brook, which is mapped as extending as far as the northern boundary of the Assessment Site. The Wealden Beds are underlain by a progressively older sequence of Mesozoic and Palaeozoic strata.

Stratigraphy

11.33 The geological sequence to be penetrated by the proposed borehole is shown in **Table 11.1** below.

Table 11.1: Proposed Development - Expected Geological Sequence

Unit Name and Age		Estimated Drilled Depth to top of Formations Shown		Unit Thickness Penetrated		
		ft	m (rounded)	ft	m (rounded)	
Lower Cretaceous (Wealden Beds)	Hastings Beds	Weald Clay	0	0	998	304
		Upper Tunbridge Wells Sand	998	304	450	137
		Grinstead Clay	1448	441	90	27
		Lower Tunbridge Wells Sand	1538	469	100	30
		Wadhurst Clay	1638	499	250	76
		Ashdown Beds	1888	575	450	137
Upper Jurassic	Upper Purbeck Beds	2338	713	260	79	
	Middle Purbeck Beds	2598	792	285	87	
	Lower Purbeck Beds	2883	879	420	128	
	Purbeck Anhydrite	3303	1007	85	26	
	Portland Beds	3388	1033	255	78	
	Kimmeridge Clay	3643	1110	562	171	
	Upper Kimmeridge Limestone	4205	1282	275	84	
	Lower Kimmeridge Limestone	4480	1366	1398	426	
	Corallian Beds	5878	1792	300	91	
	Oxford Clay	6178	1883	430	131	
Middle Jurassic	Kellaways Beds	6608	2014	45	14	
	Cornbrash	6653	2028	60	18	
	Great Oolite	6713	2046	150	46	
	Fullers Earth	6863	2092	93	28	
	Inferior Oolite	6956	2120	350	107	
Lower Jurassic	Upper Lias	7306	2227	650	198	
	Middle Lias	7956	2425	149	45	
	Lower Lias					
Total Depth		8105	2470	-	-	

11.34 Available geological mapping shows Weald Clay to be underlying the Assessment Site and surrounding area with no superficial cover other than in the south east corner of the site where Arun Terrace Deposits may be present.

11.35 The Upper Tunbridge Wells Sand formation lies below the Weald Clay but does not crop out in this area, doing so some 10-12 km to the north-west.

- 11.36 BGS Sheet 318/333 (Brighton and Worthing) differentiates the Wealden Beds stratigraphy in more detail and by reference to this map and the BGS Lexicon it is possible to define the stratigraphy more precisely (Ref 11.8).
- 11.37 The key features are that the Tunbridge Wells Sand Formation is separated into Upper and Lower parts by the Grinstead Clay. The Lower Tunbridge Wells Sand is then underlain by the Wadhurst Clay Formation and the Ashdown Formation, the latter overlying the Purbeck Beds. Beds between the Upper Tunbridge Wells Sands and the Ashdown Beds are collectively known as the Hastings Beds, and these, combined with the Weald Clay, are referred to as the Wealden Beds.

Lithology

- 11.38 The lithological characteristics of the individual units are summarised in **Table 11.2**. The information presented is taken from regional geological mapping referenced above and associated reports.
- 11.39 The Weald Clay formation contains minor and sometimes discontinuous bands of sandstone, the location of which, in relation to the drill site, is evident on the Solid Geology map of the Envirocheck report at **Appendix 11.1**. The Assessment Site is located just south one of the sandstone units, which is mapped as being evident in the Boxal Brook cutting.

Structure

- 11.40 The geological structure is illustrated by the section shown on **Figure 11.4**. The shallower rock sequence represented by the Wealden Beds dips gently southwards to pass beneath the South Downs.

Locally, the Weald Clay is subject to minor faulting to the north-west and north-east of the Application Site. This faulting affects the minor sandstone units that form part of the Weald Clay sequence.

Table 11.2: Lithological Descriptions

Stratigraphic Unit	Lithological Description
Weald Clay	Pale to dark grey clay or mudstone, locally with subordinate lenticular sandstone and limestone layers.
Upper Tunbridge Wells Sand	Interbedded siltstone, silty mudstone and sandstone.
Grinstead Clay	Principally shale and mudstone.
Lower Tunbridge Wells Sand	Coarse-grained quartzose sandstone overlying interbedded siltstone and sandstone, becoming increasingly argillaceous with depth.
Wadhurst Clay	Brick red, brown, or grey-green claystone.
Ashdown Beds	Fine-grained silty sandstone and mudstone (claystone)
Upper Purbeck Beds	Calcareous claystones, grading to silty claystone.
Middle Purbeck Beds	White to light grey limestone.
Lower Purbeck Beds	Interbedded limestone and claystone.
Purbeck Anhydrite	White to translucent anhydrite.
Portland Sandstone	Firm to moderately hard fine grained sandstone or siltstone.
Kimmeridge Clay	Thick sequence of moderately calcareous and silty claystone with thin limestone stringers.
Corallian Beds	Argillaceous limestone grading to calcareous claystone, interbedded with siltstone, sandstone and thin limestone stringers.
Oxford Clay	Thick claystone with stringers of limestone.
Kellaways Beds	Thick sequence of fine-grained sandstones which are locally glauconitic.
Cornbrash	Shelly micritic limestone and minor claystone.
Great Oolite (including Forest Marble)	Oolitic limestone with argillaceous laminations, grading to calcareous claystone.
Fullers Earth	Calcareous claystone with thin argillaceous limestones.
Inferior Oolite	Shelly limestone, calcareous mudstone and sandy limestone.
Upper Lias	Calcareous mudstone and shale.
Middle Lias	Micaceous mudstone grading upwards into siltstone, sandstone and limestone.
Lower Lias	Alternating shale, mudstone and limestone.
Triassic	Mercia Mudstone overlying Sherwood Sandstone and the Rhaetic.
Palaeozoic	Not known.

Hydrogeology

The Aquifer System

11.41 The stratigraphy and lithology summarised in **Tables 11.1** and **11.2** results in the aquifer system presented in **Table 11.3** below. The Aquifer Designations accord with the latest Environment Agency Groundwater Protection Policy (GP3). Under the Water Framework Directive, groundwater in the Weald Clay is unclassified chemically or quantitatively, which is indicative of its general status as unproductive strata.

11.42 The geological structure is such that the proposed exploratory borehole:

- will not encounter the Upper Tunbridge Wells Sand until a drilled depth of approximately 304 m depth has been reached; but
- may penetrate the Secondary Aquifers formed by the sandstone and limestone lenses within the Weald Clay.

Groundwater Levels and Flow

11.43 There are no data on groundwater levels and flow in the area. However it may be inferred from an assessment of geological mapping, lithological data, topography and drainage that:

- the Weald Clay materials directly beneath the drill site are likely to be characterised by a low overall permeability with little deep infiltration of rainfall and shallow down-slope interflow only;
- groundwater in the superficial deposits and in the Secondary Aquifer sandstones in the Weald Clay:
 1. is locally recharged and unconfined at outcrop with subsequent down-dip flow into a confined zone;
 2. is characterised by a low overall throughput of water;
- groundwater in the deeper Secondary Aquifers, starting with the Upper Tunbridge Wells Sand:
 3. will be recharged on the outcrop area, which is some 10-12 km to the north east and beyond;
 4. will flow southwards according to the regional dip of the strata; and
 5. has no practical connection with groundwater beneath the site or through which the proposed hydrocarbon exploratory borehole will penetrate.

11.44 Regarding the southerly groundwater flow in the deeper Secondary Aquifers, the actual depth of the aquifers beneath the drill site may be such that there is little actual groundwater movement in that area. Hydrochemical processes may then be such that the groundwater is of poor quality.

Table 11.3: The Aquifer System

Stratigraphic Unit	Aquifer Designation	Inferred or Recorded Aquifer Characteristics
Weald Clay Formation	Mostly unproductive strata but includes minor sandstones and limestone which are given Secondary A status (formerly designated a minor aquifer of low vulnerability)	Sandstone inferred to have moderate primary and secondary porosity and permeability with resource value constrained by limited lateral extent.
Upper Tunbridge Wells Sand	Secondary A	Recorded as sandstone and siltstone. Presumed in parts to have moderate to high primary and secondary porosity and permeability.
Grinstead Clay	Unproductive strata	
Lower Tunbridge Wells Sands	Secondary A	Recorded as sandstone and siltstone. Presumed in parts to have moderate to high primary and secondary porosity and permeability.
Wadhurst Clay	Mostly unproductive strata but includes minor sandstones and limestone which are given Secondary A status	Sandstone inferred to have moderate primary and secondary porosity and permeability with resource value constrained by limited lateral extent.
Ashdown Beds	Sands and sandstone layers are given Secondary A status	Sandstone inferred to have moderate primary and secondary porosity and permeability with resource value constrained by limited lateral extent.
Purbeck Beds	Formations below this depth (i.e. > 700m begl) are generally not recognised as aquifers in this region, being too deep to exploit and likely to contain poor quality groundwater	Mostly low permeability argillaceous formations not used as aquifers.
Purbeck Anhydrite		
Portland Sandstone		
Kimmeridge Clay		
Corallian Beds		
Oxford Clay		
Kellaways Beds		
Cornbrash		
Great Oolite		A Principal Aquifer outside of this region, whose aquifer properties are mainly dependent on extensive secondary porosity and permeability which is unlikely to be extensively developed at the depth at which it occurs below the Wisborough Green area (> 2100m begl).
Fullers Earth		Mostly low permeability argillaceous formations not used as aquifers.
Inferior Oolite		
Upper Lias		
Middle Lias		
Lower Lias		

Groundwater Utilisation

11.45 Data contained in the Envirocheck Report at **Appendix 11.1** indicate there to be no licensed groundwater abstractions within 2km of the Assessment Site boundary. However, the BGS Geindex (Ref 11.9) shows a 30m+ deep borehole to be present at Sparrs Farm, some 600m north-east of the Application site. The borehole is either disused or is an unlicensed private water supply. Water Well locations are shown on **Figure 11.6**.

Groundwater Vulnerability

11.46 The Groundwater Vulnerability Map for the area (Sheet 45, West Sussex and Surrey) indicates the entire site to be underlain by a Minor Aquifer of High Vulnerability (Ref 11.10). The more recent aquifer designation system locates the site on Unproductive Strata which accords better with the geological mapping.

Likely Significant Effects

11.47 Potential effects have been assessed sequentially in accordance with the Significance Matrix table presented earlier (**Table 2.2**) and in relation to the proposed phasing of the Proposed Development.

Phase 1: Construction of the access road and well site

11.48 Compared to baseline conditions, these works will slightly reduce soil moisture due to reduced recharge and interception of runoff and/or interflow from upstream.

11.49 However considering the small size of the site in relation to the overall catchment area, the effects in terms of either groundwater quantity or quality are expected to be negligible.

Phase 2: Mobilisation and drilling*Land Contamination at the drill site and release of contaminated runoff*

- 11.50 This is a potentially adverse effect involving uncontrolled surface release (i.e. spillages) of contaminative substances used in connection with the drilling works (chemical additives, lubricants etc.), however caused. This process potentially leads to ground contamination, groundwater contamination, and surface water contamination following the off-site migration of run-off from rainfall.
- 11.51 The potentially adverse effect would be direct, short term, but local only, and therefore the Scale of the Effect is Low. The potential magnitude of the effect is considered to be medium because of downstream water pollution impacts and the overall significance is therefore moderate/minor.

Contamination of aquifers during drilling

- 11.52 This is a potentially adverse effect caused by the release of drilling fluids into aquifers during drilling and their onward migration to water wells and surface waters. The effect is direct and short to medium term because of the slow sub-surface migration of contaminants.
- 11.53 **Figure 11.5** is a diagram showing the well construction details. Drilling as far as the Upper Purbeck will be accomplished using fresh water. On completion of drilling to this depth the well will be cased and cemented, thus preventing contact between formations above the Upper Purbeck (i.e. the potential aquifers) and subsequent drilling fluids or production hydrocarbons.
- 11.54 As the contingent lateral hole drilling all takes place below the Upper Purbeck, such drilling imparts no additional risk to the potential aquifers above this depth.

- 11.55 Hydrogeological conditions are such that the anticipated Scale of the Effect of either the vertical well or the lateral hole contingency are Low and the magnitude of the effect is also Low. The overall significance is therefore Minor.

Accidental Release of contaminants into the borehole during drilling

- 11.56 This is a potentially adverse effect similar to the above caused by the spillage and release of chemicals (in storage at the site) into the aquifer during drilling, and their onward migration to water wells and surface waters. The effect is direct and short to medium term because of the slow sub-surface migration of contaminants.
- 11.57 Again, hydrogeological conditions are such that the anticipated Scale of the Effect is Low and the magnitude of the effect is also Low. The overall significance is therefore Minor.

Phase 3a/b: Testing (gas and oil)

- 11.58 There are no additional significant effects associated with Phase 3 that are not evaluated under Phases 1 and 2 activities mentioned above. The effect of stored chemicals for use in drilling fluids is replaced by the temporary storage of hydrocarbons, the effect which is evaluated below.

Land Contamination at the drill site and release of contaminated runoff

- 11.59 The potential for land contamination at the drill site and release of contaminated runoff at this stage is mainly associated with the temporary storage of hydrocarbons extracted from the borehole. This is a potentially adverse effect which could lead to ground contamination, groundwater contamination, and surface water contamination following the off-site migration of run-off from rainfall.
- 11.60 The effect would be direct, short term, but local only, and therefore the Scale of the Effect is Low. Because of the potential surface water impact and the potential onward

connection to watercourses of more significance, the Magnitude of the Effect is assessed as Medium so the overall significance is Moderate/Minor.

Phase 3a: Extended Testing (gas and oil)

11.61 In the event that the initial short term testing provides encouraging results, Celtique may decide to run an Extended Well Test (EWT) which could run for up to 180 days. In respect of potential risk to controlled waters it may be noted that such a proposal would incorporate:

- Storage tanks for produced oil and formation water but contained within in a banded area;
- An oil/water/gas separator for the separation of the produced well stream also contained within the banded area;
- Transfer pumps to transfer fluids between the storage tanks and also to road tankers for export.

11.62 In practice there are no additional significant effects associated with the extended testing proposals that are not evaluated under Phases 1 and 2 activities mentioned above, where the effect of stored chemicals for use in drilling fluids is replaced by the temporary storage of hydrocarbons for a more extended period.

11.63 The potential for land contamination is an adverse effect which could lead to ground contamination, groundwater contamination, and surface water contamination following the off-site migration of run-off from rainfall.

11.64 The effect would be direct, still relatively short term, and local only, and therefore the Scale of the Effect is Low. Because of the potential surface water impact and the potential onward connection to watercourses of more significance, the Magnitude of the Effect is assessed as Medium so the overall significance is Moderate/Minor.

Phase 4a: Restoration*Contamination of aquifers following abandonment*

- 11.65 At whatever stage the borehole is abandoned, the potential exists for upward migration of saline waters and hydrocarbons etc. into aquifers. This is a potentially long-term adverse effect.
- 11.66 Despite the hydrogeological conditions, in theory, if the escape of these contaminants continued uninterrupted, widespread contaminant migration is a possibility such that the anticipated Scale of the Effect may be regarded as Medium. However, the lack of a reliance on groundwater is such that the magnitude of effect criterion is no more than Medium. The overall significance is therefore assessed as Moderate.

Phase 4b: Retention

- 11.67 In the event of retention of the well site as hydrocarbon production and storage facility, some of the adverse effects mentioned in respect of Phases 1-3 would be maintained in the long term and one new effect will arise. The retained effects and the additional effects are as follows:

Land Contamination at the drill site and release of contaminated runoff

- 11.68 The potential for land contamination at the drill site and release of contaminated runoff is now mainly associated with the long-term storage of hydrocarbons extracted from the borehole. This is a potentially adverse effect which potentially leads to ground contamination, groundwater contamination, and surface water contamination following the off-site migration of run-off from rainfall.
- 11.69 The effect would be direct, long-term, but local only, and therefore the Scale of the Effect is Low. Because of the potential surface water impact and the potential onward

connection to watercourses of more significance, the Magnitude of the Effect is assessed as Medium so the overall significance is Moderate/Minor.

Mitigation Measures

Phase 1: Construction of the access road and well site

11.70 There are no significant effects during Phase 1 that require mitigation.

Phase 2: Mobilisation and drilling

Land Contamination at the drill site and release of contaminated runoff

11.71 As part of site preparation, all parts of it will be underlain by a High Density Polyethylene (HDPE) liner placed on compacted and levelled 6F2 foundation material.

11.72 In addition, all drilling fluid additives will be stored in a designated bunded area. These arrangements restrict the likelihood of spillages and leaks occurring prevent them contaminating the natural ground present beneath the drill site.

11.73 The site boundaries are a ditch system that that leads to a Class 2 Interceptor so that only uncontaminated run-off water is released from the drill site area. These mitigation measures, such as the size of the interceptor, are to be finalised as part of detailed design.

Contamination of aquifers during drilling

11.74 A possible effect of the drilling is migration of the drilling fluids into the rock formations through which the borehole penetrates. In respect of the sandstones in the Wealden Beds that are locally exploited there is an inherently low likelihood of this process occurring to any extent because they are thin, frequently discontinuous, and relatively

low permeability. However, deeper geological units such as limestones in the Jurassic strata may have a higher permeability.

11.75 Several factors are incorporated into the design (i.e. the drilling works specification) mitigate this risk, the principal ones being:

- use of a water-based drilling mud with non-toxic additives;
- control of the mud-balance such that lost circulation and invasion of the formations penetrated is minimal; and
- the very short-term exposure of the formation to the drilling mud, given that the hole is quickly cased after drilling.

Accidental release of contaminants into the borehole during drilling

11.76 The HDPE membrane will be sealed around the concrete rings forming the well-head cellar, which will prevent ingress of contaminated surface water.

Phase 3a/b: Short Term and Extended Testing (gas and oil)

Land Contamination at the drill site and release of contaminated runoff

11.77 The Phase 2 mitigation measures described above will continue into Phase 3 (for both gas and oil). The mitigation measures take into account the possibility of extended testing as described earlier.

Accidental release of contaminants into the borehole during testing

11.78 The Phase 2 mitigation measures described above applicable to drilling will continue into Phase 3 testing (for both gas and oil).

Phase 4a: Restoration*Contamination of aquifers following abandonment*

11.79 Prior to abandonment the well will be fitted with cement plugs to prevent fluid movement between horizons. The theoretical risk of deterioration of the casing and screen, thereby linking the hydrocarbons to the aquifers, will be mitigated by using best practice-industry standards as follows:

- perforated casing sections in the production zones will be plugged with cement, thereby preventing the escape of residual hydrocarbons left in the reservoir (noting that, by that time, production will have removed most of the hydrocarbons present);
- the cement plugs and cement used in the casing will be placed in neutral pH environments, thereby minimising the risk of attack by acidisation;
- where necessary, sulphate-resistant cement will be used to minimise the risk of sulphate attack; and
- the steel casings will be protected:
 - externally by the cement lining; and
 - internally by creation of a pH neutral environment and the development of anaerobic conditions.

Phase 4b: Retention

11.80 The Phase 2 mitigation measures described above applicable to drilling will continue into Phase 4b: Retention (for both gas and oil), should such circumstances arise.

Residual Effects

11.81 In respect of the potentially adverse effects identified, following implementation of the proposed mitigation measures, no significant residual effects are anticipated, i.e. all will become negligible.

Cumulative Effects

11.82 Cumulative and interactive effects have been assessed in accordance with the EIA Methodology described in **Chapter 2**. There are no anticipated cumulative or interactive effects connected with ground or groundwater contamination once the mitigation measures have been implemented.

Summary

11.83 The Proposed Development is to be drilled through a geological sequence that is well-defined and understood. The inferred and recorded hydrogeological conditions accord with groundwater licensing records to indicate that there are no major aquifers present and no local reliance on groundwater for water supplies.

11.84 The risk of groundwater pollution is therefore inherently low but is reduced further by the incorporation of mitigation measures such as use of water-based, non-toxic drilling fluids etc., which are industry standard. This risk assessment applies to both the vertical well and the lateral contingent. Well abandonment proposals will ensure no such risk exists in the long-term.

11.85 The risk of local ground and surface water contamination will be removed by well-engineered site preparation, including the use of HDPE linings and the capture of all surface runoff via an interceptor ditch system. A summary of the effects, their significance and proposed mitigation is included below in **Table 11.4**.

Table 11.4: Wisborough Green Site: Table of Significance

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)	Mitigation Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	D	L	
Phase 1: Construction of Access Road and Well Site											
Loss of soil moisture and reduced recharge	Temporary	Negligible	None required							✓	Negligible
Impairment of groundwater quality	Temporary	Negligible	None required							✓	Negligible
Phase 2: Mobilisation of the drill rig and drilling operations											
Land contamination at the drill site and release of contaminated run off (all potential sources)	Temporary	Moderate/Minor	Placement of HDPE line across site and creation of lined ditches leading to interceptor.							✓	Negligible
Consequential effect on protected areas	Temporary	Negligible	Arrangements as above plus distance to nearest protected area.							✓	Negligible
Contamination of aquifers during drilling.	Temporary	Minor	Short duration of work on uncased shallow aquifers, mud balance control to reduce formation entry and use of non-toxic drilling fluids							✓	Negligible
Accidental release of contaminants during drilling	Temporary	Minor	HDPE liner is sealed around well cellar preventing entry of spilled contaminants into the borehole							✓	Negligible
Phase 3a: Short-term testing and evaluation (Oil and/or Gas)											
Land contamination at the drill site and release of contaminated run off (all potential sources)	Temporary	Moderate/Minor	Placement of HDPE liner across site and creation of lined ditches leading to interceptor.							✓	Negligible
Phase 3b: Extended testing											
Land contamination at the drill site and release of contaminated run off (all potential sources)	Temporary	Moderate/Minor	Placement of HDPE liner across site and creation of lined ditches leading to interceptor.							✓	Negligible
Phase 4a: Restoration											
Contamination of aquifers following well abandonment	Permanent	Moderate	Sealing of well using cement plugs and use of corrosion-resistant materials.							✓	Negligible

Phase 4b: Retention											
Contamination of controlled waters as a result of hydrocarbon spillages	Temporary	Moderate/Minor	Placement of HDPE line across site and creation of lined ditches leading to interceptor.							✓	Negligible
<p>* Geographical Importance</p> <p>I = International; UK = United Kingdom; E = England; R =Regional; C = County; D = District; L = Local</p>											

References (Ref)

- 11.1 European Parliament and Council. The Water Framework Directive. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000
- 11.2 Department for Communities and Local Government, 2012. National Planning Policy Framework
- 11.3 UK Statute Law Database. Water Resources Act, 1991. Official Text
- 11.4 West Sussex County Council, 2003. Minerals and Waste Policy. Minerals Local Plan
- 11.5 Chichester District Council 1999. Local Plan
- 11.6 Environment Agency/DEFRA, 2004. Contaminated Land Report (CLR) 11. Model Procedures for the Management of Land Contamination
- 11.7 British Geological Survey 1:50,000 Geological Maps 301 (Haslemere) and 317/332 (Chichester and Bognor)
- 11.8 British Geological Survey 1:50,000 Geological Map 318/333 (Brighton and Worthing)
- 11.9 BGS (2013) Website Geindex (water wells). www.bgs.au.uk
- 11.10 Environment Agency/BGS Groundwater Vulnerability Map Sheet 45, West Sussex and Surrey

12.0 LIGHTING

Introduction

- 12.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of the proposed lighting that will be installed
- 12.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Application Site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed. This chapter has been prepared by Royal HaskoningDHV.

Planning Policy Context

National Planning Policy

National Planning Policy Framework (Ref 12.1)

- 12.3 The National Planning Policy Framework sets out the Government's planning policies for England and how these are expected to be applied.
- 12.4 Section 11 addresses 'conserving and enhancing the natural environment' and states that:

"The planning system should contribute to and enhance the natural and local environment by: preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of....pollution"

Clean Neighbourhoods and Environment Act (CNEA) 2005 (Ref 12.2)

- 12.5 The Clean Neighbourhoods and Environment Act 2005 (Sections 101-103) is the only UK legislation in existence which applies some statutory regulation over the environmental impact of light pollution and nuisance glare. This act extended the statutory monitoring and enforcement duties of WSCC as the local environmental health authority to include monitoring and enforcement of nuisance glare. The Act requires the environmental health authority to complete periodic assessment to identify:

“Artificial light emitted from premises [where]... prejudicial to health or a nuisance”.

Local Planning Policy

Chichester District Council Local Plan (1999) (Ref 12.3)

- 12.6 The Chichester District Council Core Strategy is due for Public Consultation from August to September 2012. The Local Plan is currently the development plan for the District. The Chichester District Local Plan does not contain any specific policies relating to lighting.

West Sussex Minerals Local Plan (2003) (Ref 12.4)

- 12.7 The West Sussex Local Plan does not contain any specific policies relating to lighting. However the Plan does contain “saved” policies (policies 10-22) that are relevant for the Proposed Development and aim to protect the environment. The Minerals Local Plan also contains a policy relating directly to the potential exploration of oil and gas (Policy 26) which states that the Local Authority will pay particular attention to the means of protecting nearby residents and amenities from the effects of the operations.

West Sussex Minerals and Waste Core Strategy (2007) (Ref 12.5)

12.8 The West Sussex Minerals and Waste Core Strategy covers the period to 2021 sets out a vision, strategic objectives, a strategy for minerals and waste planning, and a monitoring and implementation framework. It also contains policies against which proposals for minerals and waste development will be assessed. The Core Strategy includes one policy relating to lighting (Policy CSG8: Public Amenity) and states that proposals for mineral and waste development will be permitted provided that:

“Appropriate measures are incorporated to control the impact of lighting”

Design Guidance

12.9 Relevant design guidance includes the following documents:

- BS-EN 12464-2:2007 – Lighting of work places. Outdoor work places (Ref 12.6).
- Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:1992 – Outdoor Environment (Ref 12.7). This document provides guidance on workplace lighting requirements.
- Defra (2001) Lighting in the Countryside: Towards Good Practice (Ref 12.8). The guide covers all forms of lighting, including lighting for mineral extraction and lighting of rural roads, junctions, services and parking areas. Its key objectives are to identify good practice in the planning and design of lighting in rural areas, and to advise on how it can be achieved.
- Institution of Lighting Professionals (ILP formerly ILE) Guidance Notes for the reduction of Light Pollution. This is particularly relevant to the design of lighting for rural areas (Ref 12.9). This guidance is used to inform designers of the necessity to minimise light spill from developments, and provides guidance on good practice in use; and
- The Health and Safety at Work Act 1974 (Ref 12.10). This indicates the need to provide lighting for the safe transit and operations around the site.

Guidance for lighting effects on bats

12.10 Bats are protected by the Wildlife and Countryside Act (1981) (Ref 12.11) and the Conservation of Habitats and Species Regulations 2010 (Ref. 12.12). This makes it illegal to kill, injure, capture or disturb bats, obstruct access to bat roosts or damage/destroy bat roosts. Lighting in the vicinity of a bat roost causing disturbance could constitute an offence. There is no legislation relating directly to lighting effects on bats; however, there is a guidance document produced by the Bat Conservation Trust (Ref 12.13). The Bat Conservation Trust Guidance states that no bat roost (including access points) should be directly illuminated. If it is considered necessary to illuminate an area known to be used by roosting bats, the lights should be positioned to avoid the sensitive areas. It also states that the height of lighting should be as low as possible. The times during which the lighting is on should be limited to provide some dark periods. Roads or trackways in areas important for foraging bats should contain stretches left unlit to avoid isolation of bat colonies. These unlit stretches should be 10 metres in length either side of commuting route.

12.11 Lighting is not specifically mentioned in planning policies and therefore they do not have a specific implication for the Proposed Development. However regional and local planning documents do have specific policies relating to the protection of the landscape and the environment and the Proposed Development should comply with the planning policy or provide suitable mitigation for any potential effects of the proposed lighting. Any potential effects on bats are discussed in the Ecology Chapter (**Chapter 7**).

Assessment Methodology

General Approach

12.12 A site visit was conducted on 28th February 2013 to ascertain the context of the study area by day and night. This included noting existing sources of illumination. An assessment of relative heights between the Application Site and the local landscape including any existing adjacent properties or structures was made whilst on site.

12.13 The site survey was conducted by assessing the strategic views from the Application Site to the adjacent areas along with any relative views towards the Application Site from adjacent roadways and properties. The photographs utilised are relative to these views selected. They are not 'stitched' panoramic scenes and are not to the same scale. They are used to give context to the lighting assessments.

12.14 Relative heights for photographs include the 1.7m 'eye level' height and have been indicated to the nearest metre. They are not intended as absolutes, but are designed to provide some context relevant to the day and night views illustrated. Distances are similarly quoted to a point roughly central to the Application Site. These are provided using Google Earth for general context and are not intended as absolutes.

12.15 Night-time photographs cannot be compared between different Receptors, owing to differing ambient lighting conditions, exposure times and light sensitivity settings, as well as differing weather and atmospheric conditions.

12.16 General camera settings were left as normal, with auto white balance. No post-processing of photographs has been carried out, other than:

- Amending orientation if needed;
- Cropping to letterbox format; and
- Reduction of JPEG sizes for printing purposes within the Word document.

12.17 Following the site visit, an assessment was made of the effects that the Proposed Development lighting may have on the local landscape, including any potential alterations to longer distance views towards the Application Site. The survey/assessment was made of potential areas/views that may be affected by the proposed lighting.

Significance criteria

12.18 The significance criteria used are those outlined in the methodology chapter (**Chapter 2**). The significance level attributed to each impact has been assessed based on the

magnitude of change due to the Proposed Development, and the sensitivity of the affected receptor/receiving environment to change. The criteria used to determine the “significance” of any change in baseline lighting levels have been defined qualitatively using professional judgement and best practice guidance. The lighting assessment has been based on “Lighting in the Countryside: Towards Good Practice” (Ref 12.8).

Summary of Terms

12.19 A summary of the terms used in the following sections is provided in **Table 12.1**.

Table 12.1: Summary of Terms

Term	Definition
Atmospheric Conditions (for Aura / Sky Glow)	The amount of particle pollution and presence of moisture and other gases in the atmosphere. Light is scattered by the particles and that coming back to an observer below causes the veiling effect of Sky Glow.
Aura	Localised halo of light above a lit area, caused by direct upward light or reflections from the ground and other surfaces. More obvious where light units are grouped relatively close together and / or of high power.
Sky Glow	Wide area of night sky scattering direct and indirect upward light back to an observer. Depends on atmospheric conditions and the amount of upward light. Very typical above urban areas.
Environmental Zone E1 – E4	A classification method developed by the ILE to match appropriate lighting controls to the local environment e.g. an E1 Zone is an ANOB and an E4 Zone a City Centre area

Baseline Conditions

Landscape by Day

- 12.20 The location of the Application Site is described in Chapter 3. The Application Site lies in an area of rural landscape surrounded by woodland and agricultural land accessible from the Kirdford Road. Wisborough itself is situated approximately 1.5km to the west of the Application Site. The site lies approximately 14.25km west of Horsham Town with the nearest City being Chichester, situated approximately 28km south west of the Application Site.
- 12.21 The Application Site is 1.65ha. The Application Site is located north of the South Downs National Park and is not within an Internationally designated site (Special Protection Area, Special Area of Conservation or Ramsar) or a nationally designated site (Sites of Scientific Special Interest and National Nature Reserve). The field in which the Application Site is situated is surrounded by woodland, some of which is designated as ancient woodland. To the east of the Application Site there is a pond, along with a watercourse in close proximity, located to the east of the Application Site at Boxal Bridge.
- 12.22 Directly to the east of the Application Site is the dense area of woodland of Dunhurst Copse, however the southern and eastern boundaries remain open the area of agricultural land adjacent to the Application Site.
- 12.23 There are a number of residential, agricultural properties/businesses properties within the locality of the Application Site, however other than the large barn located directly adjacent to the Application Site, these are generally not visible from the Application Site itself owing to the tree cover around the perimeter.
- 12.24 The survey was undertaken in the winter and despite the loss of leaves from the deciduous trees and hedgerows, there was significant tree cover. It should therefore be taken into consideration that during the spring and summer months increased cover shall be provided affording to the fact that the trees/hedgerows will be in full bloom with

increased foliage. The increased cover shall further restrict views onto and from the Application Site, over and above that shown in the photographs contained within this Chapter.

Landscape by Night

- 12.25 The rural nature of the immediate vicinity is confirmed by night. The Application Site itself and the surrounding woodland/farmland are in total darkness.
- 12.26 The local network of “B” roads and country lanes has no street/road lighting. There are localised areas of lighting affording to private developments and residential properties within Wisborough Green and its surrounding agricultural and business properties.
- 12.27 Due to the fact that the Application Site is fully enclosed by trees/woodland the longer distance views looking out from the Application Site are largely restricted. As such there are no visible lighting units within the vicinity of the Application Site.

Visual Assessment during the day

- 12.28 The lighting visual assessment has been undertaken separately to the Landscape and Visual Assessment presented in Chapter 8, as this assessment is streamlined to ensure it remains relevant to making an assessment of the likely effect of lighting. Discussions were undertaken with the Landscape architect prior to the assessment to identify the most sensitive receptors and viewpoints and to ensure that the approach taken to the lighting assessment was aligned to that used for landscape and visual impact assessment.
- 12.29 Viewpoints have generally been selected in accordance with the landscape assessment and the viewpoints detailed on **Figures 8.5** and **8.6** in **Chapter 8**. However views have been rationalised and lighting has been assessed from those views from which the site itself or parts of the exploration rig are visible, or those areas which are highlighted as sensitive receptors.

12.30 Where possible viewpoints have been selected to give representative views from the North, South, East and West towards the Application Site.

12.31 A summary of each viewpoint and its geographical location relative to the Application Site is given below in accordance with those viewpoints illustrated In the Landscape and Visual Impact Assessment in Chapter 8 (**Figures 8.5 and 8.6**);

- Viewpoint 1 - Views from the proposed entrance to the Application Site from Kirdford Road.
- Viewpoint 4 - Views from the east along Kirdford Road Looking West towards the Application Site entrance.
- Viewpoint 5 - Views from the east along Kirdford Road Looking West towards the Application Site entrance.
- Viewpoint 8 – Views from the west along Kirdford Road looking east towards the Application Site
- Viewpoint 17 – Views from the south-west of the Application Site, along the A272 adjacent to Bulchins Copse
- Viewpoint 25 – Views from the west of the Application Site, along Kirdford Road opposite the entrance to Whiffletree Farm/Normandie Stud.
- Viewpoint 32 – Views from the north of the Application Site along the PRoW at Walthurst Farm.
- Viewpoint 38 – Views from the north-east of the Application Site from the edge of Bittles Wood along Durbans Road
- Viewpoint 45 – Views from the south of the Application Site along the A272 Petworth Road
- Viewpoint 48 – Views from the east of the Application Site along the Kirdford Road

Viewpoint 1 – Views from the proposed entrance to the Application Site from Kirdford Road (**Plate 12.1**).

Relative Height: + 4m

Distance: 0m from site entrance



Plate 12.1

12.32 **Plate 12.1** shows an open view across agricultural land, onto the proposed Application Site access road along Kirdford Road. The Application Site itself is located out of view beyond the barn and row of trees to the left of the image.

Viewpoint 4 - Views from the east along Kirdford Road looking west towards the Application Site entrance (**Plate 12.2**).

Relative Height: - 2m

Distance: 100m from site Entrance



Plate 12.2

12.33 **Plate 12.2** shows a view looking towards the Application Site entrance along Kirdford Road. The Application Site entrance lies within a slightly elevated position, partially screened by the trees as indicated on the image above. There are no direct views of the Application Site itself from this location as it lies to the east of this view and is screened by dense woodland of Dunhurst/Northop Copse.

Viewpoint 5 - Views from the east along Kirdford Road looking west towards the Application Site entrance (**Plate 12.3**).

Relative Height: - 2m

Distance: 140m from site



Plate 12.3

12.34 **Plate 12.3** shows a view looking towards the Application Site Entrance along Kirdford Road. The Application Site entrance lies within a slightly elevated position, partially screened by the trees as indicated on the image above. There are no direct views of the Application Site itself from this location as it lies to the east of this view and is screened by dense woodland of Dunhurst/Northop Copse.

Viewpoint 8 – Views from the west along Kirdford Road looking east towards the Application Site (**Plate 12.4**).

Relative Height: + 2m

Distance: 500m from site



Plate 12.4

12.35 **Plate 12.4** shows a view looking towards the Application Site from the east along Kirdford Road. The Application Site is partially visible from this location although it is largely screened by the hedgerows which line Kirdford Road as indicated on the image above.

Viewpoint 17 – Views from the south west of the Application Site along the A272 adjacent to Bulchins Copse (**Plate 12.5**).

Relative Height: +17m

Distance: 2.2km from site



Plate 12.5

12.36 **Plate 12.5** shows an obstructed view from the A272 to the south west of the Site. As can be seen in the image, any views of the Application Site are restricted by the residential property, trees and hedgerows within the immediate view. There are no direct views of the Application Site from this location due to its relative distance from the site along with the restrictions identified.

Viewpoint 25 – Views from the west of the Application Site along Kirdford Road opposite the entrance to Whiffletree Farm/Normandie Stud (**Plate 12.6**).

Relative Height: + 6m

Distance: 1.7km from site

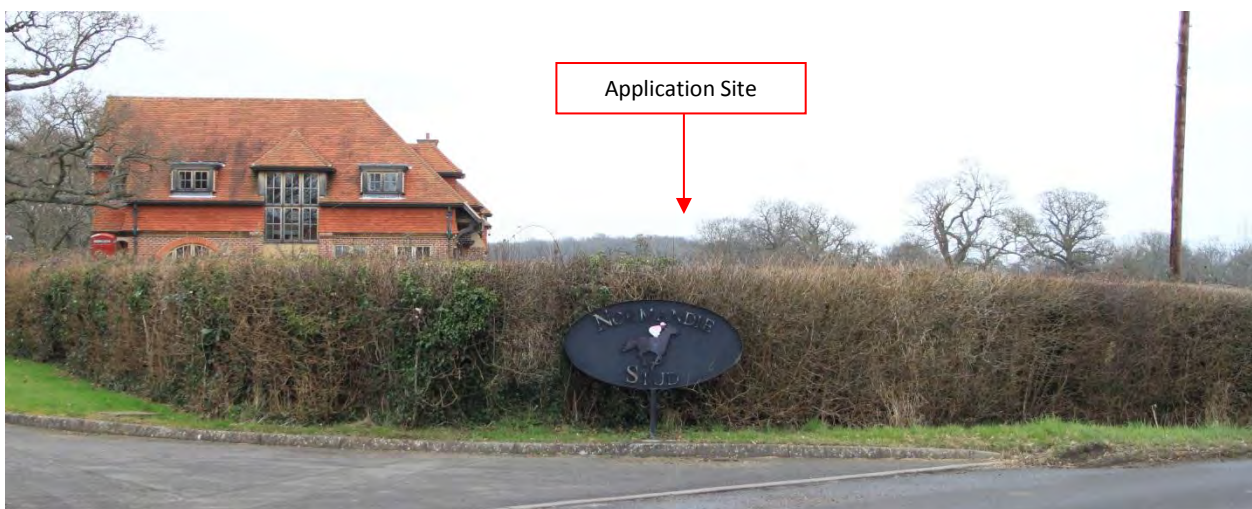


Plate 12.6

12.37 **Plate 12.6** illustrates the views from Kirdford Road, south of Kirdford itself, located to the west of the Application Site. There are no direct views of the Application Site from this location due to its relative distance from the site and the presence of hedgerows/trees within the immediate and middle distance views between the viewpoint and the site itself.

Viewpoint 32 – Views from the north of the Application Site along the PRow at Walthurst Farm (**Plate 12.7**).

Relative Height: + 20m

Distance: 2.4km from site

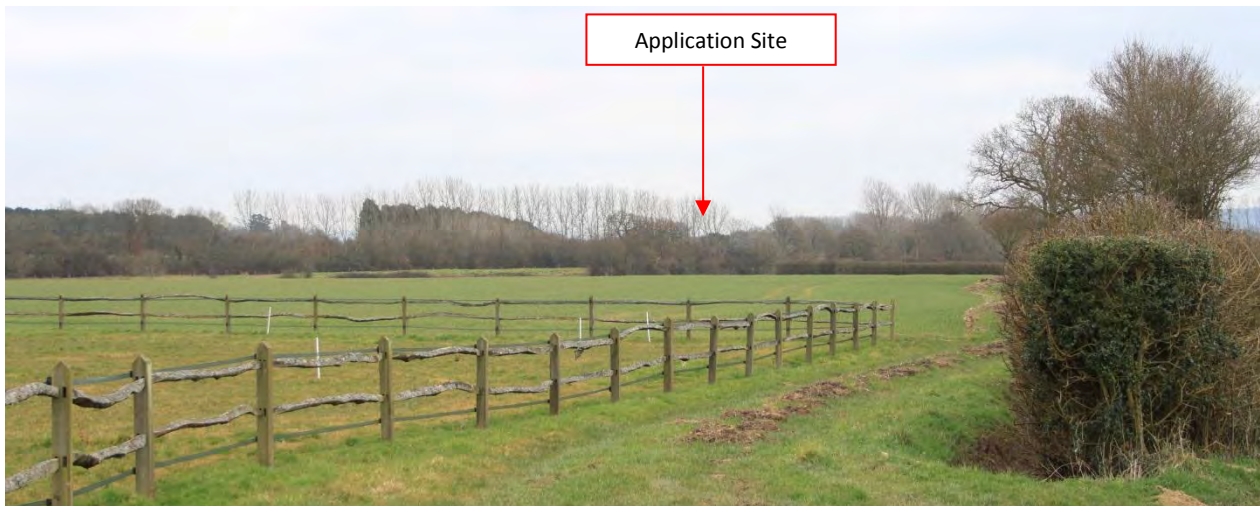


Plate 12.7

12.38 **Plate 12.7** shows the representative views towards the Application Site from the PRoW located north of the Site at Walthurst Farm. From this location there are open views across the agricultural land within the immediate view. However, there are no direct views of the Application Site from this location due to its relative distance from the site along with the dense area of woodland of Dunhurst Copse between the viewpoint and the Application Site.

Viewpoint 38 – Views from the north-east of the Application Site from the edge of Bittles Wood along Durbans Road (**Plate 12.8**).

Relative Height: + 15m

Distance: 1.8km from site



Plate 12.8

12.39 **Plate 12.8** represents the views towards the Application Site from the north-east of the Site from the edge of Bittles Wood along Durbans Road. From this location there are open views across the agricultural land within the immediate view. However, there are no direct views of the Application Site from this location due to its relative distance from the site along with the dense area of woodland of Dunhurst Copse between the viewpoint and the Application Site.

Viewpoint 45 – Views from the south of the Application Site along the A272 Petworth Road (**Plate 12.9**).

Relative Height: - 5m

Distance: 1.2km from site

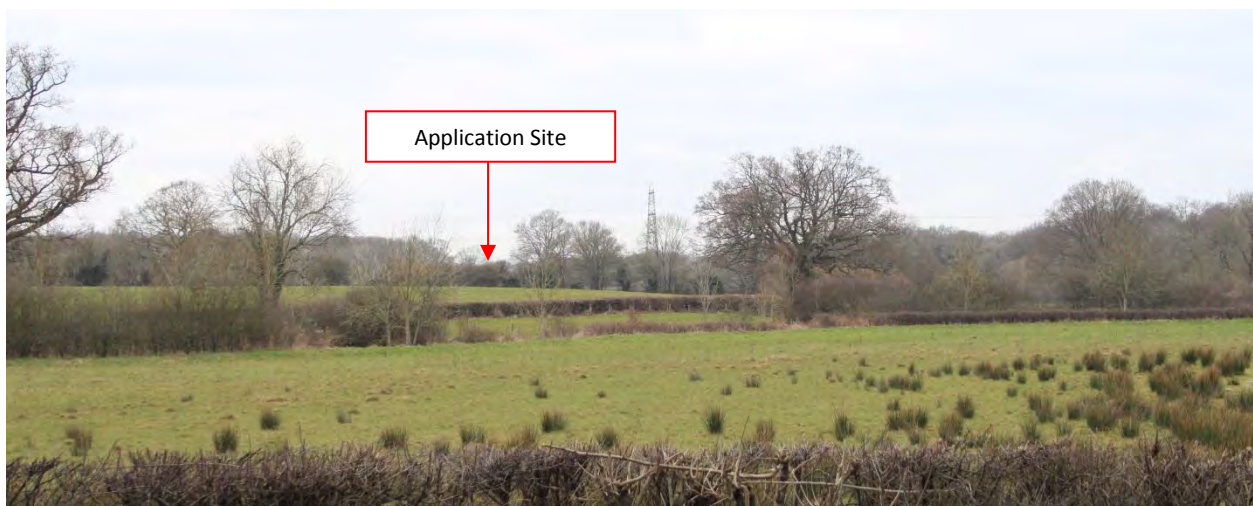


Plate 12.9

12.40 **Plate 12.9** represents the views across open agricultural land towards the Application Site from the A272 Petworth Road located south of the Application Site. There are no direct views of the Application Site from this location due to its relative distance from the site along with the various trees and hedgerows between the viewpoint and the Application Site.

Viewpoint 48 – Views from the east of the Application Site along the Kirdford Road (**Plate 12.10**).

Relative Height: + 6m

Distance: 500m from site

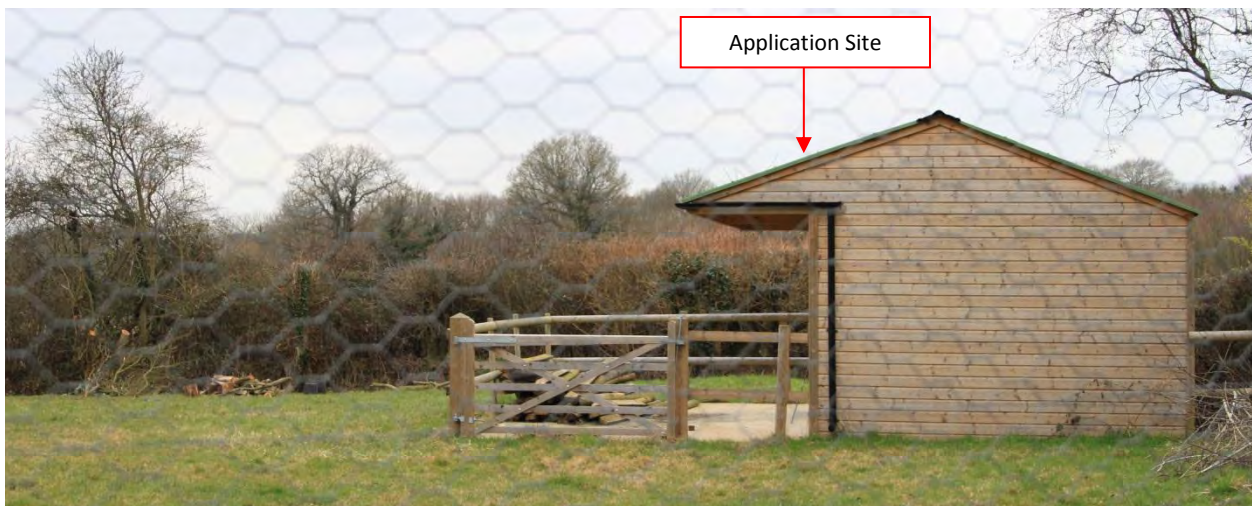


Plate 12.10

12.41 **Plate 12.10** shows views from the east of the Application Site along Kirdford. There are no direct views onto the site from this location due to the outbuilding/stable shown in the immediate view along with the significant tree cover beyond which is attributable to Northop Copse and Dunhurst Copse.

Visual Assessment during the night

View 1 – Views from the proposed entrance to the Application Site from Kirdford Road (**Plate 12.11**).

Relative Height: + 4m

Distance: 0m from site entrance

Conditions: Fair, some cloud cover. Moon and stars partially visible

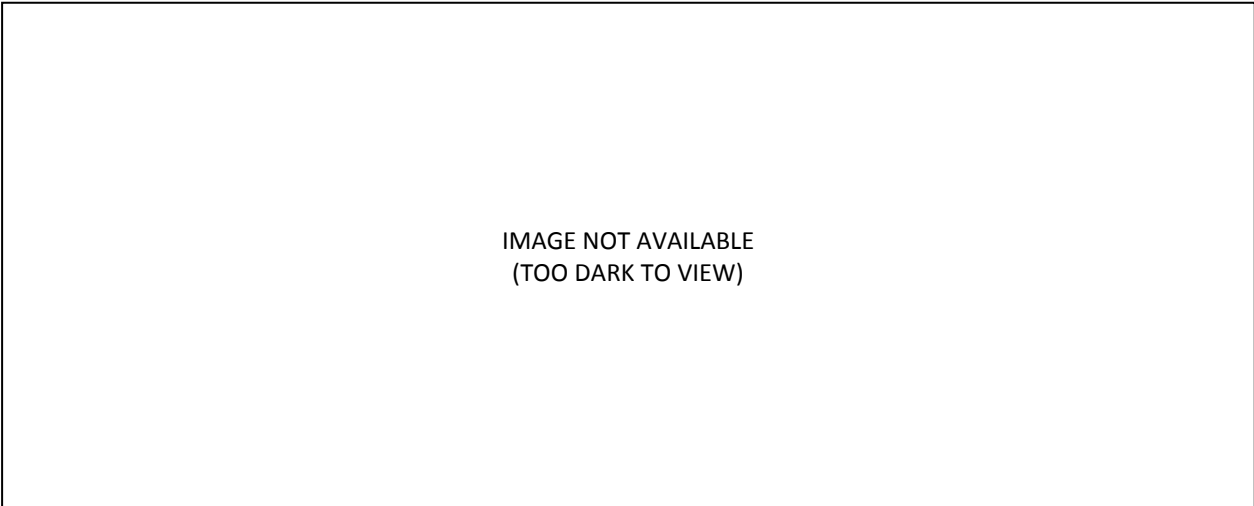


IMAGE NOT AVAILABLE
(TOO DARK TO VIEW)

Plate 12.11

12.42 It is not possible to capture a night-time image of this view as the area and associated views are in total darkness. There are no visible light sources within this view. Sky glow is also minimal which emphasises the dark nature of this view. The agricultural land which forms the immediate foreground is very dark and difficult to distinguish against the trees and hedgerows and the night sky.

Viewpoint 4 - Views from the east along Kirdford Road looking west towards the Application Site entrance (**Plate 12.12**).

Relative Height: - 2m

Distance: 100m from site Entrance

Conditions: Fair, some cloud cover. Moon and stars partially visible

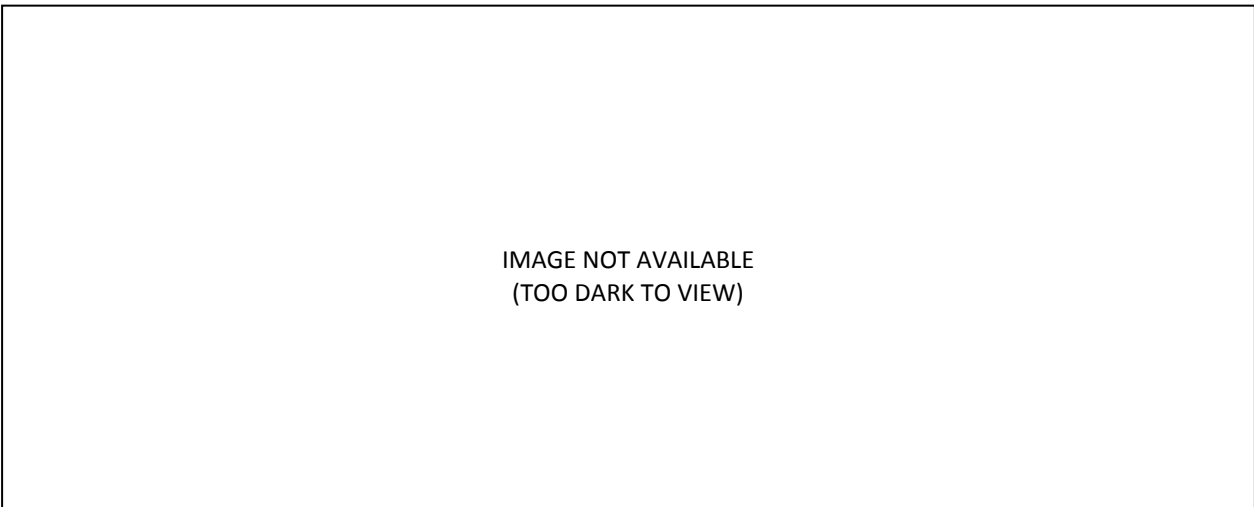


IMAGE NOT AVAILABLE
(TOO DARK TO VIEW)

Plate 12.12

12.43 It is not possible to capture a night-time image of this view as the area and associated views are in total darkness. There are no visible light sources within this view. Kirdford Road which forms the immediate foreground is very dark and difficult to distinguish against the trees and hedgerows which line either side of the road looking up towards the site entrance. It is not possible to view the Application Site or the proposed entrance from this location. Lighting attributable to the vehicles passing along Kirdford Road are visible from this location, however they are momentary and relatively infrequent.

Viewpoint 5 - Views from the east along Kirdford Road Looking West towards the Application Site entrance (**Plate 12.13**).

Relative Height: - 2m

Distance: 140m from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

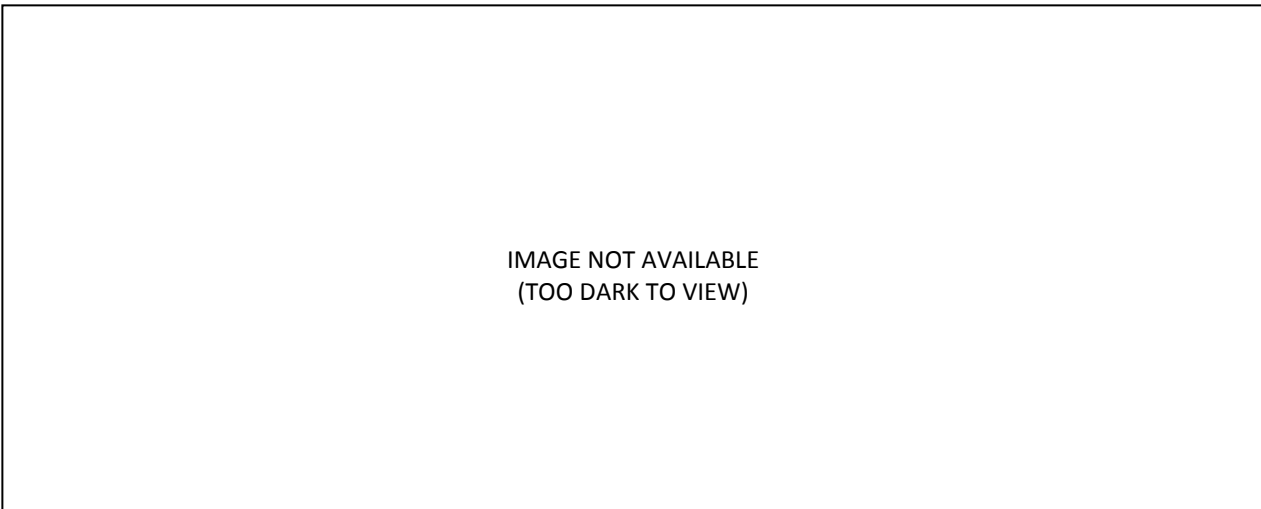


IMAGE NOT AVAILABLE
(TOO DARK TO VIEW)

Plate 12.13

12.44 It is not possible to capture a night-time image of this view as the area and associated views are in total darkness. There are no visible light sources within this view. Kirdford Road which forms the immediate foreground is very dark and difficult to distinguish against the trees and hedgerows which line either side of the road looking up towards the site entrance. It is not possible to view the site or the proposed entrance from this location. Lighting attributable the vehicles passing along Kirdford Road are visible from this location, however they are momentary and relatively infrequent.

Viewpoint 8 – Views from the west along Kirdford Road looking east towards the Application Site (**Plate 12.14**).

Relative Height: + 2m

Distance: 500m from site

Conditions: Fair, some cloud cover. Moon and stars partially visible



Plate 12.14

12.45 **Plate 12.14** shows a view looking towards the Application Site from the east along Kirdford Road. The Application Site is partially visible from this location although it is largely screened by the hedgerows which line Kirdford Road as indicated on the image above. Sky glow is also minimal which emphasises the dark nature of this view.

Viewpoint 17 – Views from the south-west of the Application Site along the A272 adjacent to Bulchins Copse (**Plate 12.15**).

Relative Height: +17m

Distance: 2.2km from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

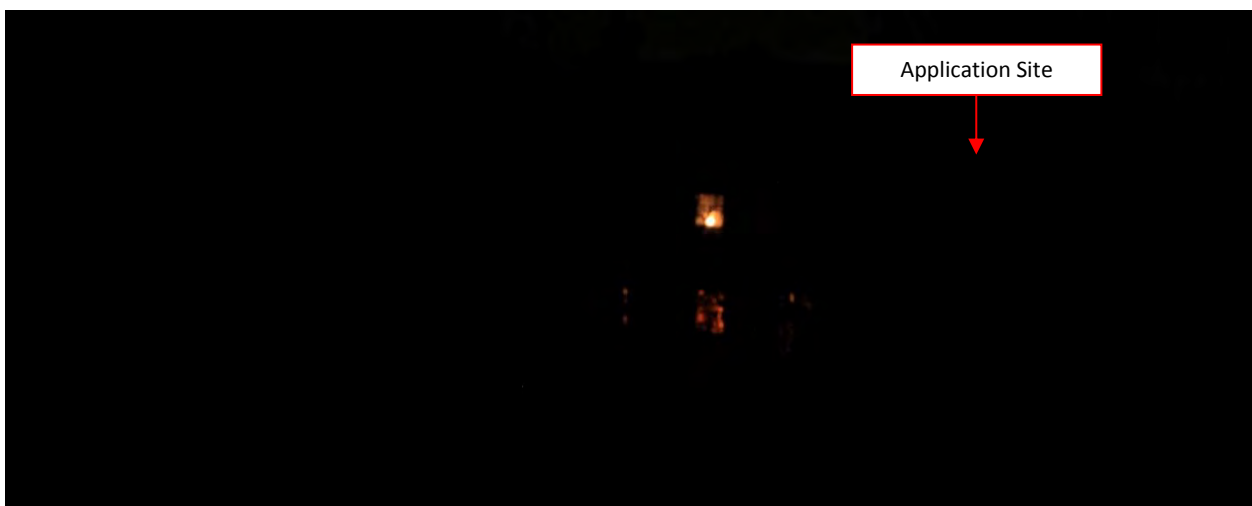


Plate 12.15

12.46 **Plate 12.15** shows the night time view from the A272 to the south-west of the Site. The view from this site is intrinsically dark at night, with only lighting from the adjacent residential property visible as illustrated in the photograph. Sky glow is also minimal which emphasises the dark nature of this view. Lighting attributable to the vehicles passing along the A272 is visible from this location and whilst they are momentary they are fairly frequent.

Viewpoint 25 – Views from the west of the Application Site, along Kirdford Road opposite the entrance to Whiffletree Farm/Normandie Stud (**Plate 12.16**).

Relative Height: + 6m

Distance: 1.7km from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

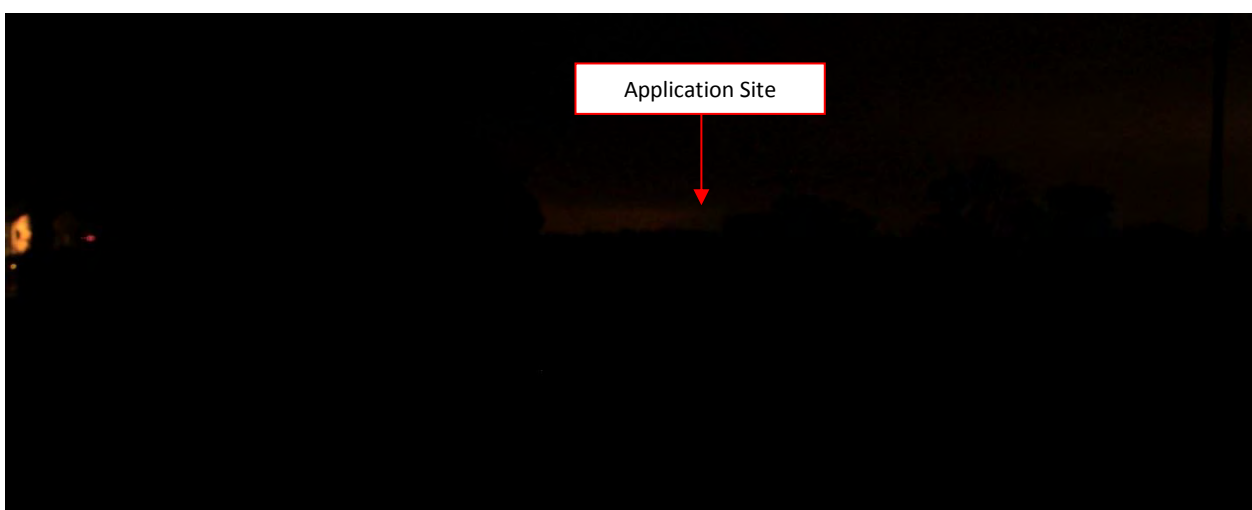


Plate 12.16

12.47 **Plate 12.16** illustrates the night time views from Kirdford Road, south of Kirdford itself, located to the west of the Application Site. Plate 12.18 demonstrates the intrinsically dark view from this location over the agricultural land towards the site. The light source to the left of the image is attributable to external floodlighting located at Whiffletree Farm/Normandie Stud. Sky glow within this view is minimal. Other light sources visible from this viewpoint are those of vehicles passing along Kirdford Road, although these are momentary and they are fairly infrequent.

Viewpoint 32 – Views from the north of the Application Site along the PRow at Walthurst Farm (**Plate 12.17**).

Relative Height: -+ 20m

Distance: 2.4km from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

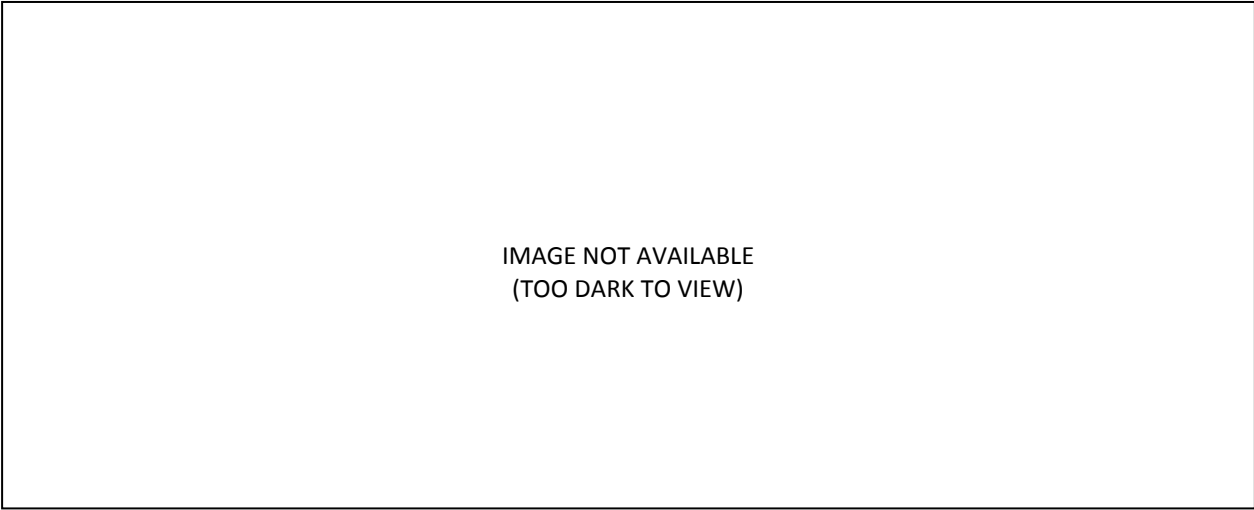


IMAGE NOT AVAILABLE
(TOO DARK TO VIEW)

Plate 12.17

12.48 It was not possible to assess the views from this viewpoint at night. However our assessment would be that the views from here would be intrinsically dark across the agricultural land within the immediate views. There would be no light sources from here and similar to the other views sky glow/aura would be minimal due to the fact that there is very little artificial light within the surrounding district

Viewpoint 38 – Views from the north east of the Application Site from the edge of Bittles Wood along Durbans Road (**Plate 12.18**).

Relative Height: + 15m

Distance: 1.8km from site

Conditions: Fair, some cloud cover. Moon and stars partially visible



Plate 12.18

12.49 **Plate 12.18** represents the night time views towards the Application Site from the north-east of the site from the edge of Bittles Wood along Durbans Road. As illustrated within the image the view from here is extremely dark across the agricultural foreground. There are no artificial light sources within this view. Sky glow is minimal with the hedgerow along Durbans Road in the immediate view and the tree line of Dunhurst Copse showing as a faint silhouette against the dark sky.

Viewpoint 45 – Views from the south of the Application Site along the A272 Petworth Road (**Plate 12.19**).

Relative Height: - 5m

Distance: 1.2km from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

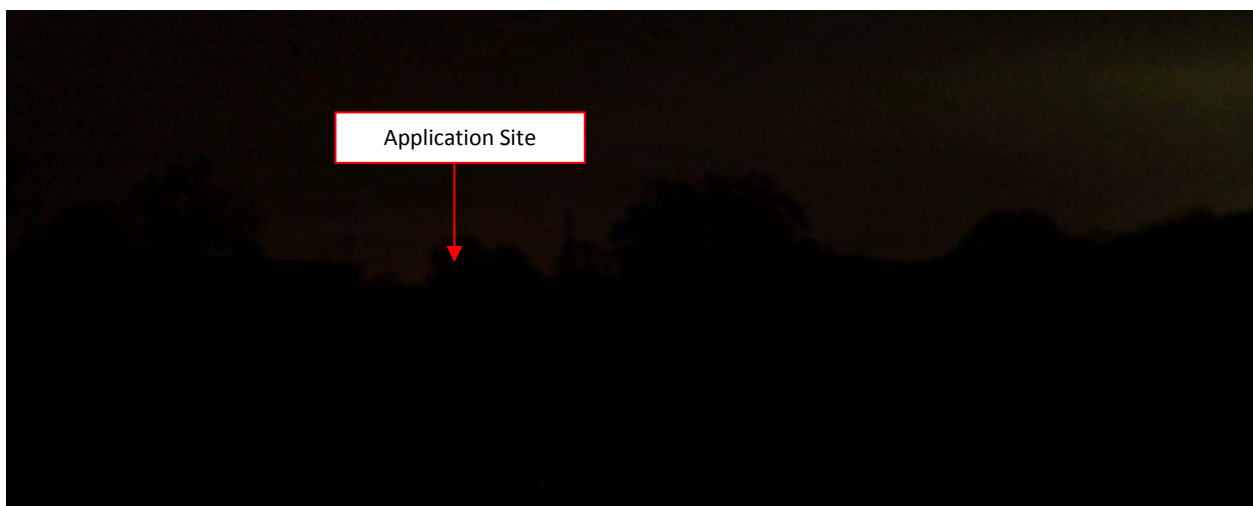


Plate 12.19

12.50 **Plate 12.19** represents the night time views across open agricultural land towards the Application Site from the A272 Petworth Road located south of the Application Site. As illustrated within the image the view from here is extremely dark across the agricultural foreground. There are no artificial light sources within this view. Sky glow is minimal with the tree line and hedgerows between the viewpoint and the Application Site showing as a faint silhouette against the dark sky.

Viewpoint 48 – Views from the east of the Application Site along the Kirdford Road (**Plate 12.20**).

Relative Height: + 6m

Distance: 500m from site

Conditions: Fair, some cloud cover. Moon and stars partially visible

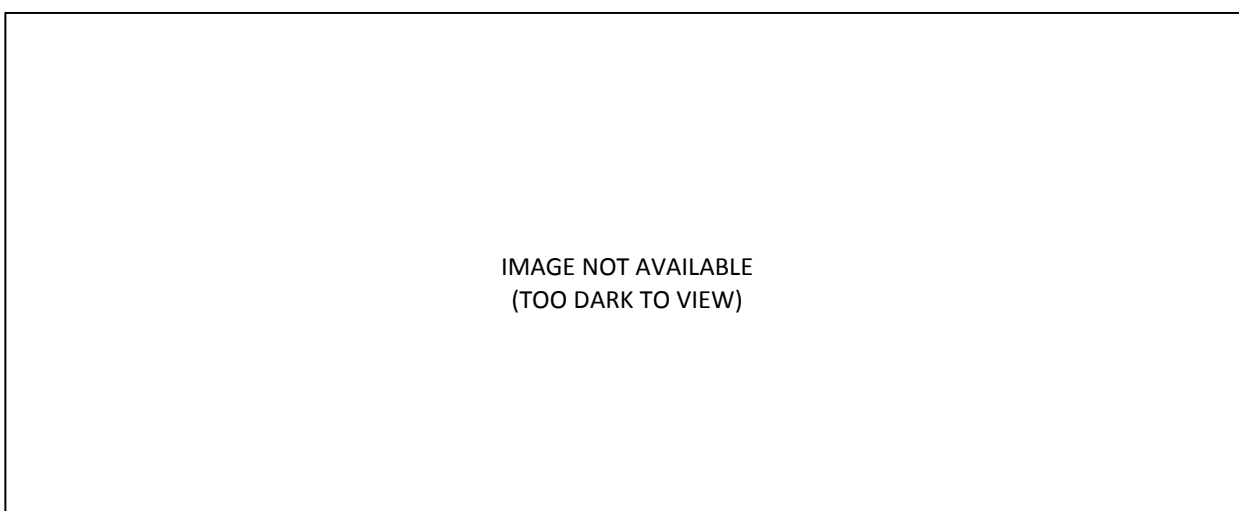


Plate 12.20

12.51 It is not possible to capture a night time image of this view as the area and associated views are in total darkness. There are no visible light sources within this view. The immediate foreground is very dark and difficult to distinguish against the trees and hedgerows located between the viewpoint and the site. Also sky glow is minimal which adds to the dark nature of this view. Lighting attributable the vehicles passing along Kirdford Road are visible from this location ate noticeable; however they are momentary and relatively infrequent.

Bat Activity

12.52 Refer to Chapter 7 Ecology for a full assessment of the effects of lighting on bats.

Proposed Application Site Lighting

Performance Objectives

12.53 The primary aims of the lighting design are summarised as follows:

- To deliver an efficient lighting design applicable to the exploration processes carried out on site;
- Provide safe and clear routes during the night time for site operatives;
- To create an environment where users feel safe and secure; and
- Be considerate to the sensitive areas of the site with regard to the ecological constraints and attempt to preserve the landscapes and minimise the environmental impact of the lighting installation.

Lighting Obtrusion

12.54 The ILE assessment method for lighting obtrusion is based on classifying landscapes into four Environmental Zones, E1 – E4. The current recommendations are set out in **Table 12.2**.

Table 12.2 Obtrusive light limitations

Obtrusive Light Limitations – ILE UK Recommendations						
Environmental Zone	Sky Glow ULR (Max) %	Light Trespass (into windows) Ev Lux		Source Intensity Kcd		Building Luminance L (cd/m ²)
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Pre-curfew
E1 Intrinsically dark landscapes National Parks, AONBs etc	0	2	1*	2.5	0	0
E2 Low distinct brightness Rural, small village, relatively dark urban location	2.5	5	1	7.5	0.5	5
E3 Medium distinct brightness Small town centres or urban location	5	10	2	10	1.0	10
E4 High distinct brightness areas Town / city centres with high night-time activity levels	15	25	5	25	2.5	25

ULR – Upward Light Ratio of Installation (maximum permitted % of luminaire flux for total installation going directly skywards).

Ev – Vertical Luminance in Lux (Lumens per square metre) – measured on glazing at centre of window.

I – Light source intensity in Kilocandelas (Kcd)

L – Luminance in Candelas per square metre (cd/m²)

Institution of Lighting Engineers “Guidance Notes for the Reduction of Obtrusive Light” –

12.55 This assessment is based upon the classification of the project falling within environmental zone E2.

Proposed Development Lighting

12.56 Throughout the mobilisation, drilling and testing modes (Phases 2 and 3 of the Proposed Development) lighting is to be provided as detailed on **Figure 4.12**.

12.57 The proposed lighting comprises of the following:

- Six freestanding 3 metre high fluorescent lights facing inwards towards the site and pointing downwards;
- Eight tungsten filament bulkhead lights located on site cabins;
- Two horizontal strip lights at cabin level adjacent to the rig; and
- Inward facing lighting within the derrick of the drilling rig.

Likely Significant Effects

Quantification of effects

12.58 This section sets out to provide an informed assessment of the effects that the lighting installations described above will have on the Application Site itself and the surrounding areas, as well as any alteration to any long distance views where applicable.

12.59 In order to provide a clear and concise assessment, the effect of the lighting will be considered in accordance with the proposed development phases as follows:

- Phase 1 Construction
- Phase 2 Mobilisation and drilling
- Phase 3a Testing (gas)
- Phase 3b Testing (oil)

- Phase 4a Restoration
- Phase 4b Retention

12.60 A detailed project description is provided in Chapter 4 Project Description. The Proposed Development comprises of the drilling of a vertical exploration well with a lateral exploration well being drilled as a contingent to the successful completion of Phase 2 or 3 of the initial vertical well. Drilling of the contingent lateral exploration well will involve additional mobilisation and drilling (Phase 2), and testing (Phase 3) if hydrocarbons are found. The lighting for the contingent lateral exploration well will not differ from that proposed for the other phases and therefore will not result in additional effects. Therefore it is not assessed separately in this chapter.

12.61 The identification of significant effects covers all effects but does not include mitigation measures, which have been considered as a separate entity.

Phase 1 - Construction

12.62 The site establishment works will normally be limited to daylight hours, and artificial lighting will be required only for short periods if establishment works extend into hours of darkness.

12.63 Should any lighting be required for Phase 1 during the hours of darkness, it will be largely screened from view by the well-established hedgerows, trees and dense woodland surrounding the site. Views of any lighting will be largely restricted, unless any of the lighting shall protrude above the canopy on the trees.

12.64 Sky glow arising from any direct lighting sources would be negligible providing lanterns and lamp sources are installed and angled so that they face downwards and inwards giving due consideration to obtrusive or nuisance light. Any aura created by the construction lighting is unlikely to be identifiable beyond the dense screening of woodland, some minor effects of localised aura may be present.

12.65 The effects of any lighting will be short term, given that the construction period will be a maximum of 10 weeks.

12.66 The effects of any lighting used during Phase 1 would be minor. Effects at a local level and on longer distance views and the surrounding landscape are considered to be negligible.

Phase 2 - Mobilisation and drilling

12.67 Further to the completion of the Phase 1 works. The site lighting is expected to be as discussed herein and as detailed in **Figure 4.12**. The Phase 2 drilling works will be a 24 hour operation and will therefore require the proposed site lighting to be operational throughout this period of up to 10 weeks for the vertical exploration well and up to 12 weeks for the lateral exploration well.

12.68 Owing to the contouring landscape surrounded by well established hedgerows, trees and dense woodland the majority of the lighting will be screened from direct view from any sensitive receptors. Due to the positioning of the lighting towards the centre of the Application Site, light spill from the Application Site to the surrounding agricultural land and woodland will be minimal.

12.69 It is not anticipated that any sky glow or aura resulting from the low level site lighting will be visible within the locality of the site, as it will be largely screened by the tree coverage, its effect is therefore considered to be negligible. Inward lighting within the derrick on the drilling rig will minimise any spillage but may be partially visible from the viewpoints identified within this report, should it protrude above the height of the woodland. However this will be a small element of localised lighting to illuminate the rig only. The effect of the rig lighting on the surrounding district is considered to be low magnitude on medium sensitive receptors. Given the short term period over which any effect will occur, the overall effect is considered to be minor adverse.

-
- 12.70 Direct views of lighting in the derrick and in particular any aviation warning lighting may be visible from the viewpoints assessed, although the effects of these would be minimal.
- 12.71 Direct views of some of the low level lighting may be visible through gaps in the hedgerow and woodland screening the Application Site from the local properties, for example Whiffletree Farm.
- 12.72 The direct lighting sources will not be visible from any other locations other than those discussed above. It is unlikely therefore that this lighting will have any adverse effects on the district scale views and the surrounding landscape. The effect of the proposed lighting at a district scale is considered to be negligible.

Phase 3a: Testing (gas)

- 12.73 If gas is encountered during Phase 2, the Proposed Development will move to Phase 3a.
- 12.74 Phase 3a will use the same lighting set up provided for the Phase 2 works for a period of up to 2 weeks for both the lateral or vertical exploration well. The effects will therefore remain the same as those described for the Phase 2 works.

Phase 3b: Testing (oil)

- 12.75 If oil is encountered during Phase 2, the Proposed Development will move to Phase 3b. Phase 3b will use the same lighting set up provided for the Phase 2 works for a period of up to 2 weeks as a result of the vertical exploration well, or up to 26 weeks following the lateral exploration well. The effects will be further reduced compared with Phase 2 because the drilling rig will not be on site continuously throughout the phase.

Phase 4a - Restoration

- 12.76 Should Phases 2 or 3 in either the vertical or lateral exploration well be unsuccessful, then Phase 4a of the Proposed Development will commence. This will involve the

restoration of the site back to its original state which is anticipated to take 6-10 weeks. As previously identified this would require an element of temporary construction lighting as discussed in relation to Phase 1 and will result in the same effects.

Phase 4b – Retention

- 12.77 Should Phase 3 be successful, Phase 4b of the Proposed Development will commence, which will involve works to retain the well pending further planning consent. It is unlikely that any construction lighting would be required here as the works will only involve decommissioning of the drilling rig and site accommodation.
- 12.78 All ground works will remain in place pending further planning consent; hence no construction lighting will be required throughout this Phase and there will be no effect on any receptors.

Mitigation Measures

- 12.79 The following mitigation measures will be applicable throughout the whole of the Proposed Development (Phases 1 to 4) and will be implemented through an Environmental Management Plan to be issued to the contractor.
- Lighting on the rig will be inward and downward pointing;
 - The target lighting levels for the site to be set according to the relevant standards, Health and Safety and security requirements, but should be kept to a minimum to limit the effects of reflected upward light creating an aura above the site;
 - If areas of the site are not used operationally throughout the night, the opportunity to dim fittings or switch some off should be taken, again subject to safety and security needs.
 - Lighting should be angled away, and where possible positioned away, from the woodland edges; and
 - The power of the lights should be the minimum necessary for purpose.

Residual Effects

12.80 The residual effects which are likely to be unavoidable are the visibility of any lighting used during Phase 1 (construction), and lighting of the rig (derrick) due to its elevated position above the tree canopy surrounding the site. Therefore a minor adverse effect remains within the local areas surrounding of the Application Site.

Cumulative Effects

12.81 The committed developments set out in Chapter 2 are too distant from the Application Site to lead to cumulative lighting effects in combination with the Proposed Development. All residual lighting effects of the Proposed Development are assessed as negligible with the exception of one minor adverse effect so cumulative effects would not be significant.

Summary

12.82 At present the Application Site is an intrinsically dark site. It is therefore inevitable that there will be an element of alteration to the ambient lighting conditions within the site boundary and the immediate adjacent areas throughout the various phases of the works. However these effects will largely remain localised to the functional lighting provided for the site during all four Phases of the Proposed Development.

12.83 Alterations to the landscape and the effects of the site lighting within the longer distance views will be negligible. It is unlikely that any lighting other than those located within the derrick will be visible, and even the effects of this will be negligible.

12.84 **Table 12.3** contains a summary of the likely significant effects of the Proposed Development.

Table 12.3: Table of Significance – Lighting

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate/ Minor) (Beneficial/Adverse/ Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/ Minor) (Beneficial/Adverse/ Negligible)
				I	UK	E	R	C	D	L	
Phase 1: Construction of access road and well site											
Effect of construction lighting on local landscape	Temporary	Negligible	Construction will take place mostly during daylight hours.							✓	Negligible
Effect on longer distance views and the landscape	Temporary	Negligible	No specific mitigation required						✓		Negligible
Effect on local properties adjacent to site	Temporary	Minor Adverse	Construction will take place during daylight hours except in emergencies.							✓	Minor adverse
Effect on Wisborough Green and its associated properties	Temporary	Minor Adverse	Construction will take place during daylight hours except in emergencies.							✓	Minor adverse
Effect on Kirdford and its associated properties	Temporary	Minor Adverse	Construction will take place during daylight hours except in emergencies.							✓	Minor adverse
Phase 2: Mobilisation and drilling											
Effect on residents of Wisborough Green and Kirdford, of proposed low level lighting.	Temporary	Negligible	If areas of the site are not used operationally throughout the night, the opportunity to dim fittings or switch some off should be taken.							✓	Negligible

Effect on residents of Wisborough Green and Kirdford of rig lighting	Temporary	Minor Adverse	All lighting equipment on the site to have luminaires with optics to eliminate any direct upward light and maximise control of spill light. The target lighting levels for the site will be set according to the relevant standards, H&S and security requirements, but will be kept to a minimum to limit the effects of reflected upward light creating an aura above the site.										✓	Minor adverse
Effect of rig lighting on passing motorists	Temporary	Negligible	No specific mitigation										✓	Negligible
Effect of rig lighting on the surrounding adjacent area	Temporary	Negligible	No specific mitigation										✓	Negligible
Effect of rig lighting on the district level views	Temporary	Negligible	No specific mitigation									✓		Negligible
Effect on longer distance views and the landscape of proposed rig lighting	Temporary	Negligible	No specific mitigation required									✓		Negligible
Phase 3a: Testing (gas)														
As outlined in Phase 2														
Phase 3b: Testing (oil)														
As outlined in Phase 2														

Phase 4a: Restoration												
As outlined in Phase 1												
Phase 4b: Retention												
No effects identified												
Cumulative												
No cumulative effects												
<p>* Geographical Level of Importance</p> <p>I = International; UK = United Kingdom; E = England; R = Regional; C = County; D = District; L = Local</p>												

References (Ref)

- 12.1 Department for Communities and Local Government (2012) National Planning Policy Framework.
- 12.2 Clean Neighbourhoods and Environment Act (2005).
- 12.3 Chichester District Local Plan (1999)
- 12.4 West Sussex County Council (2003) West Sussex Minerals Local Plan.
- 12.5 West Sussex Minerals and Waste Core Strategy Development Plan (2007).
- 12.6 BS EN 12464-2:2007 Lighting of work places. Outdoor work places.
- 12.7 Chartered Institute of Building Services Engineers (CIBSE) Lighting Guide 6:1992 – Outdoor Environment.
- 12.8 Defra (2001) Lighting in the Countryside: Towards Good Practice.
- 12.9 Institution of Lighting Professionals (ILP formerly ILE) Guidance Notes for the reduction of Light Pollution.
- 12.10 The Health and Safety at Work Act 1974.
- 12.11 Wildlife and Countryside Act (1981).
- 12.12 The Conservation of Habitats and Species Regulations (2010).
- 12.13 Bat Conservation Trust (Version 3, May 2009) ILE Bats and Lighting in the UK.

13.0 SOCIO ECONOMICS

Introduction

- 13.1 This chapter of the ES has been prepared by Celtique Energie Weald Ltd, and assesses the likely significant socio-economic effects of the Proposed Development on the Application Site and surrounding area. The chapter considers the impacts on those that visit, live and work in the locality of the Application Site and the likely effects on the local economy.
- 13.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Application Site and surroundings; the likely significant economic effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

Policy Context

National Energy Policy

Energy White Paper – Meeting the Energy Challenge, 2007 (Ref: 13.1)

- 13.3 The Energy White Paper, *Meeting the Energy Challenge* sets out the UK Government's international and domestic energy strategy for the UK. The Government recognises two long-term energy challenges; tackling climate change and ensuring secure, clean and affordable energy. The Paper acknowledges the rising price of fossil fuels, the risks associated with our dependency on foreign imports and the need to make substantial investment in new energy infrastructure including gas.
- 13.4 The Paper says that to meet our security of supply challenges, the Government will "maximise the economic production of our domestic energy sources" and "strengthen the UK energy investment framework so that investors have the confidence to make timely investment in new gas and electricity infrastructure". The Government accepts

that fossil fuels will continue to play “an essential role in our energy system for the foreseeable future” and therefore, the economic recovery of the UK’s remaining oil and gas reserves must be maximised (page 19-20).

National Tourism Policy

Government Tourism Policy, 2011 (Ref. 13.2)

- 13.5 The Government Tourism Policy (GTP) published by the Department for Culture, Media and Sport (DCMS) recognises the importance of tourism to Britain as one of our six biggest industries and our third-largest export earner, accounting for almost £90bn direct spend each year, supporting over 200,000 businesses and providing 4.4% of our nation’s jobs. The Government’s tourism aims include funding an ambitious marketing campaign to attract 4 million extra visitors to Britain over the next 4 years amounting to £2bn more spend in our economy and 50,000 new jobs, increase the length of stay and proportion of residents who holiday in the UK by almost 10% creating 4.5m extra domestic trips each year and improving the sectors productivity (page 7).
- 13.6 The GTP states that “Britain consistently ranks as one of the top 6 or 7 visitor destinations in the world” but notwithstanding the importance of leisure travel, because of our open and international economy “business travel is an important (and high spending economy) element of both our domestic and foreign travel sectors too” (page 11). The tourism sector is the fourth fastest growing sector behind business services, financial services and construction, with 3.5% annual growth compared to 2.0% for electricity, gas and water sectors which is joint eighth fastest with health (page 14).
- 13.7 To deliver improvements and strengthen our tourism sector the GTP encourages establishing stronger tourism bodies, raising industry standards, making the sector more competitive including improving skills, staff, management and the sectors resilience to weather, and improving our transport infrastructure and services.

National Planning Policy*National Planning Policy Framework, 2012 (Ref. 13.3)*

- 13.8 The National Planning Policy Framework (NPPF) seeks to promote sustainable development which is considered to consist of three dimensions – economic, social and environmental. To achieve sustainable development, the economic role of planning is to contribute to “building a strong, responsive and competitive economy” ensuring that land is available at the right time to support growth and innovation, and “by identifying and coordinating development requirements, including the provision of infrastructure” (page 2). The social role consists of “supporting strong, vibrant and healthy communities” and a “high quality built environment”. The environmental role of planning is concerned with the protection and conservation of our environment, minimising waste and pollution, and “moving to a low carbon economy” (page 2).
- 13.9 The Government is committed to building a strong competitive economy “to create jobs and prosperity”, and to “ensuring the planning system does everything it can to support sustainable economic growth” and not act as an impediment. Therefore the NPPF states that “significant weight should be placed on the need to support economic growth through the planning system”. Similarly “investment in business should not be overburdened by the combined requirements of planning policy expectations” and “planning policies should recognise and seek to address potential barriers to investment” (page 6).
- 13.10 The Government also supports the development of prosperous rural economies, and the creation of jobs and prosperity in rural areas by supporting business growth, enterprise, agricultural diversification and tourism (page 9). The NPPF makes clear that planning plays an important role in supporting the delivery of low carbon and renewable energy sources, to help tackle the impacts of climate change.
- 13.11 In Chapter 13 - Facilitating the sustainable use of minerals, it states that “minerals are essential to support sustainable economic growth and our quality of life”, and the material to provide for the country’s energy needs, amongst other things, should be kept

in sufficient supply (page 32). The NPPF recognises that minerals are a finite resource which can only be worked where they are naturally found and their long term conservation should be secured through best use.

13.12 When determining applications planning authorities are expected to “give great weight to the benefits of the mineral extraction, including to the economy” (page 34). The NPPF further states that local planning authorities should ensure that their Local Plans are based on adequate, up-to-date and relevant evidence about the economic, social and environmental characteristics and prospects of the area. Local planning authorities should ensure that their assessment of, and strategies for, employment and other uses are integrated and take full account of relevant market and economic signals (page 38).

13.13 Local planning authorities are also expected to work proactively with developers “to secure developments that improve the economic, social and environmental conditions of the area” (page 45).

County Planning Policy

Supporting Economic Growth in West Sussex 2012 – 2020 (Ref: 13.4)

13.14 The vision for the West Sussex economy over the strategy period is to create “an economy with a thriving entrepreneurial culture that actively supports and promotes sustainable living and working communities and makes the most of its natural, physical and human capital assets; and which attracts, retains and grows well connected businesses that are staffed by a highly skilled and motivated workforce, producing high value goods and services” (page 6). This will be achieved through a series of strategic priorities which are outlined in the document. These include promoting West Sussex as a business location to attract inward investment, understanding and supporting the needs of businesses, responding to new funding conditions, delivering transport and communications infrastructure, making the best use of land and property, supporting the creation of a range of jobs, and supporting local people in developing skills.

13.15 West Sussex has a strong and diverse economy including a “strong tourism and visitor economy” and a “strong and diverse advanced engineering sector” (page 13). However, there is a level of economic underperformance indicated by the Draft West Sussex Local Economic Assessment (2011) which illustrates that Gross Value Added (GVA) and GVA per head were well below the national and South East averages in the ten years up to 2007. Also job growth was modest at 4.9% compared to a national average of 9.5% in the ten years up to 2008, and average workplace earnings for full time earners are below average (page 24).

13.16 West Sussex has a number of important sectors including the construction sector which “is highly cyclical and is still in recession” whilst “tourism and the cultural sector continue to be important to the West Sussex economy” with tourism having shown “some resilience” in the local economy during the recession. The Strategy notes that a quarter of all jobs in West Sussex are in the public sector and spending cuts will have a “significant impact on the local economy and some support is likely to be needed to enable people to transfer into private sector roles over the short to medium term” (page 27).

The South Downs Management Plan 2008 – 2013 (Ref: 13.5)

13.17 The Application Site does not fall within the South Downs National Park (SDNP) but does fall approximately 500m from the boundary. Therefore whilst those who are specifically visiting and staying in the South Downs may not explore beyond its boundaries, some visitors will travel to or stay in the villages and towns outside of the Park. The inclusion of SDNP policies in this Assessment covers two elements – the impact on tourism from outside the Park and the impact on tourism from inside the Park. In particular it considers the potential to impact on the countryside, conserving and enhancing the natural beauty, opportunities for public enjoyment and wildlife.

13.18 The aims of the South Downs Management Plan (SDMP) are to protect, conserve and enhance the natural beauty of the South Downs, promote opportunities for the understanding and quiet enjoyment of the area’s special qualities, and the

encouragement of sustainable forms of economic and community development in ways that help support the first two aims (page 7).

- 13.19 The SDMP contains a summary of the 10 ambitions the Authority hope to achieve in their management of the Park. This includes Ambition 7 which supports “A buoyant local economy supported by, and directly contributing to the management of natural beauty and its enjoyment”. This includes promoting “sustainable tourism” which is a major economic sector for the Park (Page 18).
- 13.20 The protected landscape of the South Downs is subject to a number of threats including pressure for economic growth as well as “demands for recreation” (page 32). In regard to the rural economy the SDMP is considered to have only a small tourism sector “with a very small proportion of current visitors staying with the South Downs” which limits the contribution tourism makes to the local economy. Visitors contribute £178 million to the South Downs economy annually compared to £54 million from all farm production within the South Downs (page 34).
- 13.21 There are a number of landscape classifications in the South Downs and the Application Site falls close to the boundary of what is classified as the Low Weald where there is “a rapid sequence of geological outcrops” that have “created a landscape of remarkable diversity”. The Low Weald is also considered to include “deeply sunken lanes and dense woodland cover” of what is a medieval landscape (page 38, 40).
- 13.22 The SDMP states that “the natural beauty of the South Downs is vulnerable to intrusive developments occurring beyond the boundary of the protected landscape that threaten the fragile sense of peace and tranquillity within the protected landscape” (page 41). This is particularly the case at Arun where the protected landscape narrows, and development on the fringes of the South Downs will increase localised recreational pressure (page 42).
- 13.23 There is continuing pressure on the SDNP for larger-scale development and whilst the SDMP states that this can be intrusive, it also states that “Larger-scale development may,

however, be acceptable, if well-designed, within the larger settlements of the South Downs” (page 43). The SDMP notes that in 2005 there were 13 active and 6 inactive mineral extraction sites (chalk, sand, gravel and clay) and 14 landfill sites with a number of other workings just outside the Park boundary. Policy P1.10 seeks to “ensure that mineral extraction and landfill sites, where permitted, are carefully operated and sensitively restored” (page 44).

13.24 In respect of preserving the tranquillity and dark night skies of the SDNP, the SDMP says that no future developments within or close to the Park “either individually or cumulatively, adversely affect the peace and dark night skies of the South Downs through traffic generation, noise, light or visual intrusion” (page 60). The Figure on page 63 of the SDMP indicates that the Application Site is close to an area of lower tranquillity.

13.25 The South Downs is in a highly accessible location and whilst the figures are now somewhat out of date, in 2003 there were 39.42 million visitor days to the South Downs of which 4% of visitors were holidays spent in the Park, 16% were day trips from holiday accommodation outside of the Park and 80% were day trips from homes outside of the Park. It was estimated that visitor spending supported 1,270 businesses and over 4,000 jobs with tourism related businesses in the South Downs receiving around £221.1 million illustrating the importance of tourism to the National Park (page 104, 105).

13.26 The SDMP considers that the tourism sector is poorly developed but with careful management increasing the number and length of stays could create a more sustainable tourism sector (page 109). The main reasons visitors travel to the South Downs is for the scenery and landscape (73%), peace and quiet (46%), good walks (34%), general ambience (28%) and wildlife/nature (27%). The most frequently undertaken activities are going for a walk (25%), visiting attractions (24%) and relaxing and enjoying the view (19%) (page 112). The SDMP aims to encourage increasing the understanding and awareness of the South Downs including promoting and celebrating “the special qualities of the South Downs” (page 130).

South Downs Visitor and Tourism Economic Impact Study, 2013 (Ref: 13.6)

- 13.27 Businesses, residents and visitors were surveyed on their understanding of the reasons for designating the National Park. The responses are presented collectively below in **Table 13.1**.

Table 13.1: Reasons for designating the National Park

Respondent and Base Number	Businesses - 88	Residents - 2,026	Visitors - 6,815
It has special habitat/wildlife which needs protection	2%	42%	33%
It has special archaeological interest which needs protection	0%	19%	12%
It has special landscape which needs protection	72%	46%	43%
It has a unique cultural heritage which needs protection	2%	24%	14%
It needs special management to promote sustainable growth	1%	21%	15%
Not sure reasons for designation/don't know	12%	22%	24%
Other responses	10%	-	-
Total	100%	100%	100%
Page number in source	17	23	34

Source: *South Downs Visitor and Tourism Economic Impact Study, 2013, page 39*

- 13.28 For all three respondent groups special landscape protection was highlighted as the reason in each case followed by not sure for businesses (10%), wildlife for residents (42%) and visitors (33%). The main reasons for people visiting the South Downs includes going for a walk (29%), followed by visiting a tourist attraction (19%), getting fresh air and enjoying the views (9%) and taking the dog for a walk (8%) (page 39).
- 13.29 A quarter of the residents surveyed believe that visits cause congestion and pollution but 73% of local residents did not perceive this to be a problem (page 39). Of the 6,815 visitors surveyed in 2011/12, 83% had travelled to the South Downs by private motor vehicle (page 40).
- 13.30 Including local resident expenditure it is estimated that in 2011/12 the SDNP generated around £499,990,000 for local businesses and discounting local residents expenditure this equates to £464,388,000 and a growth of 39.4% (+4.9% per year) since the last study in 2003/04 although this does not take inflation into consideration. Taking inflation into account, the increase from 2003/04 is much smaller at around 10.7% (+0.7% per year)

(page 61, 62). It is also concluded that the South Downs National Park expenditure supports just under 5,000 full time equivalent jobs and 8,194 actual jobs (page 63). The study concludes with a series of comparative visitor volume and value figures across National Parks which is presented below (**Table 13.2**).

Table 13.2 Comparative visitor volume and value figures across the National Park

National Park name	Area (sq kilometres)	Population	Trips a year ¹ (million)	Visitor days a year (million)	Visitor spend a year (£million)
Brecon Beacons	1344	32,000	4.1	5.1	£220
Broads	305	5,721	7.2	11.3	£419
Cairngorms	4,528	17,000	1.5	0.1	£185
Dartmoor	953	34,000	2.4	3.1	£111
Exmoor	694	10,600	1.4	2.0	£85
Lake District	2,292	42,200	15.8	23.1	£952
Loch Lomond and the Trossachs	1,865	15,600	4	.07	£190
New Forest	570	34,400	12.3	13.5	£123
Northumberland	1,048	2,200	1.5	1.7	£190
North York Moors	1,434	25,000	7	10.7	£411
Peak District	1,437	38,000	8.4	10.4	£356
Pembrokeshire Coast	621	22,800	4.2	13.0	£498
Snowdonia	2,176	25,482	4.27	10.4	£396
South Downs	1,624	110,400	44.7	46.4	£464
Yorkshire Dales	1,769	19,654	9.5	12.6	£400

Source: *South Downs Visitor and Tourism Economic Impact Study, 2013, page 65*

13.31 The South Downs is shown to have almost 3 times the number of trips a year as the next highest National Park (Lake District at 15.8m) and twice as many visitor days a year (Lake District at 23.1m). The study accepts in the footnotes that the comparables are from 2009 and it cannot be confirmed if they show indirect or direct expenditure. The South Downs also has a much higher population than any of the other National Parks at 110,000 compared to the next highest value of 42,200 (Lake District).

Local Planning Policy

Chichester District Council (CDC) Local Plan, 1999 (Ref. 13.7)

13.32 As the Local Plan was adopted before the Planning and Compulsory Purchase Act (2004)

the policies will only be given due weight according to their consistency with the NPPF (NPPF, page 48).

- 13.33 The Economic Strategy of the Local Plan is contained at Chapter 4 with the main purpose being “the maintenance of a prosperous and developing local economy with high levels of employment to ensure a successful and economically active community” (page 77). Policies in the Local Plan are aimed at implementing the CDC Economic Development Strategy by improving the contribution of the local economy to the national economy, ensuring there are enough job and business expansion opportunities without damage to rural or built environments, and conserving the aspects of the environment that attract business and personal spending (page 77).
- 13.34 The strategy for business, industry and warehousing are now outdated referring mainly to Structure Plan targets on floorspace. However, the main guiding principles include providing sufficient jobs, encouraging farm diversification but avoiding the proliferation of new buildings, and ensuring the standard of developments do not conflict with other Plan policies (page 79).
- 13.35 The Local Plan states that Chichester is “an area which is attractive to tourists because of its countryside, coast and historic towns and villages” and that it makes a substantial contribution to the economy assisting in rural diversification which includes farm diversification (page 88). The Local Plan will encourage tourist facilities and will take a restrictive line where development may be intrusive or environmentally damaging.
- 13.36 The Local Plan states that “farm diversification is now a well-established means of extending the economic viability of farm business” and it is Government policy to “support the process of diversification”. The Local Plan suggests that “the countryside can accommodate development, especially proposals which are small in scale, with little adverse environmental impact if their location and design is handled with sensitivity” (page 92).

An Economic Strategy for Chichester District 2013 - 2019 (Ref 13.8)

- 13.37 The Economic Strategy for Chichester (ESC) acknowledges the changed economic conditions and accepts that; “Prospects for growth are weak, the District Council’s budgets are tight and new organisations and partnerships have been established to help deliver sustainable economic growth” (page 5). The priorities for the ESC are to provide a highly regarded business environment, create a qualified and highly skilled workforce, improve the sustainability of businesses, develop a rural economy and regenerate the District including the rural towns.
- 13.38 The ESC states that CDC is “widely recognised as one of the UK’s most attractive locations” encompassing a number of attractions including the South Downs National Park which covers 70% of the District and Chichester Harbour AONB, along with other cultural facilities including Festival Theatre, Pallant House Gallery, country homes, a Roman Palace and sport and recreation venues including Goodwood and Cowdray Park. The ESC states that 6.5m visitors contribute £460m to the CDC economy and supports more than 9,000 jobs. CDC supports “notable concentrations of jobs in tourism related sectors” including accommodation, food services, arts, entertainment and leisure. The EDC also notes that Rolls Royce provides CDC with “a notable engineering presence” (page 8).
- 13.39 The ESC is aiming to support a range of jobs and local people in acquiring skills as well as identifying businesses that have potential for growth that can attract new investment and jobs (page 11, 12). Delivering the transport and communications infrastructure that businesses and residents need is a strategic action for the ESC along with making “the best use of land and property to support a robust and sustainable economy” (page 13). A primary action of the ESC is to encourage education-business networks and maximise internship and apprenticeship opportunities (page 14).
- 13.40 The ESC states that “Chichester’s natural and cultural assets are what makes it distinct and special” and working with the natural environment is key to encouraging sustainable economic development. The ESC concludes that “Chichester’s high quality natural

environment needs to be viewed as an economic asset, not an obstacle to securing economic growth” with the District farmers, foresters and landowners being encouraged to make “the best economic use of their buildings and land assets” with regard to environmental constraints (page 16, 17).

Assessment Methodology

- 13.41 The assessment focuses on the likely significant effects of the Proposed Development on socio-economic issues. The assessment examines changes in labour supply and employment as the economic elements. It considers any potential impacts on tourism and the local population in terms of housing, education and health.
- 13.42 The Application Site is located in the ward of Wisborough Green, in Chichester District and therefore for the purposes of this study, the ward of Wisborough Green will be the “Study Area” (**Figure 13.1**). For the purposes of comparison, analysis of the District, County, Regional and Country level data are also undertaken.
- 13.43 To establish the baseline conditions and assess the potential effects of the Application on the local area, information has been obtained from the following sources;
- ONS, *Key Figures for Census – Key Statistics*, 2001 and 2011
 - ONS, *Interim 2011-based subnational population projections, persons by single year of age for local authorities in England*, 28 Sep 2012
 - ONS, *Age by Single Year*, 2011
 - ONS, *Economic Activity*, 2011
 - ONS, (NOMIS) *Claimant Count – Occupation*, 2013
 - ONS, *Distance Travelled to Work*, 2001
 - ONS, *Industry*, 2011
 - ONS, *Qualifications Gained*, 2011
 - ONS, (NOMIS) *Annual survey of hours and earnings*, 2012
 - ONS, *Occupation*, 2011

- ONS, *The Supply Side of Tourism - The Geography of Tourism Employment, 2012*

13.44 In respect of population and employment, information has been obtained at a national, regional and/or county, district and local level. Population projections have been included for the years 2014, 2015 and 2016 (when the construction and operational phase of the Proposed Development is anticipated).

Determining Significance of Effects

13.45 In this assessment, the Significance Matrix table presented earlier in Chapter 2 of the ES, has been used to define the level of significance of effects (**Table 13.3**).

Table 13.3: Significance of Effects

Sensitivity /Value of Receptor	Magnitude of Effect		
	High	Medium	Low
High (England, UK, International)	Major	Major/Moderate	Moderate
Medium (West Sussex, South East)	Major/Moderate	Moderate	Moderate/Minor
Low (Ward, Chichester)	Moderate	Moderate/Minor	Minor

13.46 In the context of the Proposed Development, local and borough level effects are those with a low value which affect receptors in the wards comprising the Study Area and Chichester District. County and Regional level effects are those with a medium value which affect receptors within West Sussex and the South East, whilst England or the UK is a high sensitivity/value receptor. Where an effect is considered to be not significant or have no influence, irrespective of other effects, this is classified as “negligible”.

13.47 This assessment is based on previous project experience and in consideration of other comparative projects. The assessment of effects is qualitative with the job creation figures based on previous project experience.

Baseline Conditions

13.48 The baseline economic conditions with regard to population and employment levels are provided below, based largely on ONS 2011 Census information and more recent ONS derived labour market statistics.

Population

13.49 In its current use, the Application Site consists of arable farmland and has no resident population. The Proposed Development would not result in a long term resident population although 2 key personnel would live on the site temporarily during drilling operations. This section of the Assessment therefore focuses on establishing the baseline population conditions and economic profile of the local, district, regional and national population.

13.50 According to the Census, in 2011 the population of the Study Area was 2,477 people with 113,794 people living in Chichester District which is a 9% increase from 2001 Census data which indicates that the Study Area had a population of 2,272 people. The total male population for the Study Area in 2011 is 1,203 (54,401 in Chichester) with the total female population being 1,274 people (59,393 in Chichester) which have increased by 7.2% and 10% respectively since 2001.

Table 13.4: Population increase from 2001-2011

Year	Study Area	Chichester	South East	England
2001	2,272	106,450	8,000,645	49,138,831
2011	2,477	113,794	8,634,750	53,012,456
% Change	+9%	+6.8%	+7.9%	+7.8%

Source: ONS, *Key Figures for Census - Key Statistics, Census data 2001 and 2011 (Ref. 13.9)*

13.51 **Table 13.4** shows that the population of the Study Area has increased at a greater rate in comparison to district, regional and national levels. Projected population increases are not available for the Study Area but ONS data indicates the following projected district,

county, regional and national population increases for the next 3 years (**Table 13.5**).

Table 13.5: Projected population increases from 2014-2016

Year	Chichester	West Sussex	South East	England
2014	117,257	833,047	8,897,919	54,548,568
2015	118,378	841,485	8,980,028	55,022,729
2016	119,497	849,917	9,060,665	55,480,580
% Change	+1.9%	+2%	+1.8%	+1.7%

Source: ONS, *Interim 2011-based subnational population projections, persons by single year of age for local authorities in England, dated 28 Sep 2012 (Ref. 13.10)*

13.52 **Table 13.5** sets out the population projections over the period 2014-2016 and demonstrates that the population of the district will increase as a result of natural growth (births, death, and migration) by 1.9% over this 3 year period. **Table 13.5** demonstrates that the Application Site is located in a district and county of above average growth rate when compared to the regional and national projections.

Age Profile

13.53 Data on age for the Study Area, district, regional and national level have been collected from the ONS (2011) with the number of people in each age range being converted to a % of the population (**Table 13.6**).

Table 13.6: Population Age Profile 2011 Census (%)

Age Band	Study Area	Chichester	South East	UK
<15	16.6%	15.3%	17.8%	17.7%
15-64	61.3%	60.3%	65.1%	65.9%
65+	22%	24.5%	17.2%	16.3%
Total (people)	2,477	113,794	8,634,750	53,012,456

Source: ONS, *Age by Single Year, 2011 (Ref. 13.11)*

13.54 Analysis of age profiles of the area demonstrate that in 2011 the Study Area and Chichester, in general had a higher proportion of people aged 65+ than the regional and national average, with the number of younger people (<15) and the working age population (15-64) being lower than the regional and national average. This indicates

that Chichester overall, has a high population of elderly people (almost a quarter of the total population) which is similar to the Study Area, and a lower than average level of young and working age people.

- 13.55 Population projections categorised by age bands (**Table 13.7**) demonstrate that by 2016 Chichester will have continued the trend of having a greater proportion of elderly residents than at a county, regional or national level. At a county level, West Sussex will also maintain a greater proportion of elderly people in comparison to other age bands. At a regional level the elderly population will exceed the younger population, whilst at a national level there will be a marginal difference of only +0.2% between the younger and elderly population. The working age population continues to provide the greatest proportion of the population in all four areas although it increases in proportion from a local to the national level.

Table 13.7: Projected Age Profile by 2016

Age Band	Chichester	West Sussex	South East	England
<15	15.7%	17.1%	18.1%	18%
15-64	57.9%	60.4%	62.8%	64%
65+	26.3%	22.4%	19%	17.8%
Total (people)	119,498	849,917	9,060,665	55,486,580

Source: ONS, Interim 2011-based subnational population projections, persons by single year of age for local authorities in England, dated 28 Sep 2012 (Ref: 13.10)

- 13.56 Based on the 2011 ONS data on population (**Table 13.4**) and the projected population increases to 2016 derived from 2012 ONS data (**Table 13.7**), at a local level Chichester is expected to increase in population by almost 6,000 people or 5%, compared to a national increase of around 4.6%.
- 13.57 The proportion of retirement age and elderly people is expected to continue rising, accounting for more than a quarter of the proportion of residents in Chichester by 2016 (26.3%). The proportion of the working population in Chichester looks set to decrease by around 2.5% by 2016 with the proportion of regional and national working populations also decreasing.

Economic Profile

13.58 The economic profile of the Study Area is identified below in **Table 13.8** along with District, regional and national figures on economic activity for 2001 to 2011. This table illustrates the economic activity and inactivity of all usual residents aged 16-74 from 2001 to 2011, and the changes during this 10 year period.

Table 13.8: Economic Activity from 2001 to 2011 – people, % and % change

Economic Activity	Year	Study Area	Chichester	South East	England
All usual residents; aged 16-74	2001	1,631	75,216	5,766,307	35,532,091
	2011	1,786 (+9.5%)	81,037 (+7.7%)	6,274,341 (+8.8%)	38,881,374 (+9.4%)
All usual residents; economically active	2001	1,090 (67%)	49,576 (66%)	4,037,629 (70%)	23,756,707 (67%)
	2011	1,301 (73%) (+6%)	56,102 (69%) (+3%)	4,521,184 (72%) (+2%)	27,183,134 (70%) (+3%)
All usual residents; economically inactive	2001	541 (33%)	25,640 (34%)	1,728,678 (30%)	11,775,384 (33%)
	2011	485 (27%) (-6%)	24,935 (31%) (-3%)	1,753,157 (28%) (-2%)	11,698,240 (30%) (-3%)

Source: ONS, *Economic Activity, 2001 and 2011* (Ref. 13.12)

13.59 As demonstrated in **Table 13.8**, the population of all usual residents aged 16-74 had increased by 9.5% since the previous Census in 2001 which was greater than the District, regional and national average. Of the 1,786 people in the Study Area, the labour supply comprised 1,301 economically active people (73%) which had increased by 211 people or +6% since 2001.

13.60 Economic inactivity was shown to have decreased by -6% in 2011 from 2001 which was better than the District, regional or national average. However, when the figures for “all usual residents economically active” are broken down to illustrate unemployment, the Census data indicates a rise in unemployment despite a rise in economic activity (**Table 13.9**).

Table 13.9: Unemployment and retirement from 2001 to 2011 – number of people, % of population and % change from 2001

Economic Activity	Year	Study Area	Chichester	South East	England
All usual residents; aged 16-74	2001	1,631	75,216	5,766,307	35,532,091
	2011	1,786 (+9.5%)	81,037 (+7.7%)	6,274,341 (+8.8%)	38,881,374 (+9.4%)
All usual residents economically active; unemployed ¹	2001	26 (1.5%)	1,403 (1.8%)	133,481 (2.3%)	1,188,855 (3.3%)
	2011	48 (2.6%) (+1.1%)	2,267 (2.7%) (+0.9%)	216,231 (3.4%) (+1.1%)	1,702,847 (4.3%) (+1%)
All usual residents economically inactive; retired	2001	265 (16.0%)	13,673 (18.1%)	772,936 (13.4%)	4,811,595 (13.5%)
	2011	285 (15.9%) (-0.1%)	14,773 (18.2%) (+0.1%)	859,293 (13.6%) (+0.2%)	5,320,691 (13.6%) (+0.1%)

Source: ONS, *Economic Activity, 2001 and 2011 (Ref. 13.13)*

13.61 **Table 13.9** illustrates that the population of the Study Area which is unemployed has almost doubled from 26 people in 2001 to 48 people in 2011, and the percentage of the Study Area in unemployment has increased by +1.1% to 2.6% of the total population. This is a greater increase than the District and national average but equal to the regional figures.

13.62 In 2011 the number of those in retirement has increased by 20 people although as a percentage of the population, the number of those in retirement has actually decreased by -0.1% with 15.9% of the Study Area population being in retirement. This was similar to the District level figure of 18.2% for 2011 but almost 5% higher than the regional and national figure of 13.6%.

13.63 In summary, **Table 13.9** demonstrates that the Study Area experienced a significant increase in unemployment from 2001 to 2011, above that of the District and national average although equal to regional figures. The Study Area also has a high proportion of retired residents although as a percentage of the total population this had decreased marginally in 2011 compared to 2001.

¹ A person is defined as unemployed if he or she is not in employment, is available to start work in the next 2 weeks and has either looked for work in the last 4 weeks, or is waiting to start a new job.

13.64 Further details on unemployment levels in the Study Area can be obtained through the examination of economically active residents claiming Job Seekers Allowance (JSA). ONS data is supplied via NOMIS and **Table 13.10** shows annual data on claimant counts from before the recession to 2013.

Table 13.10: Number of JSA Claimants from 2008 to 2013 – number of people

Date	Study Area	Chichester	West Sussex	England
March 2007	10	838	6,102	797,609
March 2008	13	722	5,497	700,433
March 2009	29	1,544	13,373	1,272,858
March 2010	41	1,631	13,841	1,333,659
March 2011	22	1,420	11,827	1,246,554
March 2012	24	1,482	12,147	1,370,504
March 2013	17	1,408	10,781	1,295,436

Source: ONS, (NOMIS) JSA Claimants, 2013 (Ref. 13.14)

13.65 The data on JSA claimants for the Study Area from just before the recession, shows that in 2007 the claimant count for the Study Area was 10 people which peaked 3 years later in 2010 at 41 people. This number decreased to 22 people in 2011 but rose slightly again the following year, before falling to the recent rate of 17 people in 2013. This shows that the Study Area has been subject to increases and fluctuations in JSA claimant counts since the economic recession and current JSA claimant figures are still above pre-recession figures.

13.66 Further details on the types of jobs which are sought can be obtained via NOMIS and data on job seekers by occupation is rounded up to the nearest 5. Due to the small size of the Study Area, there were no numerical results for any of the occupations listed because of the rounding up of figures to 5. However data is available at a district, county, regional and national level.

13.67 To understand the potential economic impacts arising from the Proposed Development and the potential impact on tourism, **Table 13.11** identifies the number of claimants for occupations associated with tourism and the National Park (green), and a number of occupations associated with the Proposed Development (blue). Occupations which overlap between the three have been left blank.

Table 13.11: JSA Claimants by occupation from 2012/13

Occupation	Chichester	West Sussex
Kitchen and catering assistants	35	245
Customer care occupations	10	220
Labourers in building and woodworking trades	25	215
Bar staff	25	165
Labourers in other construction trades	15	110
Waiters and waitresses	10	90
HGV drivers	5	40
Construction trades	5	40
Sales related occupations	0	25
Restaurant and catering manager	0	20
Construction operatives	0	20
Road construction operatives	0	20
Hotel porter	0	15
Transport and distribution managers	0	10
Hotel and accommodation manager	0	5
Leisure and theme park attendants	0	5
Travel and tour guides	0	0
Transport operatives	0	0
Countryside and park rangers	0	0

Source: ONS, (NOMIS) Claimant Count – Occupation, 2013 (Ref. 13.14)

13.68 The data indicates that there is little demand for jobs relating to attractions and leisure activities at a District and county level although there is a significant demand for jobs which support tourism including food, drink and accommodation, and customer service roles including kitchen and catering assistants, customer care occupations and bar and waiting staff.

13.69 **Table 13.11** also shows that there is significant demand for construction and labouring roles with approximately 40 residents of Chichester seeking employment as construction labourers, 5 residents as HGV drivers and 5 in the construction trades.

13.70 At a county level, which could also provide the labour supply for the Proposed Development, around 325 residents were seeking employment as labourers, 40 as HGV drivers, 40 in the construction trades and 25 as road and construction operatives.

13.71 During construction and operation of the Proposed Development, workers would

support a number of local businesses including hotels, food and drink services, and customer care occupations.

Distance of Travel to Work

13.72 Census data on the “Distance of Travel to Work” is not yet available for 2011 but 2001 data indicates that a high proportion of residents in the Study Area (29%) travel between 10km and 30km for employment. By comparison at a district level only 21% travel this distance, whilst at a regional and national level the proportion is 20% for each (Ref. 13.10).

13.73 This represents a particularly high percentage of ‘out commuting’ compared to Chichester or the South East overall where the highest percentage of commuters travelled less than 2km for employment. This considerable disparity indicates a need for increased employment opportunities closer to home.

Employment by Industry

13.74 According to 2011 Census data on “Industry” the local economy within the Study Area is primarily driven by the Wholesale and Retail Trades (G), Construction (F) and Education (P) as illustrated in **Table 13.12**.

Table 13.12: Main Sectors of Employment 2011

Industry	Study Area	Chichester	South East	England
G Wholesale and Retail Trade; Repair of Motor Vehicles and Motor Cycles	1	1	1	1
F Construction	2	4	4	5
P Education	3	3	3	3
M Professional, Scientific and Technical Activities	4	5	5	6
N Administrative and Support Service Activities	5	10	10	10
R,S Arts, Entertainment and Recreation; Other Service Activities	6	9	12	11
Q Human Health and Social Work Activities	7	2	2	2
C Manufacturing	8	6	6	4
I Accommodation and Food Service Activities	9	7	11	8
H Transport and Storage	10	12	9	9
A Agriculture, Forestry and Fishing	11	14	16	15
J Information and Communication	12	11	8	13

K Financial and Insurance Activities	13	13	13	12
O Public Administration and Defence; Compulsory Social Security	14	8	7	7
L Real Estate Activities	15	15	14	14
T Activities of Households as Employers; Undifferentiated Goods - and Services - Producing Activities of Households for Own Use	16	17	18	19
E Water Supply; Sewerage, Waste Management and Remediation Activities	17	16	15	16
D Electricity, Gas, Steam and Air Conditioning Supply	18	18	17	17
B Mining and Quarrying	19	19	19	18
U Activities of Extraterritorial Organisations and Bodies	20	20	20	20

Source: ONS, *Industry, 2011 (Ref 13:15)*

- 13.75 Administrative and Support Service Activities (N), Arts, Entertainment and Recreation (R, S) and Accommodation and Food Service Activities (I) are also important employment sectors for the Study Area (ranked 5, 6 and 9) but less so for the District (ranked 10, 9 and 7), Regionally (ranked 10, 12 and 11) and Nationally (ranked 10, 11 and 8), except for Accommodation and Food Services which is of importance to the District.
- 13.76 Mining and Quarrying (B) is currently one of the smallest employment sectors and is ranked 19 at all levels except nationally where it is ranked as the 18th largest employment sector.
- 13.77 **Table 13.12** indicates that whilst Wholesale and Retail Trade and Education are the largest and third largest employment sectors for all four areas, Construction is the fourth largest employment sector for Chichester and the South East, and fifth for England as a whole compared to second for the Study Area.
- 13.78 Health and Social Work (Q) is the second largest employment sector for all areas except the Study Area indicating the availability of a readily available workforce in proximity to the Application Site (**Table 13.13**).

Table 13.13: The largest employment sectors

Economic Activity	Study Area	Chichester	South East	England
All usual persons; aged 16-74 in employment	1,249	53,285	4,260,723	25,162,721
Largest Employment Sector	G) Wholesale/ Retail 14.6%	G) Wholesale/ Retail 15.2%	G) Wholesale/ Retail 15.6%	G) Wholesale/ Retail 15.9%
2 nd Largest Employment Sector	F) Construction 11%	Q) Health/ Social Work 13.3%	Q) Health/ Social Work 11.6%	Q) Health/ Social Work 12.4%
3rd Largest Employment Sector	P) Education 8.9%	P) Education 10.2%	P) Education 10.1%	P) Education 9.9%

Source: ONS, *Industry, 2011 (Ref. 13.15)*

13.79 **Table 13.13** illustrates that 11% of all usual persons aged 16-74 in the Study Area are employed by the Construction industry which is equal to 137 people. **Table 13.9** has already indicated that there are a number of construction workers seeking employment and currently claiming JSA. To ensure the future economic viability and vitality of the District it will prove important to boost opportunities within other key employing sectors, not least of all Construction where an experienced labour force already exists.

13.80 **Table 13.14** below indicates that since 2001 there has been a 34.6% increase in the number of people in the Study Area who are employed in Skilled Trades Occupations although in respect of the number of people, this represents an increase of 17 people.

Table 13.14: Change in Skilled Trades Occupations – persons (%) in employment

Occupation	Year	Wisborough Green	Chichester	South East	England
All usual residents aged 16-74 in employment	2001	1,063	47,996	3,888,756	22,441,498
	2011	1,249 (+17.4%)	53,285 (+11%)	4,260,723 (+9.5%)	25,162,721 (+12.1%)
Skilled Trades Occupations; Skilled Construction and Building Trades	2001	49	2,020	138,659	788,978
	2011	66 (+34.6%)	2,342 (+15.9%)	168,339 (+21.4%)	976,710 (+23.7%)

Source: ONS, *Industry, 2001 and 2011 (Ref. 13.15)*

13.81 This increase is greater than in other parts of the district, region and country although these areas have had a less significant increase in population when compared to the Study Area.

Qualifications

13.82 Examination of the qualification levels of those residents aged 16+ at the time of the 2011 Census (**Table 13.15**), demonstrates that the population of the Study Area has a low proportion of people with no qualifications, and at a district, regional and national level has the highest proportion of people with GCSE and A Levels. The Study Area is also more highly qualified than the overall population at a national level.

Table 13.15: Qualifications from 2011 Census

Qualification Level	Study Area	Chichester	South East	England
No qualifications	7.4%	8.8%	8.8%	10.7%
GCSE/A Level	63.4%	61.2%	61.9%	60.8%
Degree/NVQ4+/HND/ Professional Grade	29%	29.9%	29.2%	28.3%

Source: ONS, Qualifications Gained, 2011 (Ref. 13.16)

13.83 Higher levels of qualified residents coupled with higher incidences of lengthy commuting distances could indicate a need for increased levels of more specialist or technical based employment to be generated locally. This would seem to be substantiated by the ONS data supplied at **Table 13.13** which indicates that the highest volume of occupations available within Chichester tends to be Wholesale/Retail, and Construction based.

Average Earnings

13.84 Comparison of the earning capacity of workers resident in Chichester in 2012 demonstrates that the average weekly and annual income of workers was approximately 3% higher than in West Sussex generally (**Table 13.16**) but lower than regional averages.

Table 13.16: Average Earnings 2012

Earnings	Chichester	West Sussex	South East	England
Average weekly pay – gross	£530.10	£516.30	£555.80	£512.70
Average annual pay - gross	£28,111	£27,128	£29,491	£26,804

Source: ONS, (NOMIS) Annual survey of hours and earnings, 2012 (Ref. 13.17)

Economic Profile Summary

13.85 The Application Site is located in a district that demonstrates a rising unemployment trend over time with economically active residents actively seeking employment opportunities in sectors such as Construction.

13.86 There has been an historical need for residents of Chichester to travel above average distances to reach suitable employment but analysis has shown that employment provided within Chichester is more highly paid than in the County generally.

Tourism

13.87 Tourism and tourism related occupations including leisure and recreation services, accommodation, and food and beverage services support a number of jobs and businesses in the Study Area and District where there is a greater dependency on these sectors than at a regional and national level (**Table 13.17**).

13.88 These sectors are not totally attributed to the tourism industry but reflect the growth in roles that are associated with tourism in the Study Area.

Table 13.17: Change in leisure and customer service occupations – persons (%) in employment

Occupation	Year	Wisborough Green	Chichester	South East	England
All usual residents aged 16-74 in employment	2001	1,063	47,996	3,888,756	22,441,498
	2011	1,249 (+17.4%)	53,285 (+11%)	4,260,723 (+9.5%)	25,162,721 (+12.1%)
Caring, Leisure and Other Service Occupations	2001	6.8%	7.9%	6.9%	6.8%
	2011	7.8% (+1%)	9.7% (+1.8%)	9.3% (+2.4%)	9.3% (+2.5%)
Sales and Customer Services Occupations	2001	3.9%	6.7%	7.3%	7.6%
	2011	4.8% (+0.9%)	7% (+0.3%)	7.9% (+0.6%)	8.4% (+0.8%)

Source: ONS, *Occupation, 2001 and 2011 (Ref: 13.18)*

13.89 **Table 13.17** indicates that the proportion of occupations in tourism related services has grown over the last 10 years by 1% in caring, leisure and other service occupations, and just under 1% in Sales and Customer Services Occupations within the Study Area. The latter exceeds the level of growth elsewhere in the country. Growth of caring, leisure and other service occupations has grown at a lower rate in comparison to district, regional and national levels.

13.90 More specific data published by the ONS in “The Supply Side of Tourism, The Geography of Tourism Employment” (2012), indicates that 11.4% of employment in West Sussex between 2010/11 involved a main or second job in tourism which was the 17th highest out of 135 NUTS3 level areas. It also showed that 5.3% of employment as a main or second job is dependent on accommodation and food/beverage serving (ranked 48th/135 NUTS3 areas). In addition 6.1% of employment is depend on passenger transport, vehicle hire, travel agency, cultural, recreation, sporting and conference activities as main or second job (ranked 2nd/135 NUTS3 areas).

Existing Mineral Developments

13.91 There are a number of existing oil and gas developments in West Sussex and the South Downs National Park which can be seen alongside the Application Site on **Figure 13.2**.

This includes the following sites in **Table 13.18**, none of which are owned or operated by the Applicant, and most of which fall within the South Downs National Park.

Table 13.18: Existing well sites in West Sussex and the South Downs National Park

Well Site	District	County	Active since (circa)	Approved activity and application history from Council search
Humbly Grove	Basingstoke and Deane	Hampshire	1980	Exploratory borehole drilled in 1980 with further sidetrack wells in 1992, currently used for production, power generation, gas treatment and storage. <i>Applications in 1979, 1984, 1992, 1996, 1999 and 2005.</i>
Singleton	Chichester	West Sussex and South Downs	1980's	Multiple wells, gas generators installed and in production <i>Applications in 1991, 1993, 1994, 2007</i>
Storrington	Horsham	West Sussex and within c.15m of South Downs	1986	Multiple wells, gas generators and turbines, and in production <i>Applications in 1994, 1996, 1998, 2000 and 2013</i>
Lidsey	Arun	Hampshire	1987	Borehole drilled and re-entered in 1997, oil extracted since 2007 <i>Applications in 1985, 1987, 1988, 1992, 1997, 1999, 2001, 2003 and 2005.</i>
Hordean B	East Hampshire	Hampshire	1994	Borehole drilled and oil produced since 1995 <i>Applications in 1994, 1999 and 2010</i>
Hordean C	East Hampshire	Hampshire and South Downs	1990's	Multiple wells and in production <i>Applications in 1994, 1999 and 2010</i>
Hordean X	East Hampshire	Hampshire and South Downs	1990's	Multiple wells and in production <i>Applications in 1994, 1999 and 2010</i>
Avington	Chichester	West Sussex and South Downs	2003	Multiple wells <i>Applications in 2003, 2004 and 2008</i>
Markwell's Wood	Chichester	West Sussex and South Downs	2010	Borehole drilled and testing phase carried out <i>Applications in 2009 and 2013</i>

Source: Internet and online planning history search via West Sussex and Hampshire County Council websites, 2013²

13.92 Some additional examples from outside the South Downs and West Sussex have been included as further evidence to illustrate the existing baseline conditions of oil and gas

² The Table is based on the information available with some application dates based on when activity took place as the application history was not available.

developments in the area.

Existing tourist facilities

- 13.93 VisitEngland, the UK's tourist board, surveys and collects data from tourists which is then presented in the "Annual Survey of Visits to Visitor Attractions". Using the "Full Attraction Listing" for 2011 the existing tourist facilities for West Sussex, the South Downs and Hampshire ("the tourism study area") where there are existing oil and gas facilities, can be identified (**Appendix 13.1**). The location of these tourist facilities including the Application Site can be seen in **Figure 13.3**.
- 13.94 There are tourist attractions in proximity to existing operational oil and gas well sites and production facilities in West Sussex and Hampshire and either within, on the periphery of or outside of the South Downs National Park. The Singleton well site which was originally developed in the 1980's is located in the centre of the National Park near to the Weald and Downland Open Air Museum and West Dean Gardens which were the 3rd and 9th most visited tourist attractions in the tourism study area in 2011. The Weald and Downland Open Air Museum saw an +8.4% increase in visitor numbers from 2010-11, up to 139,204 visits. The most visited attraction in the tourism study area - Marwell Wildlife (424,972 visits), is around 7km south of the Avington well and the attraction with the biggest decrease in visitors from 2010-11 – The Westgate Museum, is 6km west. There are a number of wells in the southern western part of the South Downs at Horndean and Markwell's Wood with the latter having only recently been developed in the last 3 years. Stansted House just 2.8km south of Markwell's Wood and 4km south east of Horndean C saw a +43.5% increase in visitors from 2010-11.
- 13.95 The Application Site is located away from the main cluster of tourist attractions which fall around Horndean, Markwell's Wood, Singleton and Lidsey in the southern part of the South Downs towards the coast which is itself a tourist attraction. The nearest tourist attraction to the Application Site is Fishers Adventure Farm Park which was the 5th most visited attraction in the tourism study area in 2010-11. A similar facility – the Aldingbourne Country Centre and Open Farm, is located 3.7km north of the Lidsey well

but experienced an increase in visitors from 2010-11 of +66.7% making it the 12th most visited attraction in the tourism study area.

Public Rights of Way (PROW)

- 13.96 PROWs help to facilitate recreation and enjoyment of the countryside and National Parks in the UK. In **Appendix 13.2** plans illustrating existing well site locations and the Application Site, and their proximity to PROW can be seen. The plans do not take into consideration designations such as ancient woodland, Sites of Nature Conservation Importance or Special Protection Areas, they are maps which a tourist may use to navigate the PROWs.
- 13.97 There are a number of existing well sites including Horndean B, Markwell's Wood and Lidsey which are almost immediately adjacent to PROW or bridleways. Similarly Avington, Storrington, Singleton and Horndean C and X, are in proximity to National Trails in some cases where the well sites may be visible. In permitting these existing developments it is clear that it was concluded that no significant detriment would result and there is no indication that these PROW have been impacted as tourism in the area has grown as an industry.
- 13.98 The closest PROW to the Application Site includes a footpath (PROW ref. 768) approximately 100m to the north which does not cross the Application Site but runs in a westerly direction from its junction with Kirdford Road towards Kirdford. A second PROW, a bridleway (PROW ref: 2851/1) is 625m to the west, running in a westerly direction for 125m and then turns running northwards. A third PROW lies at approximately 625m from the Application Site and runs between Kirdford Road and a small lane off the A272 on the western edge of Wisborough Green.
- 13.99 As discussed previously, policies seek to promote opportunities for understanding and quiet enjoyment of the National Parks special qualities. From the 1980's there is a long running and successful history of oil and gas exploration in the National Park and previously the AONB, and the geology of the National Park and British countryside now

forms a part of its heritage and landscape. The Government is promoting strategies for increased energy efficiency including use reduction, improved design and build, and habitual changes. Helping people to understand where our energy comes from - the ground, air and sun rather than a switch or appliance, is an important part of supporting the Government's long term energy strategy.

13.100 Tourism and recreation can take many different forms as do people's perception of the countryside and its special qualities. For example, Geocaching is an outdoor recreational activity in which participants use Global Positioning System (GPS) or other navigational equipment to hide and seek "geocaches". These caches are waterproof containers that include a logbook where the geocachers enter the date they found the location and sign the log. Some of the well sites of Hampshire and West Sussex have been included in a geocaching series called "Oil's Well That Ends Well" that hopes to show "the sites that are quietly contributing to the oil production of the world" (**Appendix 13.3**). The geocaching.com website logs some of the visitors who have discovered the cache which includes visits to the following – Singleton (2 sites – 283), Lidsey (138) and Storrington (131). Policies for the South Downs National Park promote opportunities for understanding and quiet enjoyment of the area's special qualities.

Likely Significant Effects

Effects on Population, Housing, Healthcare and Education

All Phases

13.101 The effects on population could be considered to include impacts on residential amenity including visual impact (Chapter 7), noise (Chapter 9), transport and access (Chapter 10) and lighting (Chapter 12). There will be some views of the rig during operation although lower and middle parts of the rig and site will be mostly screened from view of properties and from the South Downs National Park (**Figure 13.4**). In respect of noise based on the worst case scenario there may be some short term audible noise during construction and operation during daylight hours only. There will be an increase in traffic

movements mostly during construction resulting in minor effects from disturbance and delivery of unconventional loads. Existing ambient lighting levels will be affected due to the functional, health and safety lighting of the rig and equipment.

13.102 The results of the environmental surveys particularly ecology (Chapter 7) and archaeology provide up to date information on the local environment and heritage which may be of interest or use to residents or other local bodies such as the EA and Natural England. There will therefore be some minor beneficial impacts on education.

13.103 As the Proposed Development comprises commercial activity only and will not generate an increase in population, there will be negligible effects on housing or community provisions such as healthcare.

Effects on Industry, Employment and Economy

13.104 The Application Site is currently used in association with the existing agricultural operations of Hookhurst Farm, and is maintained and used as arable land. The Proposed Development would not prohibit the continued use and operation of the farm and provides a suitable method of agricultural diversification which supplements the farms existing income. Should hydrocarbons be discovered, the Application Site would provide a steady income for the farm over a long term period, and similarly, if no hydrocarbons are discovered the land would be returned to its former use and therefore the farm will not suffer any loss from the Proposed Development.

Phase 1 – Construction of the access road and well site

13.105 Based on experience of previous schemes, during the construction phase, it is expected that 12 construction workers will be employed. It would be the intention of the Applicant, where practicable, to resource labour from the local community creating 12 temporary jobs. During this phase, the Proposed Development is also expected to support local trades. It is envisaged that considerable indirect employment and economic benefit will be experienced through the purchase of local services and

products; the most significant being the procurement of locally supplied aggregates, timber, and associated construction materials which will be in addition to the day-to-day needs of the workforce such as meals, refreshments etc. It is, therefore, considered that Phase 1 of the Proposed Development will have a moderate/minor beneficial effect.

Phase 2, Phase 3a and Phase 3b – Mobilisation, and Testing

13.106 Phase 2, Phase 3a and Phase 3b of the Proposed Development will primarily require the employment of specialist engineers and a crew of approximately 22 workers who operate the technical equipment for this phase of the Proposed Development. These phases will, however, not only provide employment for the crew for the period of drilling and testing but will also provide indirect employment for local businesses such as restaurants, cafes, public houses, foodstores and fuel stations. As, at this juncture, the necessary works will take the form of a 24 hour operation it is envisaged that some workers will be accommodated on-site. However, not all crew are accommodated in this way, so there would be an additional boost to the local economy, in the form of need for Bed and Breakfast or local hotel accommodation.

13.107 In addition to the creation of jobs during the construction and operation phases, the Proposed Development would also strengthen the local rural economy by providing an alternative means of income for the landowner. The Application Site forms part of a larger agricultural field which is currently used for crops. Following the completion of the testing phase, if commercial quantities of hydrocarbons are not discovered the land will be restored back to its former use in accordance with a restoration plan which prior to commencement will be agreed with the landowner and West Sussex County Council. It is considered that the Proposed Development will have a beneficial impact on the economic viability of the farm.

13.108 Overall, it is considered that Phase 2, Phase 3a and Phase 3b of the Proposed Development will have a moderate/minor beneficial effect on the employment and the local economy.

Phase 4a - Restoration

13.109 During the final phase when full restoration of the Application Site will take place, temporary employment for approximately 10 workers ranging from construction workers to landscapers will be generated. Once again, local labour and businesses will be sought to complete this phase of development resulting in a direct benefit to local employment and an indirect benefit to local suppliers of construction and landscaping services and products.

13.110 Following cessation of works, the removal of oil and gas activities from the site will result in a minor adverse impact on businesses and the local supply chain including shops, accommodation and recreational facilities used by the staff employed on the site. There will also be an impact on the local economy through the loss of employee spending.

13.111 On completion of the restoration works, the Application Site will return to greenfield status and agricultural use which in turn will support the local economy through the production of commercial goods. Overall, it is considered that Phase 4a will have a minor beneficial effect.

Phase 4b – Retention

13.112 Should it prove feasible, following the outcome of Phase 3a or Phase 3b, that the Application Site has potential to become a production site (an outcome which would make a significant contribution to employment and the local economy in general), there will follow a period of retention whilst appropriate planning consent is sought for appraisal or production. During this period, it is less likely that the site will generate any significant employment other than any maintenance or security measures that may be required. Phase 4b, therefore, is considered to have a negligible effect.

13.113 In summary, an approximate total of 44 temporary jobs will be created by the Proposed Development which will include a wide range of occupations from management to general labour and specialism ranging from engineering to landscaping. In addition, a

boost to the local economy will be experienced from the personal needs of the workforce such as accommodation and meals, to the wide ranging product and service needs of the development such as aggregates, fencing, plant hire and plant maintenance.

13.114 The provision of direct employment for 44 people and indirect employment for local businesses in an area identified as experiencing rising unemployment and comprising district-wide unemployment claimants seeking compatible trades is considered to have an overall effect ranging from negligible to moderate/minor beneficial effect.

Effects on Tourism

All Phases

13.115 There are a number of existing oil and gas developments in the South Downs, West Sussex and Hampshire with tourist facilities located in and around the tourism study area. Some tourist attractions have experienced increases or decreases in visitor numbers but this does not relate directly to the presence of oil and gas facilities because there is no correlation between fluctuations and the location of existing sites.

13.116 The nearest tourist attraction to the Application Site is Fishers Adventure Farm Park and there is a similar tourist attraction in proximity to the Lidsey well which saw more than a 60% increase in visits in 2011. This indicates that the presence of oil and gas facilities does not detriment the tourism and visitor numbers to local attractions. The Application Site will not be visible from the nearest tourist attraction as concluded by viewpoint 40 on Figure 6 in Chapter 8 – Landscape and Visual Impact. Other than some short term temporary visual impacts during drilling operations, Chapter 8 Landscape and Visual Impact, concludes that the Proposed Development will not have a long term detrimental visual impact on PROW, the National Park or the wider countryside.

13.117 In respect of noise, based on the worst case scenario there will be some temporary increases in noise at the edge of PROW 768, 100m north of the Application Site but this

will be within acceptable limits, temporary and negligible, and is not anticipated to be of detriment to visitors' enjoyment of the countryside. There will be an increase in traffic movements mostly during construction resulting in minor effects from disturbance and delivery of unconventional loads. As these tourist facilities are existing, the traffic associated with visitors will already be accounted for in the baseline conditions for Chapter 10 – Transport and Access, and will therefore not increase effects above those already identified. Existing ambient lighting levels will be affected due to the functional, health and safety lighting of the rig and equipment but will only be used at night rather than when tourist attractions are open during the day.

Mitigation Measures

Effects on Population, Housing, Healthcare and Education

All Phases

13.118 In respect of noise, based on the worst case scenario there may be some short term audible noise during construction and operation during daylight hours only. As set out in Chapter 9 Noise, quiet working methods would be adopted where possible. Mitigation measures would include avoidance of unnecessary revving of engines, switching off equipment when it is not required, minimising the drop height of materials, and starting up plant and vehicles sequentially rather than all together. The temporary impacts of construction traffic will not create significant transport effects, and minor adverse impacts from disturbance and delivery of unconventional loads will be mitigated through a Traffic Management Plan (TMP).

13.119 Existing ambient light conditions at the Application Site will be altered but these effects will be negligible, being temporary and largely localised to the functional lighting of the Proposed Development which will be downwards and inwards facing. There is no single direct view into the Application Site but there will be some views of the rig during operation. These impacts will be temporary and the site will otherwise be screened by woodland and is not adjacent to a PROW. Impacts on population or residential amenity

are therefore addressed with mitigation elsewhere in the ES.

13.120 The Applicant has also proposed that they will seek to work with local schools and encourage opportunities for education and learning on geology and engineering which would lead to longer term, minor beneficial effects. The provision of up to date environmental surveys on some of the surrounding designations and species including bats, can also provide minor beneficial effects as a result of better knowledge and understanding of the local environment. No mitigation measures are therefore proposed. However, ecological enhancements measures are being proposed which are detailed in Chapter 7 Ecology.

13.121 No further mitigation measures are required during the four phases (construction, operation, testing, restoration or retention) as no adverse effects are expected.

Effects on Industry, Employment and Economy

All Phases

13.122 The provision of direct employment for the four Phases of development and indirect employment for local businesses and services will result in moderate to minor beneficial effects. As no adverse effects are expected no mitigation is required.

Effects on Tourism

All Phases

13.123 Existing examples indicate that fluctuations in visitor numbers cannot be directly linked to the presence of oil and gas facilities in proximity, but it does indicate that they do not have a detrimental impact on tourism because tourist attractions near oil and gas facilities are still experiencing increases in the number of visitors. No mitigation is therefore proposed for the amenity of existing tourist attractions.

13.124 The transport movements for the existing tourist attractions will already be included in the baseline conditions of the Transport Assessment and therefore no additional mitigation measures are proposed above those in Chapter 10.

13.125 Chapter 8 has concluded that the site and rig will not be visible from the nearest tourist attraction – Fisher Adventure Farm Park, and the Application Site is not directly adjacent to a PROW, and therefore no additional mitigation measures are proposed. There may be some short term increases in noise to the nearest PROW to the north but these impacts will be negligible and therefore no mitigation is required.

13.126 Chapter 12 has concluded that lighting should be inwards and downwards facing and therefore no additional mitigation measures are proposed other than those already prescribed.

Residual Effects

All Phases

13.127 During all four phases the effects of the Proposed Development on population, housing, health, education, employment and tourism are expected to be either negligible or beneficial. Therefore the residual effects of the proposals are considered to be negligible to moderate/minor beneficial.

Summary

13.128 The Proposed Development is anticipated to generate employment for approximately 44 people in trades identified as having a readily available labour force. In addition, considerable indirect economic vitality will be introduced to the district through the procurement of locally supplied services and materials.

13.129 The Proposed Development will also provide opportunities for education and understanding which are of benefit to residents, schools and other local bodies or

interest groups. Moreover, the Proposed Development supports agricultural diversification and provides a steady income to supplement an existing agricultural business.

13.130 Overall, the Proposed Development is anticipated to produce a negligible to moderate/minor beneficial effect on the socio economic conditions with the Study Area and Chichester District, generally as summarised in **Table 13.19** below.

Table 13.19: Table of Significance – Socio-Economics

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate /Minor) (Beneficial/Adverse/ Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/ Minor) (Beneficial/Adverse/ Negligible)
				I	UK	E	R	C	D	L	
Phase 1: Construction of the access road and well site											
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required						*	*	Minor Beneficial
Effects on industry, employment and economy	Temporary	Moderate/Minor Beneficial	None Required						*	*	Moderate/Minor Beneficial
Effects on tourism	Temporary	Negligible	None Required						*	*	Negligible
Phase 2: Mobilisation of the drill rig and drilling operations											
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required						*	*	Negligible
Effects on industry, employment and economy	Temporary	Moderate/Minor Beneficial	None Required						*	*	Moderate/Minor Beneficial
Effects on tourism	Temporary	Negligible	None Required						*	*	Negligible
Phase 3a: Testing and evaluation - gas											
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required						*	*	Minor Beneficial
Effects on industry, employment and economy	Temporary	Moderate/Minor Beneficial	None Required						*	*	Moderate/Minor Beneficial

Effects on local economy	Temporary	Minor Beneficial	None Required							*	*	Minor Beneficial
Phase 3b – Testing and evaluation - oil												
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required							*	*	Minor Beneficial
Effects on industry, employment and economy	Temporary	Moderate/Minor Beneficial	None Required							*	*	Moderate/Minor Beneficial
Effects on tourism	Temporary	Negligible	None Required							*	*	Negligible
Phase 4a: Restoration												
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required							*	*	Minor Beneficial
Effects on industry, employment and economy	Temporary	Minor Beneficial	None Required							*	*	Minor Beneficial
Effects on tourism	Temporary	Negligible	None Required							*	*	Negligible
Phase 4b: Retention												
Effects on population, housing, healthcare and education	Temporary	Negligible to Minor Beneficial	None Required							*	*	Minor Beneficial
Effects on industry, employment and economy	Temporary	Negligible	None Required							*	*	Negligible
Effects on tourism	Temporary	Negligible	None Required							*	*	Negligible

*** Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; D = District; L = Local

References (Ref)

- 13.1 DTI, Energy White Paper – Meeting the Energy Challenge, 2007
- 13.2 DCMS, Government Tourism Policy, 2011
- 13.3 DCLG, National Planning Policy Framework, 2012
- 13.4 WSCC, Supporting Economic Growth in West Sussex 2012 – 2020
- 13.5 South Downs Joint Committee, The South Downs Management Plan 2008 – 2013
- 13.6 TSE Research, South Downs Visitor and Tourism Economic Impact Study, 2013
- 13.7 CDC, Chichester District Council (CDC) Local Plan, 1999
- 13.8 CDC, An Economic Strategy for Chichester District 2013 - 2019
- 13.9 ONS, Key Figures for Census - Key Statistics, Census data 2001 and 2011
- 13.10 ONS, Interim 2011-based subnational population projections, persons by single year of age for local authorities in England, 2012
- 13.11 ONS, Age by Single Year, 2011
- 13.12 ONS, Economic Activity, 2001 and 2011
- 13.13 ONS, Economic Activity, 2001 and 2011
- 13.14 ONS, (NOMIS) JSA Claimants, 2013
- 13.15 ONS, Industry, 2011

13.16 ONS, Qualifications Gained, 2011

13:17 ONS, (NOMIS) Annual survey of hours and earnings, 2012

13.18 ONS, Occupation, 2001 and 2011

14.0 SUMMARY OF SIGNIFICANCE

14.1 This chapter summarises any likely significant effects of the Proposed Development and concludes the ES.

Ecology

14.2 The Application Site is, in part, located on agricultural land used for intensive commercial farming. Careful stripping of soil and separate storing of top and subsoil would lessen adverse effects.

14.3 The proposed access road has been routed in order to protect natural and ancient woodland at close proximity to the site. By avoiding encroachment on tree root protection zones and implementing of protective tree fencing, adverse effects can be reduced.

14.4 Lighting would be downward and inward facing where possible to reduce light spillage from the Application Site and avoid adverse effects on ecology, particularly bats.

14.5 Due the careful design of the Proposed Development, its small scale and temporary nature, no significant adverse effects on ecology are predicted.

Landscape and Visual Impact

14.6 The introduction of industrial elements to the otherwise rural Application Site is determined as having a moderate to major adverse effects on the landscape character. Restoration of the Site however would reverse these effects and, over time, make them negligible.

14.7 Views from Kirdford Road would be the most significantly affected by the Proposed Development and are due to the height of the drilling rig. The surrounding wooded land

does however work to obstruct much of the Site, keeping the visual impact from public viewpoints minimal.

Noise and Vibration

- 14.8 Noise would be generated during the construction, mobilisation and drilling phases of the Proposed Development. The impact of this on nearby residents and on ecology would be temporary and mitigated by means of restricted working hours and best practice working methods implemented through a Construction Environmental Management Plan.
- 14.9 Noise and vibration effects during all phases of the Proposed Development are assessed as negligible with suitable mitigation measures in place.

Transport and Access

- 14.10 Construction traffic would amount to less than 30% of total daily traffic volumes on the identified construction traffic access routes. No significant transport effects are therefore expected to arise as a consequence of traffic volumes.
- 14.11 There is the potential for minor adverse impacts to arise as a consequence of disturbance and the delivery of unconventional loads during construction. A Traffic Management Plan (TMP) would be prepared and agreed with the highways authority to mitigate this.
- 14.12 With mitigation measures in place, effects would be negligible with respect to transport and access.

Ground and Groundwater Protection

- 14.13 The risk of groundwater pollution is low but would also be reduced further by the best practice drilling techniques proposed to be used. If the Application Site is restored to its

pre-development state there would be no ongoing risk to ground or groundwater.

- 14.14 The risk of local ground and surface water contamination will be removed by well-engineered site preparation, including controlling surface water runoff through installation of a ditch and bund around the site and placement of a membrane on the ground to prevent runoff sinking into the ground. All effects would be negligible with mitigation measures in place.

Lighting

- 14.15 Lighting would be downward facing and face away from the woodland boundaries to limit effects on people and ecology. Alterations to the landscape and the effects of the site lighting within longer distance views towards the Application Site will be negligible. It is unlikely that any lighting other than those located within the drilling rig will be visible, and even the effects of this will be negligible.

Socio-economics

- 14.16 During all four phases the effects of the Proposed Development on population, housing, health, education, employment and tourism are assessed as either negligible or beneficial.
- 14.17 In addition to jobs, the Proposed Development will also provide opportunities for education and understanding due to the ecology and archaeology work that has been undertaken, for example, which would be of benefit to residents, schools and other local bodies or interest groups. The Proposed Development would also support agricultural diversification and provide a steady income to supplement an existing agricultural business.
- 14.18 Overall, the Proposed Development is anticipated to produce a negligible to moderate/minor beneficial effect on the socio-economic conditions within the Study Area and Chichester District, generally.