



UK OIL & GAS PLC

ARRETON-3 EXPLORATORY WELL SITE

HYDROCARBON EXPLORATION, TESTING AND APPRAISAL

SCREENING REQUEST REPORT

TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT)

REGULATIONS 2017

PROPOSED DEVELOPMENT	THE CONSTRUCTION, OPERATION AND DECOMMISSIONING OF A WELL SITE FOR THE EXPLORATION AND APPRAISAL OF HYDROCARBON MINERALS FROM ONE EXPLORATORY BOREHOLE (ARRETON-3) AND ONE SIDE-TRACK BOREHOLE (ARRETON-3z) FOR A TEMPORARY PERIOD OF THREE YEARS INVOLVING THE SITING OF PLANT AND EQUIPMENT, THE CONSTRUCTION OF A NEW ACCESS TRACK, A NEW JUNCTION WITH THE NEWPORT TO SANDOWN HIGHWAY (A3056) THE ERECTION OF BOUNDARY FENCING, ENTRANCE GATES AND OTHER ANCILLARY DEVELOPMENT WITH RESTORATION TO AGRICULTURE.
LOCATION	LAND TO THE WEST OF ARRETON IN OFF THE NEWPORT TO SANDOWN HIGHWAY (A3056), ISLE OF WIGHT.
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1. INTRODUCTION

UK Oil & Gas PLC (UKOG) is a company focused on oil & gas assets. UKOG hold a 95% operator interest in Petroleum Exploration Development Licence 331 which includes the Wessex Basin, a proven and producing hydrocarbon system.

Hydrocarbon exploration at Arreton commenced in 1953 with the drilling of the Arreton-1 borehole¹. This was followed in 1974 with the drilling of a second exploratory borehole, Arreton-2². Initial appraisal confirmed the discovery of hydrocarbons within the Portland limestone, Purbeck limestone and the Inferior Oolitic limestone but there was no flowing of the reserves to surface at this time.

In anticipation of finding viable and recoverable reserves, UKOG intends to submit a planning application to authorise the drilling of a third exploratory borehole, Arreton-3, with associated drilling of a sidetrack Arreton-3z together with hydrocarbon testing operations prior to decommissioning and restoration. The Location Plan attached at **Appendix A.1**, shows the proximity of Arreton-1 and Arreton-2 to the proposed Arreton-3 (the “Site”).

1.1 Hydrocarbon Exploration and EIA Development

The first step in the planning process is to ensure the environmental effects of development are considered in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the “2017 EIA Regs”). A person who is minded to carry out development may request the relevant planning authority adopt a screening opinion³. Such a request must include⁴:

- a) a plan sufficient to identify the land;
- b) a description of the development, including in particular;
 - (i) a description of the physical characteristics of the development and, where relevant, of demolition works;
 - (ii) a description of the location of the development, with particular regard to the environmental sensitivity of geographical areas likely to be affected;
- c) a description of the aspects of the environment likely to be significantly affected by the development;
- d) to the extent the information is available, a description of any likely significant effects of the proposed development on the environment resulting from;
 - (i) the expected residues and emissions and the production of waste, where relevant; and
 - (ii) the use of natural resources, in particular soil, land, water and biodiversity; and
- e) such other information or representations as the person making the request may wish to provide or make, including any features of the proposed development or any measures envisaged to avoid or prevent what might otherwise have been significant adverse effects on the environment.

Furthermore, a person compiling the information must, where relevant, take into account;

- a) the criteria set out in Schedule 3 of the 2017 EIA Regs; and
- b) the results of any relevant European Union environmental assessments which are reasonably available to the person requesting the screening opinion.

In response to the above criteria, this Screening Request Report (the “Report”) is structured accordingly:

Chapter 2: Description of the Site and its Surroundings;

Chapter 3: Description of the Proposed Development;

Chapter 4: Potential Impacts of the Proposed Development;

Chapter 5: Potential Cumulative Impacts of the Proposed Development;

Chapter 6: EIA Screening Compliance Checklist; and

Chapter 7: Screening Request Report Assessment.

¹ Easting 453091, Northing 85645 Completed Date 19/04/1953

² Easting 453093, Northing 85802 Completed Date 06/06/1974

³ The Town and Country Planning, (Environmental Impact Assessment) Regulations 2017, Part 2: Screening, Reg 6(1).

⁴ The Town and Country Planning, (Environmental Impact Assessment) Regulations 2017, Part 2: Screening, Reg 6(2).

The final position of the well site and its ancillary structures have yet to be precisely fixed within the landscape which means the distances quoted within the Report are estimates but are accurate at this stage in the development process. For the avoidance of doubt, the proposed development does not include the use of high-volume fracturing.

1.2 Purpose of this Report

The Report has been the subject of careful consideration and informed professional opinion. It focuses upon environment impacts that have the potential to give rise to significant effects in isolation, combination and when considered cumulatively with other relevant proposals and operational developments. It records the methodology to be adopted for the assessment of effects within each environmental topic and the likely mitigation measures to be engaged where relevant. The environmental information provided is consistent with the criteria of the 2017 EIA Regs cited above and is sufficient to enable the adoption of an accurate and complete Screening Opinion.

2. DESCRIPTION OF THE SITE AND SURROUNDINGS

The Location Plan attached at **Appendix A.1**, and the Site Plan attached at **Appendix A.2**, identify the Site as being agricultural land. The proposed development comprises a new temporary well site set back 400m from the Newport to Sandown Highway (A3056) accessed by a new temporary highway junction and internal vehicular track. Views of the Site from the north, east and south are restricted by the undulating landscape and mature hedgerows that form field boundaries and highway verges.

The wider area has the appearance of a worked landscape supporting intensive agricultural practices, large scale renewable energy installations and non-agricultural commercial uses. The land immediately to the east supports the Wight Farm Anaerobic Digestion Energy Power Station and land to the west supports the Blackwater Quarry and ancillary uses connected to the winning and working of aggregates.

The Site resides within a “Minerals Safeguarding Area” subject to Spatial Policy SP9: Minerals, of the Isle of Wight Core Strategy (March 2012). The designation protects proven deposits of Island minerals which are, or may become, of economic importance. The production of hydrocarbons is consistent with this policy aim. No other planning designation or allocation is directly engaged by the proposed development.

The nearest residential dwellings are 600m to the south-west fronting the A3056. The nearest farmsteads are Great East Standen Manor, and Little Sullens, 700m and 950m to the north respectively. The village of Arreton is 1km to the east, Merstone 1km to the south and Blackwater 1.6km to the west. Rookley is 2.7km to the south-west and Newport is 3.8km to the north-west.

Local footpath and public right of way No.26 abuts the proposed well site before merging with local bridleway No.29 which then merges with the Vectis and Bembridge Trail (a byway open to all traffic, No.28) running east to west along a ridge line 160m to the north. This ridgeline acts as the southern boundary of the Islands Area of Outstanding Natural Beauty (AONB) designation. The wider landscape surrounding the proposed well site hosts natural and built heritage assets (designated and un-designated) amongst other features which form the environmental baseline for assessment.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

Hydrocarbon exploration, testing and appraisal comprises the following four phases of development. A detailed description of each phase is provided in this chapter:

PHASES OF DEVELOPMENT	
Phase 1	Access and Well Site Construction: minor highway works to facilitate the installation of a new junction onto the Newport to Sandown Highway (A3056); the installation of up to 400m of new compacted-stone access track, construction of a compacted-stone level working platform on top of an impermeable liner with perimeter surface run off containment ditches; the installation of drilling cellars to accommodate a conductor casing; the erection of boundary fencing, entrance gates and ancillary development.
Phase 2	Drilling and Testing: mobilisation/demobilisation of surface plant and machinery ancillary to the drilling of one borehole (Arreton-3) and one sidetrack borehole (Arreton-3z), plus subsequent well testing.
Phase 3	Well Plugging, Abandonment and Site Decommissioning: the plugging and abandonment of the borehole followed by the removal of surface plant and machinery.
Phase 4	Site Retention/Restoration: retain the Site to allow for a period of review prior to either a further application to authorise further work or restore the Site to its original use subject to a period of aftercare.

The surface area of the proposed well site is approximately 1.4 hectares. The surface area of the proposed access track inclusive of passing places, earth bunding, new highway junction and vehicular visibility splays is approximately 0.7 hectares giving rise to a total combined Site size of approximately 2.1 hectares. The track and well site have been placed to avoid ecological habitats and no trees internal to the Site will be removed.

3.1 Phase 1: Access and Well Site Construction

A crushed and compacted stone access track will connect the well site to a new temporary tarmac junction at the Newport to Sandown Highway (A3056). Junction and track construction will require targeted excavation and the removal of approximately 30m of hedgerow from the northern verge of the A3056. Further section of the hedgerow may need to be removed from within the visibility splays of the new junction but where possible, hedgerow will be trimmed and retained. Excavated material will be stored in low-level earth bunds (under 1m in height) alongside the track to minimise any disturbance to the soil structure and aid its subsequent reinstatement.

A level working platform designed to support exploration activity will be installed upon a neutral cut-to-fill plateau. It will be designed to British Standard⁵ and UK guidance "Containment Systems for the Prevention of Pollution"⁶. It will rely upon land permeability and stability investigations performed as part of a geotechnical design process managed by suitably qualified engineers.

Excavated material will be retained on-site for future reinstatement and stored as earth bunds of approximately 4m in height along the north-west, north-east and south-east boundary of the well site. An impermeable high-density polyethylene membrane (HDPE) complete with protective geotextile layers and bedding sand will overlay the cut-to-fill plateau and perimeter v-profile ditches. A stable and level finished surface of crushed and compacted stone will overlay the impermeable membrane allowing for the containment and controlled drainage of surface run-off.

Clean run-off will be discharged to ground adjacent to the Site via an interceptor if necessary. Water that is not suitable for discharge will be contained and tankered off-site for treatment and/or disposal at an appropriate water treatment works regulated by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 ("2016 EPR Regs"). Groundwater quality monitoring equipment may be installed within the Site using a water well drilling rig with a mast height of approximately 10m.

To protect groundwater and isolate near surface permeable strata a well consists of a set of concentric casing strings (steel pipes set within a concrete casing). A concrete chamber (drilling cellar) will be constructed in the middle of the well site to accommodate a conductor casing (the largest diameter outer casing) cemented from surface to provide a stable and watertight structural foundation for the subsequent drilling and setting of small diameter and deeper casing strings. A conductor setting rig will be mobilised to Site with a mast height of approximately 15m.

⁵ BS EN 1997-2:2007 Eurocode 7. Geotechnical Design. Ground Investigations and Testing.

⁶ CIRIA C736: Containment Systems for the Prevention of Pollution – Secondary, Tertiary and other measures for industrial and commercial premises, I L W Walton (SLR Consulting) CIRIA 2014.

Twelve construction staff will typically be required together with 3-6 security staff accessing the Site via cars and LGV's. Plant, machinery and materials will be delivered by HGV's during standard hours of operation (i.e. Monday-Friday 07:00hrs–19:00, Saturday 09:00hrs–13:00hrs). The majority of HGV movements will be scheduled within standard hours of operation (i.e. Monday-Friday 08:00hrs–17:00hrs). Outside of these periods, the flow of HGV's will be controlled by appropriate traffic management measures where necessary to avoid adverse traffic effects and delays.

Foul water, sewage and domestic waste will be collected and contained on-site for subsequent off-site transfer to an Environment Agency permitted waste treatment facility. Timber and packaging waste will be segregated for off-site transfer and recycling. The phase 1 programme is likely to be:

PHASE 1: ACCESS AND WELL SITE CONSTRUCTION PROGRAMME	Hours of Site Operations			Estimated Duration
	Mon – Fri	Sat	Sun/Bank Hols	
1.A: Access and Well Site Construction	07:00 – 19:00	09:00 – 13:00	None	10 weeks

3.2 Phase 2: Drilling, Testing and Appraisal

The drilling programme comprises the following operations:

- mobilisation of the main drilling rig (likely to be up to 37m in height) and ancillary equipment to Site;
- drilling of an exploratory well (Arreton-3) followed by the drilling of a sidetrack well (Arreton-3z);
- temporary storage of drilling mud and rock cuttings for subsequent off-site disposal;
- shrouded external lighting illuminating the rig mast, rig floor and ancillary infrastructure; and
- delivery of fuels, equipment, materials, drilling chemicals, steel casing and tubing.

Following the completion of the drilling programme the well would be the subject of initial short-term flow testing to confirm the existence of a hydrocarbon reservoir. If successful, a period of extended well testing (EWT) would then be performed to determine the characteristics, volume and recoverability of the hydrocarbons.

During EWT it is likely that a crane would be used to lower tools into the well to perforate target formations and remove debris (by way of a dilute acetic acid (i.e. vinegar) wash) prior to the commencement of flow-testing. In some circumstances a workover rig (up to 35m in height) or a coil tubing unit (up to 25m high) may be required to perform a maintenance workover should downhole equipment need to be changed or the formations cleaned.

Drilling and testing are continuous processes requiring 24-hour working, which introduces noise, air and light impacts outside of the standard hours of operation. As stated above, HGV's movements will be between 07:00hrs – 19:00hrs, Monday-Friday and 09:00hrs – 13:00hrs on Saturdays but the majority will be scheduled within standard hours of operation engaging appropriate traffic management measures where necessary. If natural gas is encountered a shrouded ground flare designed to Environment Agency approval and consistent with the EPR Regs 2016 would be installed to ensure safe incineration.

A sidetrack is the drilling of a new well into a new area of the target formation from within an existing main well. In this case, the drilling of the sidetrack well Arreton-3z might require the re-mobilisation of a drilling rig. As the majority of the main Arreton-3 well would already be in place, the duration of the Arreton-3z sidetrack operation is likely to be reduced but it would still necessitate 24-hour working in the interests of well stability and control.

The below ground depth and trajectory of the Arreton-3 well and Arreton-3z sidetrack well are yet to be determined. The target formations for the well(s) are the Kimmeridge limestones and the Portland sandstones set within the Arreton-1 Jurassic Oil Discovery; a hydrocarbon reservoir up to 2km below ground and centred to the south of the village of Arreton and south-east of the Site. In order to access the reservoir, the well(s) would be deviated up to 1km in a south-easterly direction with no material change in impacts or effects regardless of the final direction of drilling chosen.

During the periods of drilling and testing approximately twenty personnel (working back to back 12-hour shifts) will be required with 3-6 security staff. On-site accommodation will be provided for key staff on-call. Waste will consist of:

- Extractive waste: drilling muds, rock cuttings, cement, spent dilute acid, produced water and associated natural gas (which are subject to a mining waste permit under the 2016 EPR Regs); all waste streams will be collected and contained on-site for off-site transfer to an Environment Agency permitted waste treatment facility: and
- Non-extractive waste: foul water, sewage and domestic waste will be collected and contained on-site for off-site transfer to an Environment Agency permitted waste-water treatment facility. Timber and packaging waste will be segregated for off-site transfer and recycling.

Upon completion, all drilling and testing equipment and surface machinery will be deconstructed or dismantled, cleaned and removed from Site. The phase 2 programme is likely to be:

PHASE 2: DRILLING, TESTING AND APPRAISAL PROGRAMME	Hours of Site Operations			Estimated Duration
	Mon - Fri	Sat	Sun/Bank Hols	
2.A: Drilling - Mobilisation/Demobilisation	07:00 – 19:00	09:00 – 13:00	None	3 weeks
2.B: Drilling	24hrs	24hrs	24hrs	15 weeks
2.C: Testing - Mobilisation/Demobilisation	07:00 – 19:00	09:00 – 13:00	None	3 weeks
2.D: (i) Well Testing	24hrs	24hrs	24hrs	10 weeks
2.D: (ii) Extended Well Testing	24hrs	24hrs	24hrs	16 weeks
2.E: Sidetrack Drilling	24hrs	24hrs	24hrs	15 weeks
2.F: Maintenance Workover	24hrs	24hrs	24hrs	4 weeks

3.3 Phase 3: Well Plugging, Abandonment and Decommissioning

A workover rig (up to 35m high) will be mobilised to Site with generators, pumps and tanks. Cement plugs (barriers) will be set within the well to ensure all distinct permeable zones penetrated by the well are isolated from each other and from the surface by a minimum of one permanent barrier. Permeable zones penetrated by the well which are hydrocarbon-bearing, over-pressured and water-bearing will be isolated by two permanent barriers from the surface (the second being a back-up to the first). Once the well is abandoned the casing within the drilling cellar will be cut 1.5m below ground level and a steel plate welded over the casing top to prevent soil from re-entering the borehole.

As stated above, 24-hour working will be necessary introducing noise, air and light impacts outside of the standard hours of operation. HGV's movements will be between 07:00hrs–19:00hrs, Monday-Friday and 09:00hrs–13:00hrs on Saturdays but the majority will be scheduled within standard hours of operation engaging appropriate traffic management measures where necessary. Upon completion all surface machinery will be dismantled, cleaned and removed from Site. 12 personnel will be required with 3-6 security staff. Waste will be the same extractive/non-extractive mix as at phase 2. The phase 3 programme is likely to be:

PHASE 3: WELL PLUGGING, ABANDONMENT AND DECOMMISSIONING PROGRAMME	Hours of Site Operations			Estimated Duration
	Mon – Fri	Sat	Sun/Bank Hols	
3.A: Plugging and Abandonment	24hrs	24hrs	24hrs	3 weeks
3.B: Removal of Surface Equipment	07:00 – 19:00	09:00 – 13:00	None	2 weeks

3.4 Phase 4: Site Restoration or Retention

In the event of restoration, all concrete hardstanding and bunded areas will be cleaned prior to dismantling. The concrete chamber (drilling cellar) will be dismantled leaving the lowest pre-cast concrete ring in situ. Surface aggregates will be inspected prior to removal. Areas where contamination is identified will be removed for subsequent off-site treatment and reuse. The remaining surface aggregate will carefully be removed for subsequent off-site reuse.

Once the impermeable membrane has been removed, the exposed subsoils will be inspected. In the unlikely event that localised contamination is identified the affected area will be excavated for subsequent off-site treatment and/or disposal at an Environment Agency permitted waste facility. Soil samples will be taken, analysed and compared with soil samples taken prior to construction to confirm the absence of contamination. The subsoil will be cultivated to a depth of 600mm after-which the soil will not be traversed by machinery.

Topsoil may have degraded during storage so it will be tested prior to replacement to determine what treatments, if any, are required to improve its condition. Topsoil will be back-tipped onto loosened subsoil and graded to its original

profile. Security fencing will be removed but the highway access may be retained subject to agreement with the Highway Authority. A landscaping scheme will provide for the reinstatement of hedgerow and a site-wide environmental enhancement plan will aim to improve and restore lost biodiversity.

In the event of retention, the exploratory borehole would be suspended with two or three permanent barriers to flow. The Site would be cleaned but the stone surface, drainage ditches and the cellar left in place. A container would enclose the wellhead assembly and all valves closed pending a decision either abandon the well or carry out further works. The security fencing and entrance gates would be retained to prevent unauthorised access.

Approximately six personnel will be required with 3-6 security staff. As stated above HGV's movements will be between 07:00hrs–19:00hrs, Monday-Friday and 09:00hrs–13:00hrs on Saturdays but the majority of HGV movements will be scheduled within standard hours of operation. Waste generated will be the same as phase 1. The phase 4 programme is likely to be:

PHASE 4: SITE RESTORATION OR RETENTION PROGRAMME	Hours of Site Operations			Estimated Duration
	Mon – Fri	Sat	Sun/Bank Hols	
4.A Site Restoration	07:00 – 19:00	09:00 – 13:00	None	5 Weeks
4.B Site Retention	None			-

3.5 Development Programme

The phases of development are largely consecutive, adopting a logical progression from well site construction, through drilling, testing and appraisal to decommissioning, restoration or retention. Phase progression may be disrupted as a result of equipment constraints, the need for maintenance or adverse weather conditions. Such periods will not be significant when the development programme is considered as a whole.

As stated above, HGV's movements will be between 07:00hrs–19:00hrs, Monday-Friday and 09:00hrs–13:00hrs on Saturdays but the majority will be scheduled within standard hours of operation. The duration of each phase is an estimate only and should it be exceeded, the HGV movements per day would reduce.

ARRETON-3 WELL SITE: HGV MOVEMENTS SCHEDULE						
PHASE	Sub-Phase	Hours of HGV Operation			Estimated Duration	Estimated 2-Way HGV Movements (in and out)
		Mon – Fri	Sat	Sun/Bank Hols		
PHASE 1: ACCESS AND WELL SITE CONSTRUCTION	1.A Access and Well Site Construction	07:00 – 19:00	09:00 – 13:00	None	10 weeks	up to 15 per day
PHASE 2: DRILLING, TESTING AND APPRAISAL	2.A: Drilling - Mobilisation/Demobilisation	07:00 – 19:00	09:00 – 13:00	None	3 weeks	up to 15 per day
	2.B: Drilling	07:00 – 19:00	09:00 – 13:00	None	15 weeks	
	2.C: Testing - Mobilisation/Demobilisation	07:00 – 19:00	09:00 – 13:00	None	3 weeks	
	2.D: (i) Well Testing	07:00 – 19:00	09:00 – 13:00	None	10 weeks	up to 15 per day
	2.D: (ii) Extended Well Testing	07:00 – 19:00	09:00 – 13:00	None	16 weeks	up to 5 per day
	2.E: Sidetrack Drilling	07:00 – 19:00	09:00 – 13:00	None	15 weeks	up to 15 per day
2.F: Maintenance Workover	07:00 – 19:00	09:00 – 13:00	None	4 weeks		
PHASE 3: WELL PLUGGING, ABANDONMENT AND DECOMMISSIONING	3.A: Plugging and Abandonment	07:00 – 19:00	09:00 – 13:00	None	3 weeks	up to 10 per day
	3.B: Removal of Surface Equipment	07:00 – 19:00	09:00 – 13:00	None	2 weeks	up to 5 per day
PHASE 4: SITE RESTORATION	4.A Site Restoration	07:00 – 19:00	09:00 – 13:00	None	5 weeks	up to 10 per day

There may be exceptional occasions during the transition between phases and during drilling when these limits may be exceeded in the interests of well integrity and the efficient operation of the Site. Movements would be controlled by a traffic management plan incorporating measures to avoid any unacceptable residual transport and traffic effects. Adopting this approach would allow the duration of the phases to be reduced and it would limit the time that HGV's spend on the surrounding highway network.

4. POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

For each environmental topic addressed, the baseline environment has been recorded along with a description of the assessment methodology where relevant. The potential impacts are then recorded and used to inform an initial assessment of effects taking account of mitigation where appropriate. Details of further environmental information to be provided as part of any proposed planning application are provided where relevant.

4.1 Landscape and Visual

Assessment Criteria and Methodology

The *Guidelines for Landscape and Visual Impact Assessment*⁷, record the emphasis placed upon the identification of likely significant effects by the *European Union Environmental Impact Assessment Directive*⁸. The *National Planning Policy Framework* (NPPF) recognises the intrinsic character and beauty of the countryside⁹ and at the local level the relevant policy context from the Local Development Plan and Minerals Plan would be recorded. The assessment would rely on the following best practice guidance:

- *Guidelines for Landscape and Visual Impact Assessment*;
- *An Approach to Landscape Character Assessment* (Natural England; 2014); and
- *Photography & Photomontage in Landscape & Visual Impact Assessment*¹⁰.

Other reference documents used to inform the baseline landscape include the *East Wight Landscape Character Assessment 2015*, *Isle of Wight Historic Landscape Characterisation 2008*, and the *Isle of Wight Area of Outstanding Natural Beauty (AONB) Management Plan 2019 - 2024* (in terms of visual amenity and landscape setting of the AONB).

Published assessments will be reviewed with on-site corroboration. Zone of Theoretical Visibility analysis has been used to identify representative viewpoints (attached at **Appendix B**) that will inform the assessment of effects upon landscape designations, the landscape fabric, the host *Arreton, Perreton and Pagham Arable* landscape character area (LCA), the host *South Wight Sandstone and Gravel* historic landscape character area (HCA) and any other landscape features of value. In addition, the visual effects upon users of local rights of way (walkers, horse riders and cyclists), road users, residents within settlements and isolated dwellings will be assessed.

When assessing the likely effects, the sensitivity of each receptor would be combined with the predicted magnitude of change with reference to the geographical extent, duration and reversibility of the effect. Each effect would be described and evaluated individually, through the integration of the relevant factors based upon professional judgement. Effects would be described and evaluated across the 4-phases proposal together with any cumulative effects when considered in combination with other developments consented or in the process of construction.

Baseline Environment

Landscape Resource

The Site does not lie within a designated landscape. The Isle of Wight AONB is approximately 190m to the north following the ridgeline of the Bembridge Trail. The Site is an *Arable Farmland* landscape type (LT) within the undulating landscape of the wider *Arreton, Perreton and Pagham Arable* LCA. The landscape is broadly characterised by open arable fields with hedged boundaries and sporadic mature trees. The Site is located in a topographic depression within an irregular shaped and undulating medium sized field. Topography encloses the Site in all directions with the exception of the south-west where the landform gently dips down into the wider lowland landscape. The host field is contained by hedgerows to the south and east, scrub on slopes to the north and north-west and hedgerow with trees bounding public footpath No.29 to the west. The south-west section of the field boundary is open to the access track.

⁷ Landscape Institute, Institute of Environmental Management and Assessment, 2013 '*Guidelines for Landscape and Visual Impact Assessment*', (3rd Edition). Abingdon: Routledge.

⁸ Directive 2011/92/EU as amended by EU2014/52/EU adopted 12th March 2014.

⁹ National Planning Policy Framework (2019), para 170(b), page 49.

¹⁰ Landscape Institute Advice Note 01/11.

The LT/LCA are described as possessing a “*strong rural character*” but this is compromised by the Wight Farm Anaerobic Digestion Energy Power Station to the east, New Barn Business Park to the south-west and Blackwater Quarry to the west. These developments are within 1km of the Site and reduce the quality of its rural landscape setting.

Access to the Site from the A3056 would part-utilise an existing access track. Although the proposed development would temporarily introduce additional traffic it would not be material when considered in the context of the existing flows generated by the surrounding industrial and infrastructure land uses.

Accordingly, the baseline landscape character is found to be agricultural with industry which reduces its sensitivity to change and increases its capacity to accommodate further development.

Visual Amenity

The Site resides within a lowland landscape enclosed by chalk ridgelines that demarcate surrounding AONB designations. The topography allows views between the designations across the lowland landscape within which the proposed development would form a minor and temporary component of the view. In a more localised context, despite the proximity of the AONB to the north, there is very limited inter-visibility due to the dramatic change in topography and intervening vegetation (as illustrated by Zone of Theoretical Visibility attached at **Appendix B**). Given the limited inter-visibility between the Site and its surroundings, the study area for assessment has a 1km radius centred on the Site. Beyond this distance visual effects rapidly diminish.

The undulating topography of the lowland landscape combined with the screening effect of mature trees, sunken tracks (in places) and high hedgerows restricts the view of the Site from the surrounding network of public rights of way. There are open views across flatter fields to the north of Merstone and to the east of East Lane. Other visual receptors include users of the local road network (vehicular and pedestrian) and residents. The visual amenity within the landscape and views obtained to and from the AONB would be assessed.

Potential Impacts and Effects

The impacts of construction (phase 1) and restoration (phase 4) will be contained within the immediate setting of the Site. The arrival and departure of construction vehicles will be the most visible sign of activity and this will not give rise to significant effects. During drilling and appraisal (phase 2) and decommissioning (phase 3), a drilling or workover rig would be the tallest component on Site with a lattice mast up to 37m above ground level when fully extended. Full views would be obtained from within the immediate landscape but from the majority of viewpoints only the upper section of the lattice rig mast would be visible above screening topography or mature vegetation. In additions, views would be temporary experienced only during the intermittent times of rig deployment. These factors limit the magnitude of the impact introduced sufficient to reduce residual effects to a level that would not be significant.

Mitigation Measures and Residual Effects

An assessment of effects will accompany a planning application to establish planning policy compliance. Mitigation will be engaged to minimise effects where possible across the four phases of the development.

4.2 Lighting

Assessment Criteria and Methodology

The proposal will require artificial lighting for Site safety (pedestrian and vehicular), security and air safety (aviation). The sensitive receptors are human (i.e. residents within and outside of the AONB) and ecological (i.e. species and designations). The proposed effects are:

- Light Spill - light beyond the boundary or the area intended to be lit;
- Glare - the degree of discomfort derived from a light source when viewed against a darker background; and
- Sky-glow - the effect of artificial lighting on the natural night sky-glow derived from upward or reflected lighting.

The assessment of impacts will rely upon a baseline light survey, aerial photography and Ordnance Survey (OS) mapping of the immediate area, from which the prevailing conditions will be characterised. Effects of the drilling operations will be assessed using 3D light modelling and the assessments of effects will be informed by professional judgement, taking account of relevant legislation, policy and guidance.

Baseline Assessment

Daytime photography will be undertaken from the Site and surrounding study area. Long-exposure night-time photography will use *High Dynamic Range* imaging techniques, which provides for the better reproduction of shadows and highlights revealing detail akin to that viewed by the human eye.

Vertical illuminance (Ev-lux) measurements will be made using a suitable UKAS calibrated illuminance meter capable of accurately measuring low light levels down to 0.01 lux. The relevant Institute of Lighting Professionals (ILP) Environmental Zone(s) will be established based on quantitative and qualitative assessment.

For drilling operations, a single lighting model based on a reasonable worst-case scenario will present the potential impacts by qualitative means only, prior to mitigation and then the presentation of residual effects by quantitative means based on the lighting model outputs. For non-drilling operations, namely well site construction (phase 1) and restoration (phase 4), assessment will take place in daylight hours removing the need for light modelling. Impacts will be assessed on a qualitative basis. Where necessary, the outputs of the lighting model operations will be considered for non-drilling operations, representing a conservative assessment of obtrusive light impacts.

Criteria – Human (within and outside the AONB)

ILP Guidance Notes for the Reduction of Obtrusive Light, provide assessment criteria for residential receptors. The Environmental Zone (EZ) classification areas with regard to suitable obtrusive lighting limits are:

EZ CLASSIFICATION	SURROUNDING	LIGHTING ENVIRONMENT	EXAMPLES
E0	Dark	Dark	UNESCO Starlight Reserves
E1	Natural	Intrinsically Dark	Areas of Outstanding Natural Beauty
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city with high levels of night-time activity

For each EZ area there are obtrusive light limits designed to help decision makers determine the acceptability of artificial lighting effects in the context of residential amenity. The limits are recorded in the table below and for the avoidance of doubt, EZ Classification E1 will be adopted when considering the effect of artificial lighting on residents within the AONB.

EZ CLASSIFICATION	MAX SKY GLOW ^(a) (%)	LIGHT TRESPASS (INTO WINDOWS) E V (LUX) ^(b)		SOURCE INTENSITY I (KILO CANDELAS – KCD) ^(c)	
		PRE-CURFEW	POST-CURFEW ^(d)	PRE-CURFEW	POST-CURFEW
E0	0	0	0	0	0
E1	0	2	1	2.5	0
E2	2.5	5	1	7.5	0.5
E3	5	10	2	10	1
E4	15	25	5	25	2.5

(a) Upward light ratio (ULR) of the installation – maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.

(b) Vertical illuminance measured flat at the glazing at the centre of the window.

(c) Light Intensity (cd)

(d) From public road lighting installations only.

There are no set time periods for lighting curfews; however, 23:00 is often used as adopted criteria (Ecological)

Criteria – Ecological (Species and Designations)

St George's Down Site of Importance for Nature Conservation (SINC) (Local level designation) is located 100m to the north and the *Arreton Down Site of Special Scientific Interest (SSSI)* (National level designation) is located 1.5km north-east. There are currently no definitive guidelines setting limits for ecological receptors. In the absence of statutory guidance, a suitable light spill criterion will be adopted to demonstrate that only negligible levels of light spill will occur.

Potential Impacts and Effects

An initial assessment finds negligible/minor adverse effects upon human receptors (within and outside of the AONB) across phases 1-3, derived from light spill, glare and sky-glow. Negligible/minor adverse effects are anticipated for

ecological receptors across phases 1-3, derived from light spill alone. Negligible adverse effects are predicted for all receptors during phase 4.

Mitigation Measures and Residual Effects

Mitigation will inform scheme design. The use of angled and variable intensity lighting will be considered and a lighting management plan designed to minimise effects while remaining consistent with other regulations. The assessment will then report the residual effects following mitigation.

4.3 Noise and Vibration

Assessment Criteria and Methodology

Each phase of development has the potential to generate noise and vibration effects. Therefore, sensitive receptors will be identified and background measurements undertaken at positions representative of the nearest sensitive properties to the well site. Background sound levels will be used to develop noise limits consistent with national noise guidance and any other relevant standards.

The proposed scope of the Noise Impact Assessment (NIA) will be informed by:

- knowledge of the noise from likely drilling and well testing equipment to be used at this Site;
- confidence that tried and tested mitigation will be in place (secured by way of a Noise Monitoring Plan) to protect residents and other sensitive receptors; and,
- experience of similar equipment in use at other operational on-shore well sites.

Policy, guidance and standards material to the proposal will derive from the following sources:

- *National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE) and National Planning Practice Guidance (NPPG)* relevant to Noise and Minerals;
- *Guidelines for Community Noise and Night Noise Guidelines for Europe: World Health Organization 1999 and 2009;*
- *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise (most notably Annex E) and Part 2: Vibration.*

For the avoidance of doubt, *BS 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound*, will not be used in this case. BS 4142 has been designed to assess sound from fixed installations that form an intrinsic part of industrial or commercial operations and is not relevant when assessing temporary activities such as construction, mobilisation, drilling and restoration.

Baseline Assessment

The nearest noise sensitive receptors to the well site are recorded in the table below.

NEAREST NOISE SENSITIVE RESIDENTIAL RECEPTORS	DISTANCE AND DIRECTION IN RELATION TO WELL SITE
Great East Standen Manor	740m N
Pyle Cottages	640m WSW
Merstone Manor	930m SSW
Padan Arap	910m SSW
Cottages adjacent to White Lion Pub	990m ENE
Arreton House	1,060m NE

Potential Impacts and Effects

Activities with the potential to cause significant noise and vibration are limited to construction (phase 1) and drilling (phase 2). Given the separation distances achieved between the nearest noise sensitive receptors and the proposal, significant effects are not anticipated. Vibration will be contained within the well site surface layers during construction enabling rapid dissipation. During drilling, vibration arising from a drill bit as it travels through the near-surface geology can occasionally be detected on the drill floor (transmission up through the drill string) but none of this will pass through the ground beyond the confines of the well site. Accordingly, the effects of vibration are not significant.

Mitigation Measures and Residual Effects

An assessment of effects will accompany a planning application to establish planning policy compliance. As part of an iterative design process, further mitigation will be engaged where necessary. Mitigation successfully deployed during hydrocarbon works elsewhere (e.g. Broadford Bridge and Horse Hill well sites in West Sussex and Surrey respectively amongst others, taking the form of agreed operating hours, noise management plans and the use of silencers) will be considered amongst other measures and recorded with the NIA prior to reporting the residual noise effects.

4.4 Ground and Groundwater Protection

Assessment Criteria and Methodology

A preliminary risk assessment has been carried out to assess the likely effects of the proposal on surface water and groundwater and to assess whether these effects are likely to be significant.

A review of published information sources (including mapping data held by *British Geological Survey* (BGS), data held by Natural England, the *Flood Estimation Handbook* and data from the Environment Agency and Isle of Wight Council) has been undertaken to establish baseline conditions and develop a conceptual model of the ground, groundwater and surface water systems.

The potential migration pathways for pollutants and their potential impacts on receptors have been examined and the environmental risks qualitatively assessed by analysis of the source-pathway-receptor linkages. Mitigation measures have been taken into account when considering the likely significance of residual effects.

A preliminary hydrogeological risk assessment has been carried out in accordance with Environment Agency technical guidance, Department of the Environment and Rural Affairs (DEFRA) risk assessment methodology and taking account of mitigation embedded in the well design. In addition, the assessment has been informed by:

- **Regulations:** Water Framework Directive, Groundwater Directive and Environmental Permitting Regulations;
- **Legislation:** Water Resources Act 1991, Flood and Water Management Act 2010 and the Water Act 2014;
- **Guidance:** DEFRA Guidelines for Environmental Risk Assessment and Management: Green Leaves III, NPPF and National Planning Practice Guidance (NPPG).

Baseline Environment

The baseline hydrology, geology, hydrogeology setting of the Site is presented in the figures attached at **Appendix C**. The Site sits upon the sandstone of the Lower Greensand Group at approximately 65m AOD on the southern slope of a chalk ridge which runs east to west through the central Isle of Wight and reaches approximately 106m AOD locally. South of the Site the land slopes south-westwards towards a tributary watercourse of the River Medina which lies at approximately 20m AOD.

The Site is undeveloped within a rural setting. The soils are characterised as freely draining, slightly acid and loamy. The Site lies within the River Medina catchment area with the river located 1.8km west of the Site at its closest point. The river forms the local hydrological base and it flows northwards towards Cowes. Natural drainage from the Site is to the south/southwest towards a channelised tributary watercourse of the River Medina located approximately 1.2km southwest of the Site. This watercourse flows westward from the Merstone area towards Blackwater where it confluences with the Medina approximately 1.8km southwest of the Site. The boundary of the Eastern Yar river catchment is located approximately 0.15km to the east of the Site

The Site lies on the southern slope of the central chalk ridge associated with the Isle of Wight Monocline fold and fault system. The Site lies within the axial zone of the subsidiary Sandown Anticline and in the “*hanging-wall*” of an associated fault (the Sandown Fault). Bedding dips at the Site are expected to be around 15° to the north/northeast.

BGS mapping data shows that superficial deposits are not widespread but “*head*” composed of sand, gravel and transported material occurs sporadically in the Arreton area and is shown to underlie the southwestern part of the Site and access track. Bedrock beneath the Site is glauconitic sandstones and sandy mudstones of the Cretaceous age Ferruginous Sands Formation (Lower Greensand Group). Beneath this a full sequence through the Jurassic and Permo-

Triassic is preserved and these younger rocks rest on Devonian rocks at depth. Oil discoveries have been made in the Purbeck, Portland (Late Jurassic/Early Cretaceous) and Inferior Oolite (Jurassic) Limestone reservoirs of the Isle of Wight region

The geological sequence at the Site is summarised in the table below. Thicknesses of strata are interpreted from the nearby Arreton-1 borehole where possible or otherwise informed by published geological data. Younger strata (shown in *italics*), whilst outcropping to the north and not actually present at the Site, are included for geological context.

Expected Geological Sequence at the Site

AGE	GROUP/FORMATION		DESCRIPTION	APPROXIMATE THICKNESS (M)	APPROXIMATE DEPTH TO BASE OF UNIT - (M TVD)
Palaeogene	<i>Thames Group</i>	<i>London Clay Formation</i>	<i>Sandy silt with pebble bed at base overlain by cyclic units of silty sandy clay and sand separated by pebble beds.</i>	70*	<i>Not present beneath Site.</i>
	<i>Lambeth Group</i>	<i>Reading Formation</i>	<i>Thin basal silty sand overlain by silty clay.</i>	30*	<i>Not present beneath Site.</i>
Cretaceous	<i>Chalk Group</i>		<i>9 distinct chalk formations including marly chalks, nodular and smooth chalks. Flints and marl seams present in various formations.</i>	375*	<i>Not present beneath Site.</i>
	<i>Selborne Group</i>	<i>Upper Greensand Formation</i>	<i>Sandy mudstone and clayey sandstone, finely interbedded passes up into sand and sandstone- weakly to strongly cemented with glauconite, with calcareous concretions and chert beds.</i>	40*	<i>Not present beneath Site.</i>
		<i>Gault Formation</i>	<i>Mudstone with some sand and silt laminae, with thin seams of phosphatic nodules, micaceous and variably shelly throughout.</i>	30*	<i>Not present beneath Site.</i>
	<i>Lower Greensand Group</i>	<i>Monk's Bay Sandstone Formation</i>	<i>Sand and sandstone with some pebbly seams, strongly ferruginous with concretionary ironstone seams.</i>	22*	<i>Not present beneath Site.</i>
		<i>Sandrock Formation</i>	<i>Quartz sand, weakly calcareous-cemented sandstone with subordinate sand laminae. Silty clay, muddy glauconitic sand and lag gravel at base. Pebble bed developed in places.</i>	70*	<i>Not present beneath Site.</i>
Holocene	Head Deposits		Gravel, sand, silt and clay. Valley fill related to topography (Note: present only in northwest corner of Site)	0-5	0-5
Cretaceous	<i>Lower Greensand Group</i>	<i>Ferruginous Sands Formation</i>	<i>Sandy mudstone and muddy sandstone passing up into fine-to medium grained glauconitic sand and weakly cemented sandstone.</i>	70	70
		<i>Atherfield Clay Formation</i>	<i>Sandy mudstone overlain by thinly bedded mudstone, siltstone and fine sandstone, some calcareous concretions and phosphatic nodules in seams, very fossiliferous in basal member.</i>	15	85
	<i>Wealden Group</i>	<i>Vectis Formation</i>	<i>Interlaminated mudstone and silty fine-grained sandstone passing up into thick unit of fine to medium grained sandstone and rhythmic sandstone, mudstone and siltstone beds.</i>	600	685
		<i>Wessex Formation</i>	<i>Mudstone with subordinate fining up sandstone beds. Plant-rich beds occur throughout.</i>		
	<i>Purbeck Group</i>		<i>Limestone, calcareous mudstone with anhydrite, very shelly and lignitic in part.</i>	115	800

AGE	GROUP/FORMATION		DESCRIPTION	APPROXIMATE THICKNESS (M)	APPROXIMATE DEPTH TO BASE OF UNIT - (M TVD)
Jurassic	Portland Group		Sandy limestone with calcareous sandstone, ooidal, silty and glauconitic in part.	25	825
	Ancholme Group	Kimmeridge Clay Formation	Mudstone and calcareous mudstone, shaly, pyritic and fossiliferous.	335	1160
	Corallian Group		Calcareous mudstone, shaly and shelly ooidal limestones, micaceous.	65	1225
	Ancholme Group	Oxford Clay Formation	Siltstone and mudstone, micaceous, weakly calcareous, bituminous.	140	1365
		Kellaways Formation	Sandstone, weakly calcareous passing up into sandstone, fine grained, pyritic.	30	1395
		Cornbrash Formation	Limestone, shelly and calcareous mudstone.	5	1400
	Great Oolite Group (undifferentiated)		Interbedded shelly limestone and calcareous mudstone, ooidal in part.	135	1535
	Inferior Oolite Group (undifferentiated)		Limestone and calcareous mudstone, crystalline, sparsely shelly.	50*	1585
Lias Group (undifferentiated)		Calcareous sandy siltstone and mudstone, pyritic, micaceous, limestone in middle of succession.	375*	1960	
Triassic	Penarth Group	White Lias, Westbury Mudstone and Cotham Formations.	Mudstone and limestone.	125*	2085
	Mercia Mudstone Group (undifferentiated)		Mudstone, siltstone and minor limestone, dolomitic in part with anhydrite beds towards base.		
	Sherwood Sandstone Group (undifferentiated)		Fine to coarse grained sandstone with minor siltstone interbeds, conglomeratic at base.	200*	2285
Devonian	Devonian strata (undivided)		Siltstone and fine to medium grained sandstone, micaceous, weakly metamorphosed.	>350*	>2635

Notes: Strata in *italics* at the top of the table are present in the area of the Site but are not present at the Site itself. Wavy line indicates a geological unconformity.

* Denotes a thickness estimated from BGS geological cross-section and generalised vertical stratigraphic column.

The presence of aquifers at the Site has been informed by Environment Agency publications *The Physical Properties of Major Aquifers in England and Wales*, *The Physical Properties of Minor Aquifers in England and Wales* and the Environment Agency's updated groundwater vulnerability mapping. The hydrogeology of the Site is summarised in table below.

The Hydrogeological Sequence

GROUP/FORMATION	AQUIFER DESIGNATION	DESCRIPTION/COMMENTS
Head Deposits	Secondary "A" Aquifer	These varied recent deposits infill a valley course in the south west corner of the Site. The deposits are extremely limited in extent but sand and gravel horizons could potentially yield small local water supplies.
Ferruginous Sands Formation	Principal Aquifer	The Ferruginous Sands are part of the regionally important aquifers of the Lower Greensand Group. Locally the formation comprises sandstones, which are often glauconitic, and sandstones with clays. This formation is a Principal Aquifer and while hydrogeological data for the Isle of Wight is limited and highly variable it is expected that the unit is permeable and able to yield significant quantities of water. Yields of 25 l/s have been recorded from the Lower Greensand Group of the Isle of Wight. Recharge is from direct infiltration at surface over an extensive outcrop.

GROUP/ FORMATION	AQUIFER DESIGNATION	DESCRIPTION/COMMENTS
Atherfield Clay Formation	Unproductive Strata	The Atherfield Clay, although part of the Lower Greensand Group geologically is dominated by mudstones. Due to its low permeability this unit is unlikely to act as an important aquifer in the area and can be considered unproductive.
Vectis Formation	Secondary "A" Aquifer	The Vectis and Wessex Formations are part of the poorly permeable and generally argillaceous Wealden Group; subordinate sandstones and limestones may give useful yields of water close to outcrop. At the Site these formations are hydraulically separated from the surface groundwater system and the highly permeable Ferruginous Sands Formation by the poorly permeable Atherfield Clay. The lack of a recharge mechanism close to the Site (these formations have limited outcrop some 20km to the southwest and 15km to the east-southeast of the Site) renders these formations unlikely to yield important quantities of groundwater.
Wessex Formation	Secondary "A" Aquifer	
Purbeck Group	Secondary Aquifer	The Purbeck Group comprises limestones and calcareous mudstones with anhydrite and forms a Secondary aquifer on a regional scale. Fractured limestones may support quite high yields of water. However, on the Isle of Wight this aquifer is overlain by 600m of poorly permeable argillaceous strata of the Wealden Group and does not outcrop; recharge will therefore be extremely limited and any water present is likely to be very old and of poor quality with little or no resource value. Oil discoveries have been made in the Purbeck regionally and the formation may contain hydrocarbons at the Site. Therefore, any water present can be considered extremely poor quality with no/limited resource value as defined by UKTAG; with elevated salinity and possible hydrocarbons present.
Jurassic Strata	Principal and Secondary Aquifers; Unproductive strata	The Jurassic sequence comprises permeable limestones and sandstones separated by thick successions of mudstones. On a regional scale, the permeable horizons are classed as Principal and Secondary aquifers, however because of their depth at this location; they do not constitute viable sources of groundwater with a resource value. The Portland Group and Kimmeridge limestone beds are being targeted for oil production due to the presence of hydrocarbons. Therefore, any water present can be considered formation water and will be of extremely poor quality with no resource value as defined by UKTAG; with elevated salinity and hydrocarbons present.
Triassic Strata	Unproductive Strata and Principal Aquifers.	The Triassic strata are buried by around 2000m of overlying formations, many of which are impermeable. The Sherwood Sandstone forms a Principal Aquifer nationally but not in the south east of England. Due to the depth of these strata at this location; they do not constitute viable sources of groundwater with a resource value. Furthermore, hydrocarbon discoveries have been made in Triassic reservoirs of the Isle of Wight.

Potential Effects

The proposed development together with the handling and storage of associated materials at surface during operational activities have the potential to give rise to effects on the groundwater and surface water receptors inclusive of the following:

- shallow water drainage system close to the Site, surface water ponds to the south and southwest of the Site and the tributary of the River Medina;
- groundwater system within the Head Deposits, Lower Greensand Group and Wealden Group;
- licensed abstractions for Lower Greensand Group groundwater and River Medina surface water;
- private water supplies derived from the Lower Greensand Group; and
- deeper water bearing formations beneath the Wealden Group with limited or no resource value.

The hazards associated with the proposed development include:

- flushing contaminated soils during construction (phase 1) and restoration (phase 4) in the absence of a HDPE liner;
- creating vertical pathways during the construction of the well cellars, the installation of underground storage tanks and groundwater monitoring boreholes (if necessary);
- spillage/leakage of Site sewerage, foul water from welfare facilities, fuels, lubricants and other materials during transportation or when in use during construction (phase 1);
- loss of drilling muds, additives and cement grout during drilling operations (phase 2);

- migration of well stimulation fluids, produced water and hydrocarbons from deep formations during drilling and appraisal operations and during any workover of the wells (phase 2); and
- spillage of produced hydrocarbons during transfer to tankers on Site.

Mitigation Measures and Residual Effects

The proposed development includes a very high level of embedded mitigation measures, inclusive of the following:

- geotechnical ground investigations confirming the Site to be contamination free and load bearing;
- a well site incorporating a low permeability HDPE membrane and non-woven geotextile protective layers providing a hydraulic break between the well site and the underlying bedrock;
- perimeter drainage ditches that prevent rainfall running directly into the local surface water system;
- surface water drainage systems consistent with Environment Agency approved management plans and permits under the 2016 EPR Regs;
- concrete bunds (secondary containment) will accommodate produced oil and formation water storage tanks and a concrete tanker bay will accommodate tankers loading oil from storage tanks;
- oil, fuel and chemical management plans that ensure materials are containerised and stored in enclosed, bunded and lined areas with a capacity >110% of the storage tanks;
- a traffic management plan that will minimise the potential for tanker collisions and/or accidents;
- the erection of secure boundary fencing that will prevent unauthorised access;
- pipework and equipment used for the construction and testing of the wells will be regularly inspected for spills and leaks; key equipment will be contained within temporary bunds;
- the adoption of conventional water well drilling techniques when drilling through the Cretaceous strata followed by best practice drilling techniques that isolate the well through the full thickness of the Wealden Group and into the Purbeck Group to prevent any interaction between well fluids and groundwater.

With the above mitigation measures in place, the residual effects to receptors for all the identified hazards are minor and not significant.

4.5 Air Quality, Climate and Climate Change

Assessment Criteria and Methodology

The proposal will use predominantly diesel-fuelled plant and machinery and require the flaring of natural gas at times. These operations will result in the release of pollutants to atmosphere and greenhouse gases with a consequential air quality impact.

The assessment of impact will be undertaken in accordance with the Environment Agency (Air emissions risk assessment) and DEFRA (LAQM TG16) guidance. It will engage UK ADMS and US EPA AERMOD dispersion models across a study area incorporating nearby locations of prolonged human exposure and sensitive ecological sites. It will rely upon meteorological data representative for the area obtained from the UK Met Office and an inventory of construction and operation releases across the project duration. The significance of the impact will be assessed against the Environment Agency screening criteria for human health and ecology.

Baseline Assessment

The Site is not within an Air Quality Management Area (AQMA). The nearest AQMA is located in Portsmouth which will not be materially affected by releases from the Site. There are no automatic or non-automatic ambient measurement sites within 2km of the Site.

For the purposes of the air quality assessment background ambient concentrations available from the DEFRA air quality archive will be employed. Values currently available (2016) indicate relatively low concentrations of all relevant pollutants within 1km of the Site. The maximum annual mean background concentrations of nitrogen dioxide, carbon monoxide and benzene are equivalent to around 20%, 14% and 7% of the applicable ambient air directive limits. For the avoidance of doubt, given the low background concentrations of all pollutants, baseline air quality monitoring will not be performed as part of this assessment.

Potential Effects

The use of temporary diesel-powered generators and engines for drilling (phase 2) will result in localised releases of nitrogen oxides, carbon monoxide, PM10, volatile organic compounds and sulphur dioxide and some greenhouse gases (e.g. carbon dioxide, methane and nitrous oxide). In addition, the use of heavy machinery during Site construction (phase 1) and restoration (phase 4) and the movement of both light and heavy-duty vehicles for transportation throughout the project will also entail the release of pollutants typical of diesel use. During testing and appraisal (phase 2), if natural gas is encountered a shrouded ground flare designed to Environment Agency approval and consistent with the EPR Regs 2016 would be installed to ensure safe incineration.

The releases are generally low level, which is expected to result in the greatest air quality impact being confined to the immediate Site and close surrounding area with rapid attenuation of concentrations with distance from the Site. The Site is 600m from the nearest residential property. The nearest medium density housing is at Arreton located 1km east. Given these separation distances, no significant effects upon human health are anticipated.

The nearest sensitive nature conservation site the *Arreton Down* SSSI located 1.5km north-east. Due to the anticipated attenuation of process contributions with distance, a significant ecological impact in relation to critical levels or critical loads at this site is highly unlikely.

Greenhouse gas releases over the duration of the project are likely to be in the range 10000-15000 tCO_{2e} which is not significant in view of the temporary life of the proposed development.

Mitigation Measures and Residual Effects

Sensitive human and ecological receptors are at a distance where process contributions are anticipated to have diminished to concentration levels at which no significant air quality impacts are likely. An assessment of effects will accompany a planning application to establish planning policy compliance.

4.6 Residential and Recreational Amenity

Amenity can be compromised by noise, odour, vibration, light-spill or glare. In addition, the outlook from a residential property, private garden or cherished viewpoint can be adversely affected by operational development. Given the relative remoteness of sensitive receptors, the limited number of viewpoints which overlook the Site and the temporary nature of development the effects of the proposal upon amenity will not be significant.

4.7 Ecology, Nature Conservation and Biodiversity

Assessment Criteria and Methodology

A preliminary ecological appraisal was completed in April 2018, identifying ecological assets in accordance with standard methods. Desk study information was obtained from:

- The *Multi-Agency Geographical Information for the Countryside* (MAGIC) database: providing information on statutory European designated sites within 10km, statutory nationally designated sites within 5km and ancient woodland within 1 km of the well site; and
- *Isle of Wight Biological Records Centre* – for non-statutory designated sites and protected species records within 1 km of the well site.

Baseline Environment

Habitats and Protected Species

A Phase 1 Habitat survey was performed on 15th March 2018 to identify potential ecological constraints in accordance with standard methodology (JNCC, 2010). This has informed a suite of protected species surveys.

Natural Heritage Designations

A Preliminary Ecological Assessment (PEA) has identified the following natural heritage designation within 10km of the proposed well site:

European Designations

- *Bridlesford Copses Special Areas of Conservation (SAC)*: designated for broadleaved deciduous woodland supporting a breeding population of Bechstein's bat (*Myotis bechsteinii*) located 3.1km north-east;
- *Solent and Dorset Coast Special Protection Area (SPA)* (proposed): to be designated for its breeding populations of sandwich tern (*Sterna sandvicensis*), common tern (*Sterna hirundo*) and little tern (*Sternula albifrons*) located 3.1km north-west;
- *Solent Maritime SAC*: designated for its estuaries, sea grass and salt meadows habitats, located 4.3km north-west;
- *Solent and Southampton Water SPA/Ramsar*: designated for its estuarine habitats supporting internationally important assemblages of passage, wintering and breeding birds, located 6.3km north-east;
- *South Wight Maritime SAC*: designated for its subtidal reef, vegetated seas cliffs and submerged and partly submerged sea caves, located 7.4 km south-east;
- *Isle of Wight Downs SAC*: designated for its habitats including vegetated sea cliffs, European dry heaths and calcareous semi-natural grasslands supporting large populations of early gentian (*Gentianella anglica*), located 8.4 km south-east;

National Level Designations

- *Arreton Down Site of Special Scientific Interest (SSSI)*: designated for its grazed chalk grassland supporting important assemblages of butterflies including brown argus (*Aricia agestis*) and chalkhill blue (*Polyommatus coridon*), located 1.5km north-east.

Local Level Designations

- *Sites of Importance for Nature Conservation (SINC)*; four within 1km of the Site: the nearest of which is *St George's Down SINC* located 100m north.

Potential Effects

Habitats and Protected Species

The proposed well site is located within an arable field. Access is to be obtained by way of a new access track in from the A3056 some 400m to the south. The track will cross arable farmland and a small section of improved grassland. A short section of sporadic and species-poor roadside hedgerow will be removed to facilitate safe Site access.

Suitable habitats for foraging bats and dormice were identified within the zone of influence of the proposed development. Surveys have been performed to determine the presence/absence of these species and the relative value of the Site. A summary of the results is attached at **Appendix D**.

An ecological impact assessment will be undertaken in accordance with CIEEM guidelines to identify pathways and likely impacts on identified ecology features. It will record:

- **Habitat Change**: derived from the direct loss of habitat resulting from the access track and well pad construction;
- **Air Quality Change**: during construction (dust deposition) and operation (flaring gas and use of gas engines);
- **Noise and Visual Change**: during mobilisation, drilling and well testing;
- **Surface Water Change**: and any change in water quality; and
- **Ground Water Change**: in hydrogeology.

Embedded mitigation derived from Site selection and design means that it is unlikely any of the pathways identified will give rise to significant effects on habitats or protected species. Based upon experience derived from other operational well sites (e.g. Broadford Bridge and Horse Hill well sites in West Sussex and Surrey respectively amongst others) the magnitude of impact introduced by development is likely to be low and largely contained to within the boundary of the well site. When impacts of this nature are proposed in remote locations with a low level of ecological sensitivity it is unlikely that development will give rise to significant effects.

Natural Heritage Designations

Given the distance between the Site and the European/National level designations, direct impacts are not anticipated. Potential impacts on Local level designations as a result of changes in air quality, hydrology, surface water quality and flood risk will be assessed but are not anticipated to be significant.

Mitigation Measures and Residual Effects

Appropriate protected species licences and mitigation strategies will be developed as necessary to ensure legislative compliance during the construction and operation of the well site. Sensitive lighting design will minimise spillage beyond the Site boundary to avoid disturbance to foraging and commuting bats and badger. Mitigation for nesting birds will be employed during Site clearance works to avoid impacts on breeding birds.

Regardless of the presence of protected species within the zone of influence, it is anticipated that direct effects during construction can be adequately mitigated and the temporary loss of habitat will not significantly affect the conservation status of any of the protected species given the small footprint of the proposed development.

4.8 Traffic, Transport and Access

The proposed development includes a new highways access on Newport Road (A3056) approximately 200m east of the New Barn Business Park and 600m west of the A3056/Merstone Lane road junction.

Potential transport environmental related impacts derive from the additional traffic generated by the proposed development on the local highway network across all work phases that may include additional traffic flows, road safety, congestion, air quality (vehicle emissions), noise and vibration and the condition of the local highway.

During Site construction (phase 1), up to 15 no two-way Heavy Goods Vehicle (HGV) movements per day are anticipated. The magnitude of change this will introduce will be tempered by the temporary nature of the activity and further diluted by embedded mitigation (on-site holding bays, passing places and junction upgrades) and mitigation to be committed (management of flows, HGV communication strategies and traffic signage regimes). Such mitigation is predictable, tried and tested and can be relied upon to reduce residual effects to acceptable levels.

During drilling, decommissioning and restoration (phases 2-4), up to 10 no two-way HGV movements per day are anticipated which is not significant in the context of the local highway network and its carrying capacity.

There may be exceptional occasions during the transition between phases and during drilling when HGV movements exceed the anticipated levels in the interests of well integrity and the efficient operation of the Site. Movements would be controlled by a traffic management plan incorporating measures necessary to avoid any unacceptable residual transport and traffic effects.

A Transport Statement (TS) will record the traffic movements during the four phases of the proposal and assess the effects of operational activity on the local road network. The report will also incorporate a road casualty assessment, traffic management plan and highway access appraisal of the proposed site access point. Pre-application advice provided by Island Roads (dated 27/09/2018) will also be incorporated into the TS where applicable. The statement will be informed by *Government Guidance: Travel Plans, Transport Assessments and Statements in Decision Taking*, as well as any relevant local guidance.

The statement will accompany any future planning application and inform the assessment of landscape, visual, ecology, noise and air emissions impacts and the assessment of cumulative impacts.

4.9 Cultural Heritage and Archaeology

There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens or Registered Battlefields within a 1km diameter search area centred on the Site. There are 10 no Listed Buildings within the search area the nearest being the Grade II Great East Standen House 600m to the north. There nearest Grade II* Listed Building is Merstone Manor 900m to the south. The separation distances achieved between the Site and these assets is sufficient to find that any adverse effects of the proposal are unlikely to materially compromise the significance derived from their setting.

Prehistoric activity characterised by flint scatters of the Mesolithic and Neolithic period and cropmarks are present in the wider landscape but at sufficient distance from the Site to mitigate against any significant adverse effects. Bronze Age activity characterised by circular barrow monuments, pits, linear boundaries and curvilinear and rectilinear enclosures are present along with cropmarks within 200m of the Site. Overall, the extent of prehistoric evidence in the wider landscape suggests a high archaeological potential for the prehistoric period.

Evidence of Roman activity is limited to two entries at the edge of the search area and based on this finding, the potential for encountering Roman archaeological is considered negligible.

Early medieval activity in the area is also limited, although there have been occasional scattered finds, and earthworks of a possible Anglo-Saxon date, including a possible square enclosure, a meeting mound and the Motkin Boundary to east of the Site. None of these earthworks have been investigated to confirm their date, but the absence of other physical evidence in the search area indicates a low potential for this period. Medieval activity is largely represented by earthworks and cropmarks suggestive of agricultural activity and land division, as well as a small number of scattered finds. Given the rural and undeveloped nature of the Site, the potential for encountering evidence of medieval activity within the Site is deemed to be low. Post-medieval activity within the search area also represents agricultural activity with some evidence for resource extraction in the wider area. Historic mapping indicates the Site remained as agricultural land throughout the post-medieval period and until the present day. Taking account of these findings the archaeological potential for the post-medieval and early modern periods is considered negligible.

Subject to an appropriate scheme of investigation to secure and record buried heritage assets, there will be no significant effects. An assessment of effects will accompany a planning application to establish planning policy compliance.

4.10 Arboriculture

The well site and access track will be located on open farmland and will not result in the loss of any trees. Where the access track meets the public highway there may be the need for limited hedge removal to accommodate a new temporary vehicular junction and visibility splays. A preliminary assessment finds that the extent of hedge removal will be minor and not likely to give rise to any significant ecological, landscape or visual impacts. The impact of a proposal on established hedgerow is a material planning consideration and an assessment of effects will accompany a planning application sufficient to establish planning policy compliance.

4.11 Waste

Well construction (Phase 1) and drilling (Phase 2) will generate waste but the effects of this activity and the subsequent treatment processes engaged will not be significant. As demonstrated at other hydrocarbon exploration and appraisal sites across the UK, the adverse effects of development activity can be mitigated to non-significant and acceptable levels through the adoption of considerate construction plans and method working statements. Drilling will generate extractive wastes (i.e. drilling muds, water and rock cuttings) of such low volumes that the effects of their temporary containment prior to removal are not likely to be significant. The management of extractive waste is regulated by the Environment Agency under the 2016 EPR Regs.

4.12 Population and Human Health

Well construction (Phase 1) and drilling (Phase 2) engage construction activities and engineering processes that could potentially impact upon human health (primarily that of on-site workers). As demonstrated at other hydrocarbon exploration and appraisal sites across the UK, such effects are not significant and can be managed and mitigated to non-significant and acceptable levels.

Drilling will give rise to impacts derived from the recovery, temporary storage and subsequent transportation of hydrocarbons via road tankers. However, these activities will be regulated by Health and Safety Executive, Environment Agency permits and Highway Agency transport plans, ensuring the health of on-site operatives and the wider general population will not be compromised. Decision takers can assume that these non-planning regimes will

operate effectively¹¹ to address the effects of hydrocarbon exploration, appraisal and testing. Human health effects are not likely to be significant.

4.13 Risk of Major Accident and/or Disaster

Risks derived from issues of sub-surface instability, surface contamination or unplanned operations amongst others are not considered to be significant. As demonstrated at other hydrocarbon exploration and appraisal sites across the UK, deep drilling and the recovery of resource at surface has taken place with no unplanned effects or events that varied materially from those predicted. At all stages of development, independent over-sight ensures compliance with the regulatory regimes in place to secure Site safety and environmental protection. In taking this Site forward for exploration and appraisal, the same environmental management systems and non-planning regimes will be in place to ensure that risks are managed to non-significant and acceptable levels.

4.14 Socio-economics

The proposed development represents a form of agricultural diversification and the capital expenditure to be brought forward will boost the rural economy. It will generate employment in related trades and benefit the wider local economy through the procurement of services and supplies. The potential for adverse effects on local tourism and other sectors will be low, given the remoteness of the Site and its effective screening from the majority of public vantage points. Overall, the effect of hydrocarbon exploration and appraisal will not be significant.

¹¹ National Planning Policy Framework (2019), para 183 and National Planning Practice Guidance: Minerals - What is the relationship between planning and other regulatory regimes? Paragraph: 012 Reference ID: 27-012-20140306.

5. POTENTIAL CUMULATIVE IMPACTS OF THE PROPOSED DEVELOPMENT

The proposed development is on land between two major non-agricultural land uses; namely:

- Wight Farm Anaerobic Digestion Energy Power Station, Arreton Cross, Arreton; and
- Blackwater Quarry at St. Georges Down, Blackwater.

The above-named operational sites form part of the environmental baseline within which the proposed development must be assessed. Significant effects could arise if the proposed development were experienced cumulatively with the above-named developments, any other developments yet to be implemented or in the process of construction.

Wight Farm Anaerobic Digestion Energy Power Station

In December 2013 the Isle of Wight Council granted full planning permission (Council ref: P/00198/13) for the plant which has since been implemented and the site now accommodates two green digester units and one green storage silo (28.9m in diameter and 12m in height to the top of the domed roofs) supported by the following ancillary development components:

- single storey technical buildings;
- a tanker filling station facility;
- silage clamps (open storage of silage);
- emergency gas flare stack (1.1m diameter and height of 7.5m);
- liquified petroleum gas storage tanks and gas cooling unit;
- solids separation station; and
- a combined heat and power unit

In January 2018 a part retrospective planning permission (Council ref: P/00150/17) authorised the following additional development:

- a new clean up building and alterations to the approved gas clean up building (retrospective);
- two additional silage clamps and an enlargement to the approved silage clamps (retrospective);
- a waste storage lagoon located on land to the west of the main plant (retrospective);
- an additional gas flare (not built at the time of granting consent); and
- an additional storage building (not built at the time of granting consent).

The changes to the main site related to its approved use which was found acceptable in principle by the December 2013 permission. All other changes will take place within the boundary of the approved plant and were therefore found to be acceptable.

The majority of the approved development has therefore been implemented, the plant is operational and its impacts and effects form part of the environmental baseline. Accordingly, there will be no scope for any material cumulative effects arising from the proposed development when considered in combination with the approved development above.

Blackwater Quarry at St. Georges Down, Blackwater.

This site has been used for mineral extraction since 1931. Mineral workings are now concentrated on the north western summit of St Georges Down and its eastern slopes. In May of 2013 the Isle of Wight Council granted full planning permission (Council ref: P/00902/12) for a replacement asphalt plant including re-positioned cold-feed hoppers and a new chimney stack 26.5m in height. This permission has since been implemented, its impacts form part of the environmental baseline and therefore afford no scope for cumulative effects.

In summary, no significant cumulative effects are anticipated for the proposed development.

6. EIA SCREENING COMPLIANCE CHECKLIST

The following table presents the 2017 EIA Regs Schedule 3 in full and demonstrates where, within this Report, the criteria has been addressed.

EIA SCHEDULE 3 CRITERIA		APPLICANT RESPONSE
CHARACTERISTICS OF DEVELOPMENT		
1	The characteristics of development must be considered with particular regard to:	
	(a) the size and design of the whole development;	Chapter 2: Description of the Site and Surroundings, and Chapter 3: Description of the Proposed Development
	(b) cumulation with other existing development and/or approved development;	Chapter 5: Potential Cumulative Impacts of the Proposed Development
	(c) the use of natural resources, in particular land, soil, water and biodiversity;	Chapter 3: Description of the Proposed Development
	(d) the production of waste;	Chapter 4.11: Waste
	(e) pollution and nuisances;	Chapter 4.2: Lighting Chapter 4.3: Noise and Vibration Chapter 4.4: Ground and Groundwater Protection Chapter 4.5: Air Quality, Climate and Climate Change Chapter 4.8: Traffic, Transport and Access
	(f) the risk of major accidents and/or disasters relevant to the development concerned, including those caused by climate change, in accordance with scientific knowledge;	Chapter 4.13: Risk of Major Accident and/or Disaster
(g) the risks to human health (for example, due to water contamination or air pollution).	Chapter 4.12: Population and Human Health	
LOCATION OF DEVELOPMENT		
2	The environmental sensitivity of geographical areas likely to be affected by development must be considered, with particular regard, to:	
	(a) the existing land use;	Chapter 2: Description of the Site and Surroundings
	(b) the relative abundance, quality and regenerative capacity of natural resources in the area;	Chapters 4.1 – 4.10 record the baseline environment within each of the assessment topics. The potential impacts and effects are then informed by an appropriate assessment of the capacity of the environment to accommodate the proposal.
(c) the absorption capacity of the natural environment, paying particular attention to the following areas— (i) wetlands, riparian areas, river mouths; (ii) coastal zones and the marine environment; (iii) mountain and forest areas; (iv) nature reserves and parks; (v) European sites and other areas classified or protected under national legislation; (vi) areas in which there has already been a failure to meet the environmental quality standards, laid down in Union legislation and relevant to the project, or in which it is considered that there is such a failure; (vii) densely populated areas; (viii) landscapes and sites of historical, cultural or archaeological significance.	The assessments performed within Chapters 4.1 – 4.14 address the potential impacts and effects of the proposal within its immediate setting and the wider landscape paying proper regard to designated areas and other natural and built assets.	
TYPES AND CHARACTERISTICS OF THE POTENTIAL IMPACT		
3	The likely significant effects of the development on the environment must be considered in relation to criteria set out in paragraphs 1 and 2 above, with regard to the impact of the development on the factors specified in regulation 4(2), taking into account:	
	(a) the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);	The assessments performed within Chapters 4.1 – 4.14 address the extent, magnitude, complexity and probability of the impact where appropriate prior to performing an assessment of the likely significance of the effects.
	(b) the nature of the impact;	
	(c) the transboundary nature of the impact;	
	(d) the intensity and complexity of the impact;	The proposal is not likely to generate any significant trans-frontier impact.
	(e) the probability of the impact;	
	(f) the expected onset, duration, frequency and reversibility of the impact;	The temporary and reversible nature of the impacts likely to be generated by this proposal are relied upon as material mitigation.
(g) the cumulation of the impact with the impact of other existing and/or approved		

The proposal falls under Schedule 2 of the 2017 EIA Regs as being “*Extractive Industry*” development comprising either category 2.d) “*Deep drillings*” or 2.e) “*Surface industrial installations for the extraction of... petroleum*”¹². National Planning Practice Guidance provides indicative thresholds which are intended to help determine whether significant effects are likely. The relevant extracts for these categories are:

DEVELOPMENT TYPE	2017 EIA REGS SCHEDULE 2 CRITERIA AND THRESHOLDS	NPPG INDICATIVE CRITERIA AND THRESHOLD	KEY ISSUES TO CONSIDER
2. EXTRACTIVE INDUSTRY			
(d) Deep drillings	(i) In relation to any type of drilling, the area of the works exceeds 1 hectare.	Drilling operations involving development of a surface site of more than five hectares. [Exploratory deep drilling on its own is unlikely to require Environmental Impact Assessment].	Regard should be had to the likely wider impacts on surrounding hydrology and ecology.
(e) Surface industrial installations for the extraction of..., petroleum.	The area of the development exceeds 0.5 hectare.	Development of a site of 10 hectares or more.	Scale of development, emissions to air, discharges to water, the risk of accident and the arrangements for transporting the fuel.

¹² The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 2, Section 1, Table (Column 1) Description of Development 2: Extractive Industry, sub-type (d) Deep drillings or (e) Surface industrial installations for the extraction of... petroleum – page 66.

7. SCREENING REQUEST REPORT ASSESSMENT

The proposal falls under Schedule 2 of the 2017 EIA Regs (development description 2: Extractive Industry¹³). The area of the work at surface is likely to exceed the 1-hectare screening threshold for “Deep Drilling”¹⁴ rendering the proposal “Schedule 2 development”.

This Report has considered the proposal against the 2017 EIA Regs Schedule 3 “Selection Criteria for Screening Schedule 2 Development” and finds it will not give rise to any likely significant effects on the environment by virtue of its nature, size or location.

The proposal falls within the indicative screening thresholds of NPPG which records that exploratory deep drilling on its own is unlikely to require an Environmental Impact Assessment.

Taking account of the above findings, this Report finds the proposal to be non-EIA development.

¹³ The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 2, Section 1, Table (Column 1) Description of Development 2: Extractive Industry, sub-type (d) Deep drillings or (e) Surface industrial installations for the extraction of... petroleum – page 66.

¹⁴ The Town and Country Planning (Environmental Impact Assessment) Regulations 2017, Schedule 2, Section 1, Table (Column 2) Applicable Thresholds and Criteria relevant to Description of Development 2: Extractive Industry, sub-type (d) Deep drillings or (e) Surface industrial installations for the extraction of... petroleum – page 66.

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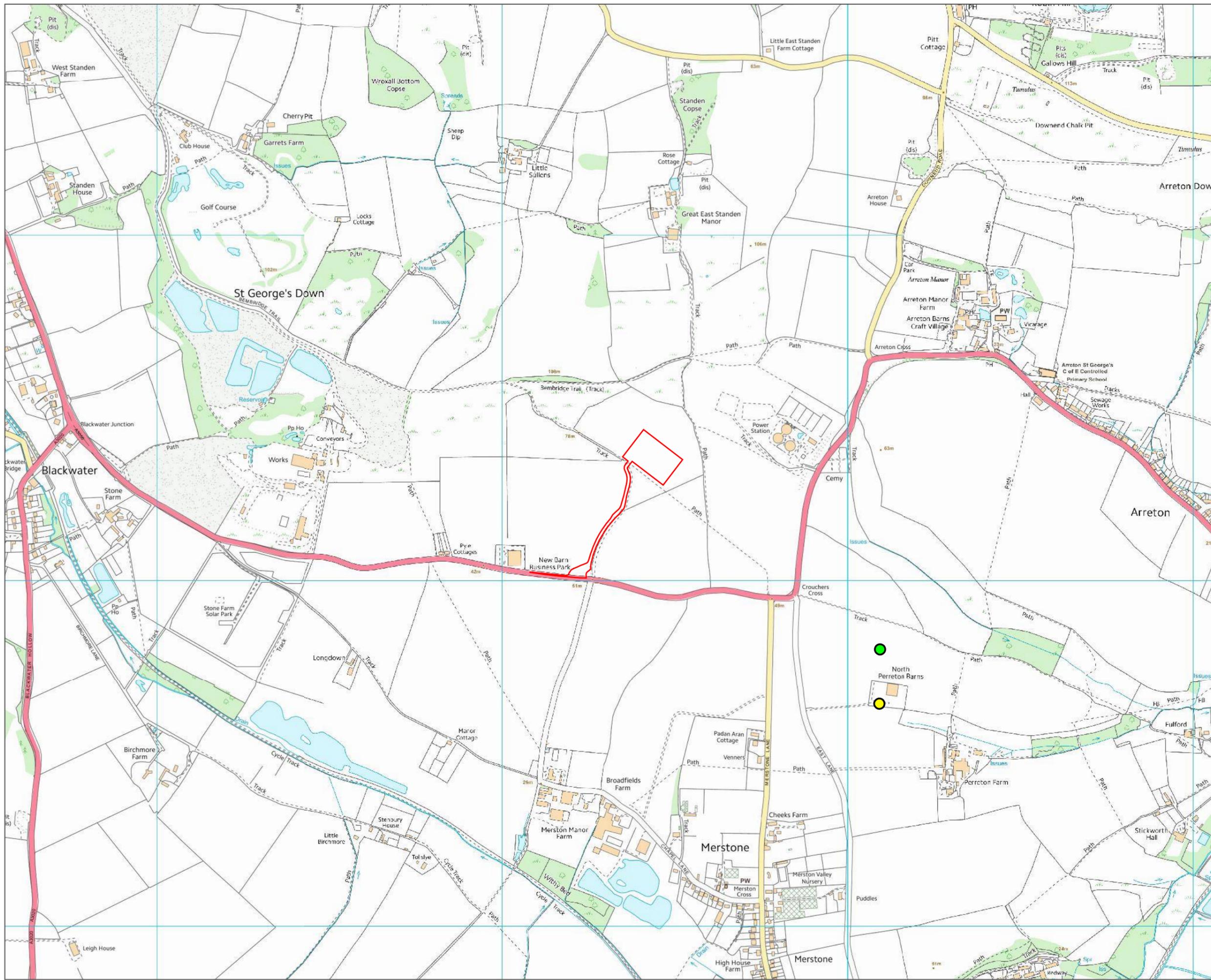
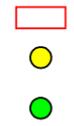
Appendix A.1: Location Plan

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KEY:
 THE SITE
 ARRETON 1 SITE OF HYDROCARBON EXPLORATION 1953
 ARRETON 2 SITE OF HYDROCARBON EXPLORATION 1972



NOTES:

REVISION HISTORY				
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-	-	-	-	-
-	-	-	-	-
0	NOV19	JF	ORIGINAL FOR ISSUE	JF
REV	DATE	BY	DETAILS	APR

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SITE: ARRETON 3 WELL SITE
 PROJECT: ARRETON 3 WELL SITE HYDROCARBON EXPLORATION, TESTING AND APPRAISAL - EIA SCREENING REQUEST APPENDIX A1.1
 TITLE: SITE LOCATION PLAN
 CLIENT: UK OIL & GAS PLC
 Scale: 1:10,000 DWG. No:
 Size: A3 ZG-UKOG-A3-PA-SRR-01
 Sheet: 1 of 1

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Appendix A.2: Site Plan

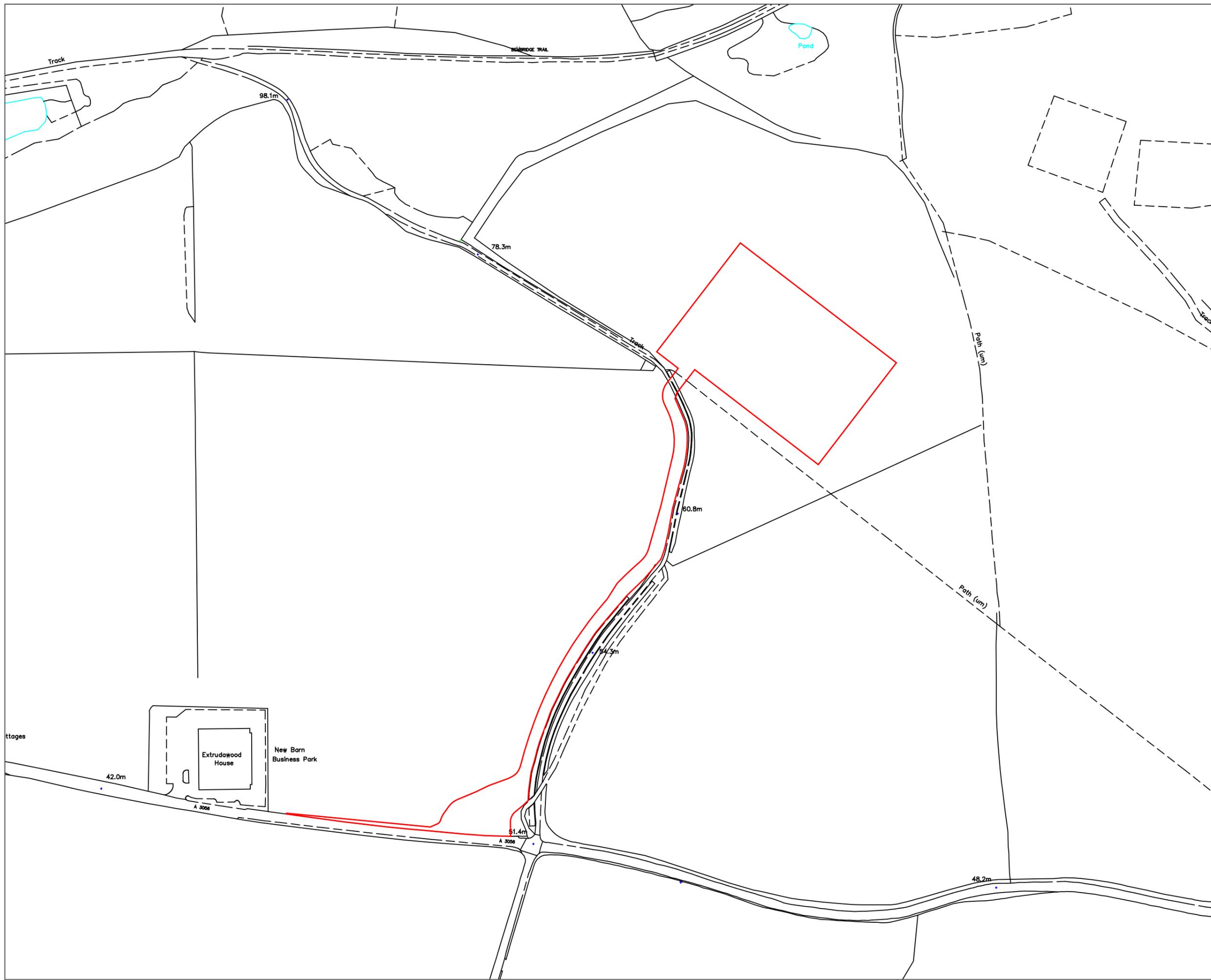
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KEY:

THE SITE



NOTES:

REVISION HISTORY

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0	NOV19	JF	ORIGINAL FOR ISSUE



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SITE: ARRETON 3 WELL SITE

PROJECT: ARRETON 3 WELL SITE HYDROCARBON EXPLORATION, TESTING AND APPRAISAL - EIA SCREENING REQUEST APPENDIX A1.2

TITLE: SITE PLAN

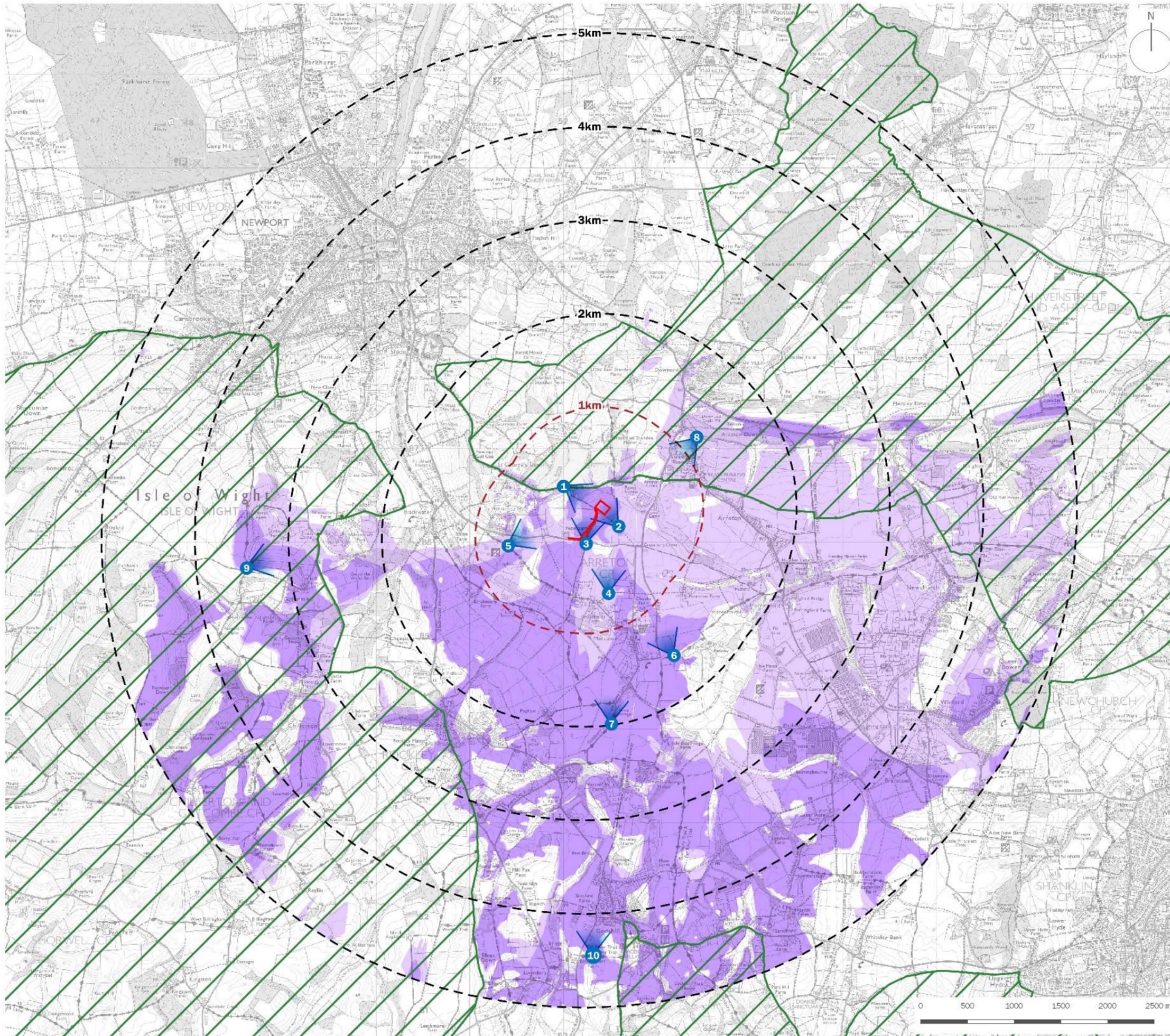
CLIENT: UK OIL & GAS PLC

Scale: 1:2,500 DWG. No:
 Size: A3 ZG-UKOG-A3-PA-SRR-02
 Sheet: 1 of 1

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Appendix B: Representative Viewpoint Location Plan (informed by a Zone of Theoretical Visibility Plan)

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-  Site Boundary
-  1km Study Area
-  Range Rings (at 1km intervals)
-  Zone of Theoretical Visibility (ZTV) - 3.66m
-  Zone of Theoretical Visibility (ZTV) - 37m
-  Area of Outstanding Natural Beauty (AONB)
-  Proposed Representative Photoviewpoint Location

NOTE:

Zone of Theoretical Visibility (ZTV) was calculated using a spatial modelling algorithm which considers the following parameters:

- 1.6m Receptor Elevation (Observer Height)
- 37m Proposed Drilling Rig Height and 3.66m Substructure Height
- 360 Degree Field of View
- LIDAR (DTM) (vertical accuracy of +/- 5cm)

client	Zetland Group		
project title	Land to the West of Arreton, Isle of Wight		
drawing title	Plan EDP 6: Zone of Theoretical Visibility (ZTV) and Proposed Representative Photoviewpoint		
date	13 NOVEMBER 2019	drawn by	GY
drawing number	edp4898_0001c	checked	JM
scale	1:40,000 @ A3	QA	RB



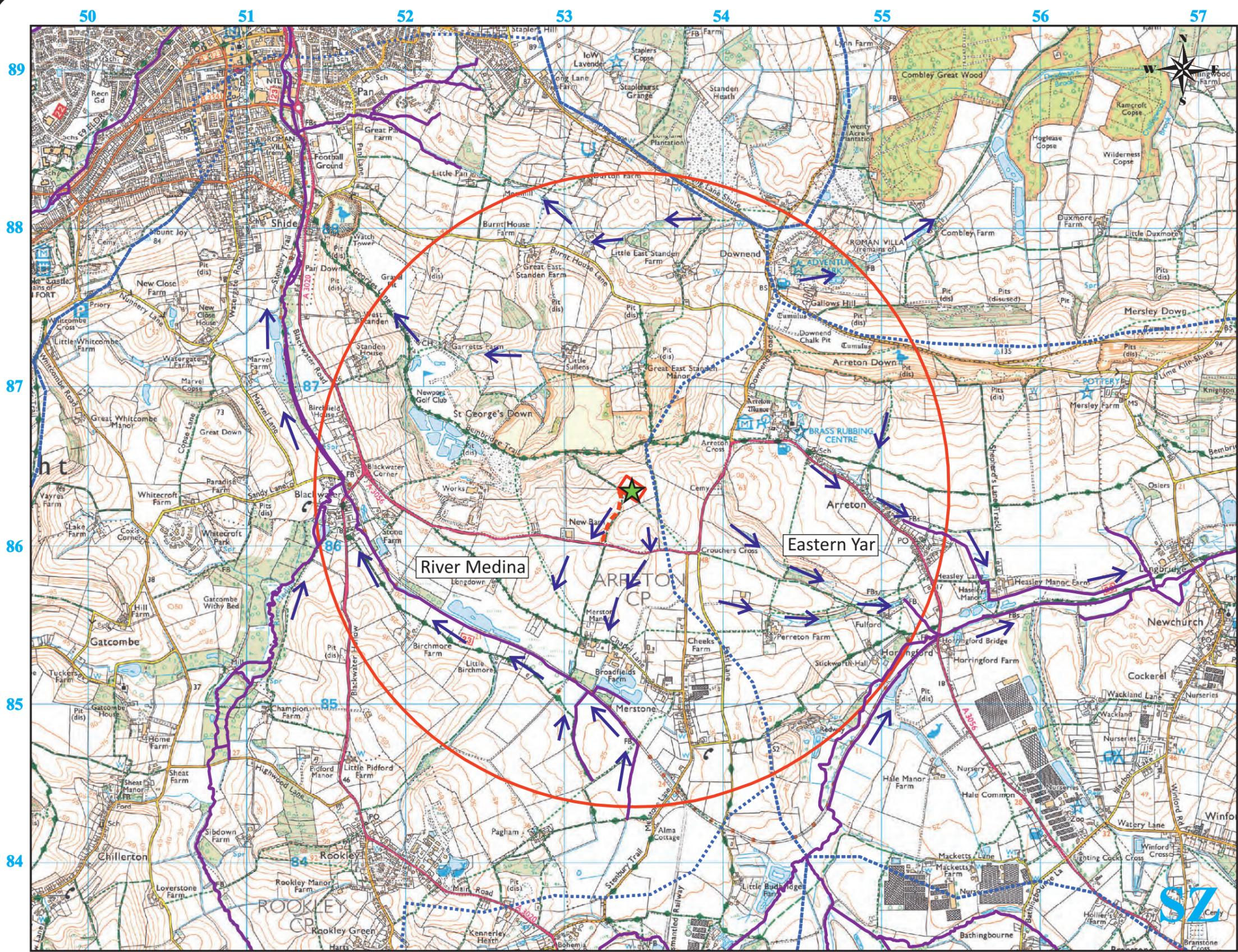
Info@edp-uk.co.uk www.edp-uk.co.uk
 Cirencester 01285 740427 Cardiff 02921 671900 Shrewsbury 01939 211190

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Appendix C: Baseline Hydrology, Geology and Hydrogeology Conditions

The figure depicting the environmental setting of the Site is based on 2018 data. Should a planning application be subsequently made, the assessment of ground and groundwater effects would be informed by 2019 data.

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KEY

- Approximate Site boundary
- Site access route
- ★ Approximate Site Centre
- 2km radius
- Statutory Main Rivers
- Surface Water Catchment Boundary
- ➔ Surface water drainage direction

Scale 1: 25,000 at A3

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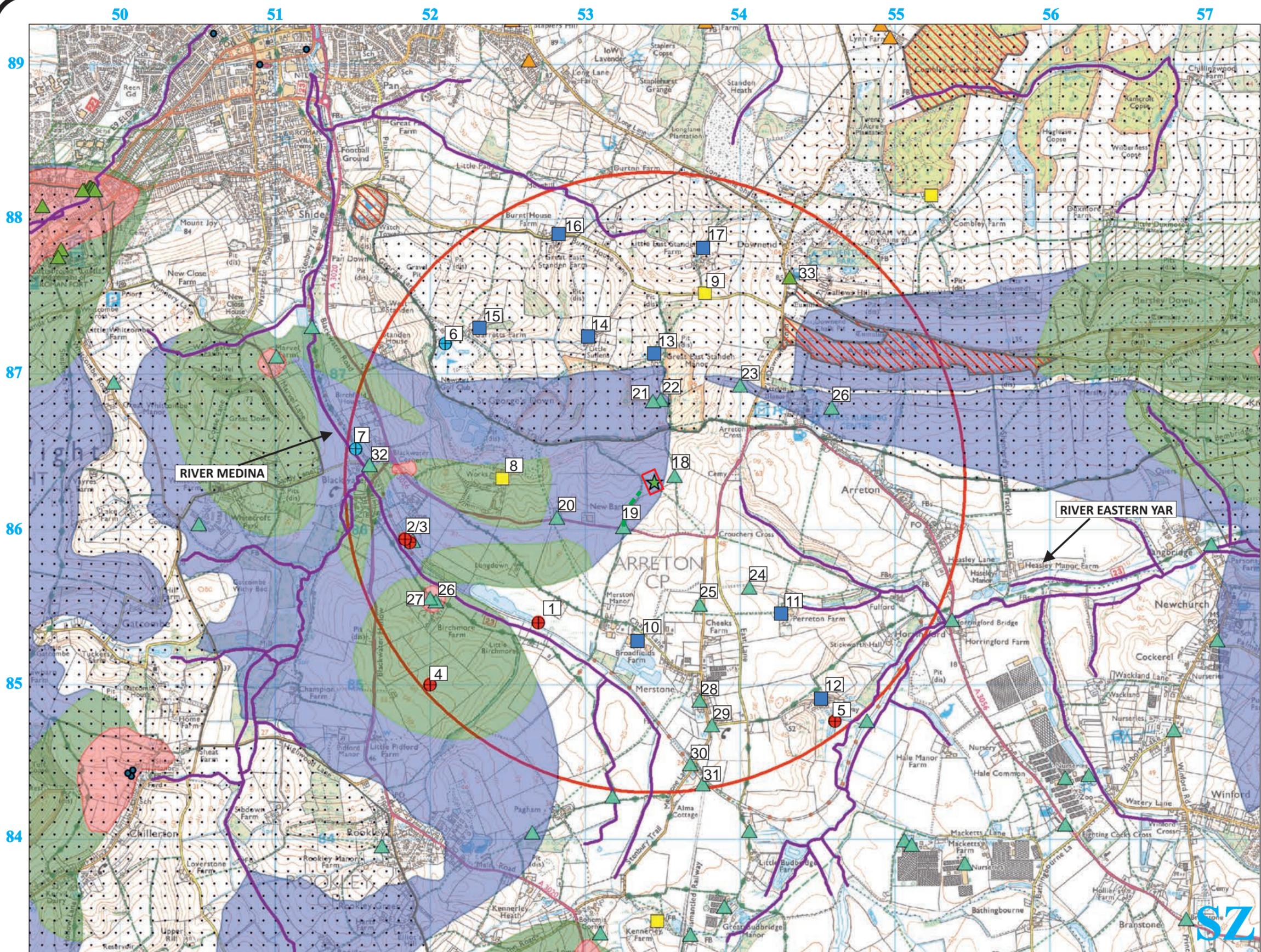


Ref:P19-295 UKOG Arreton 3
 2019 Reporting\ FIG Hydrological Setting
 Date:22/10/19

Appendix C

UKOG Arreton 3 2019

Hydrological Setting



KEY

- Approximate Site boundary
- Site access route
- 2km radius
- Water Framework Directive assessed watercourse
- ⊕ Licensed surface water abstraction
- ⊕ Licensed groundwater abstraction
- Registered private water supply
- Potential unregistered private water supply
- Area of Outstanding Natural Beauty (AONB)
- Site of Special Scientific Interest (SSSI)

BGS Water Well Record targeting:

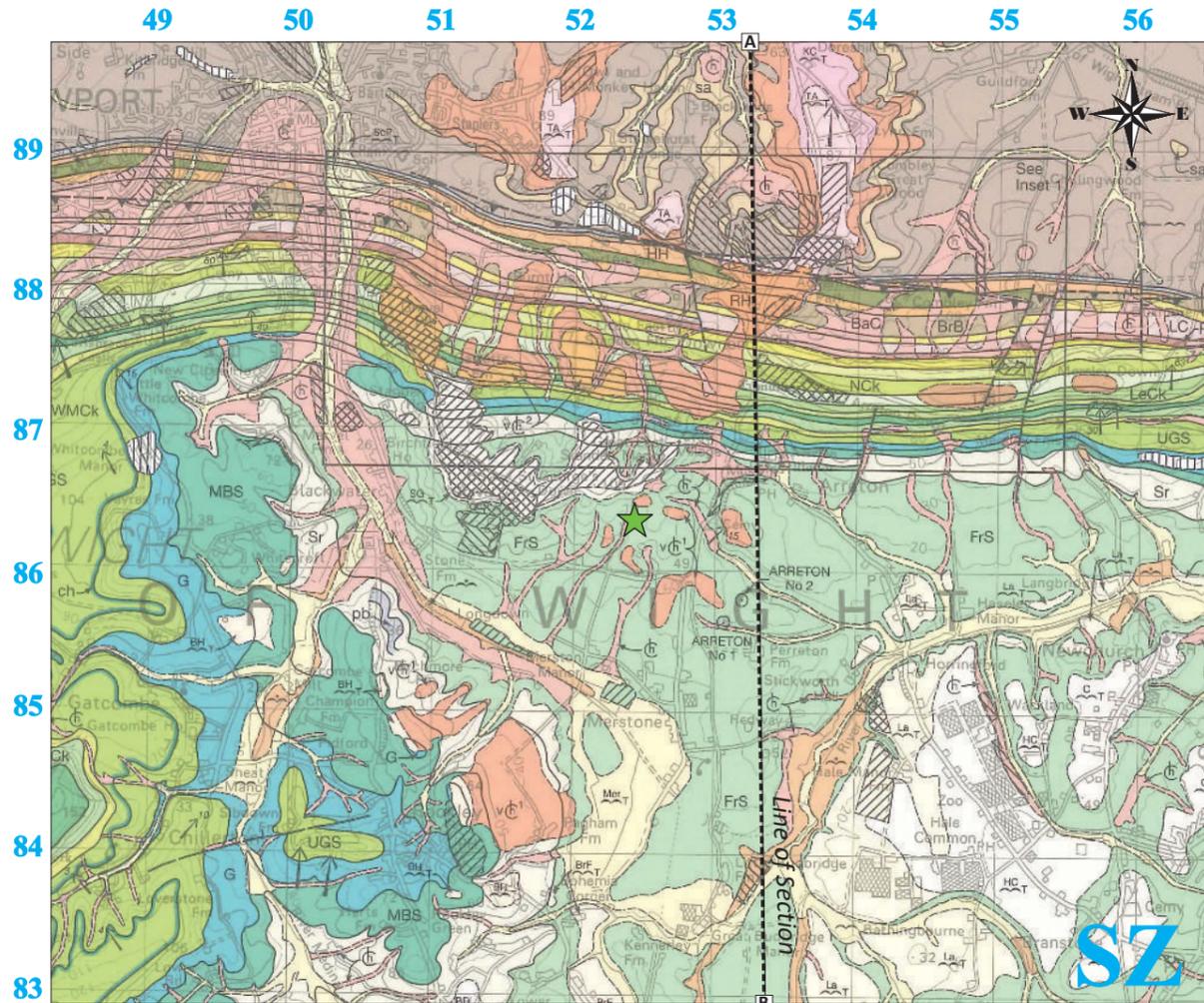
- ▲ Chalk Group
- ▲ Lower Greensand Group
- ▲ Palaeogene Strata
- ▲ Unknown

Groundwater Source Protection Zones:

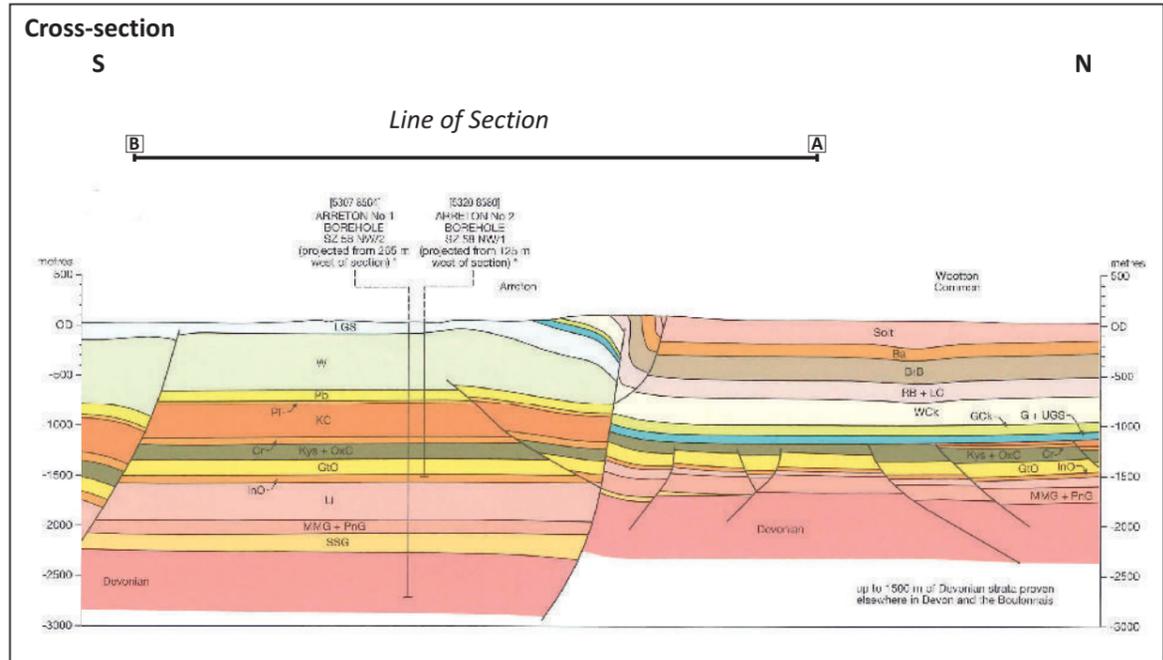
- Inner Zone (Zone 1)
- Outer Zone (Zone 2)
- Total catchment (Zone 3)

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Scale 1 : 25,000 (at A3)



Scale 1:50,000 (at A3)



KEY

- ★ Approximate Site Centre
- Geological boundary, Superficial Deposits
- Geological boundary, Bedrock
- Fault at rockhead, crossmark on downthrow side
- Reverse fault, barbs on hanging wall side
- + Horizontal strata
- + Vertical strata
- 15° / Inclined strata, dip in degrees
- ↘ Generalized dip of inclined strata
- Bathymetric contour in metres below Ordnance Datum (OD)
- Borehole

Only the geologically more significant boreholes and wells are shown. Other boreholes and wells may exist. The location of each borehole and well shown is only approximate, and the true locations of some are uncertain. Names are those by which the borehole is commonly known. Numbers are those of the BGS record system.

SOLENT RIVER FORMATION

- Knight's Cross Gravel Member
- Twenty Acre Gravel Member

MEDINA RIVER FORMATION

- Seaclose Park Gravel Member
- Bridge Farm Gravel Member
- Blackwater Hollow Gravel Member

EASTERN YAR RIVER FORMATION
Main stream

- Langbridge Gravel Member
- Hale Common Gravel Member
- Cockerel Gravel Member

SUPERFICIAL DEPOSITS

ARTIFICIALLY MODIFIED GROUND

- Worked Ground: chalk, clay, sand and gravel pits
- Made Ground: mainly quarry spoil, embankments and sea defences
- Infilled Ground: mainly backfilled, chalk, clay, sand and gravel pits
- Landscaped Ground: modified ground mainly recreational and reclaimed industrial sites

NATURAL SUPERFICIAL DEPOSITS

- Landslide Deposits
- Tidal Flat Deposits: sand and mud, generally mobile
- Beach Deposits: variable sand, gravel, silt and clay, locally with boulders
- Blown Sand: fine- to medium-grained sand
- Tidal River Deposits, undifferentiated: soft grey silts and clays and fine sands, variably organic with gravel lenses
- Alluvium: clay, silt and sand with gravel and organic-rich layers
- Peat: soft black organic debris
- First River Terrace Deposits: clayey sandy gravel
- River Terrace Deposits, undifferentiated: generally clayey sandy gravel
- Head 1: variable deposits of sandy, silty clay, locally gravelly; chalky and flinty in dry valleys
- Gravelly Head 1: of variable age, derived from local Quaternary deposits with a mixture of bedrock lithologies
- Gravelly Head 2: of variable age, derived principally from the St. George's Down Gravel Member
- Head 2: variable slope deposits, generally gravelly, including Clay-with-Flints debris
- Clay-with-Flints Formation: clay, orange brown with numerous nodular and well-rounded flints; very gravelly angular flint common on Southern Downs

The Superficial Deposits listed above are not necessarily shown in order of superposition. Other Superficial Deposits may lie between the deposit at surface and the Bedrock at rockhead, including those that may not appear in the key.

Symbol indicates the natural Superficial Deposit at surface or beneath any Artificially Modified Ground or landslide deposits, and the Bedrock at rockhead; other Superficial Deposits may intervene

For Bedrock symbols and colours see Generalized Vertical Sections

GEOLOGICAL UNITS IN CROSS-SECTION

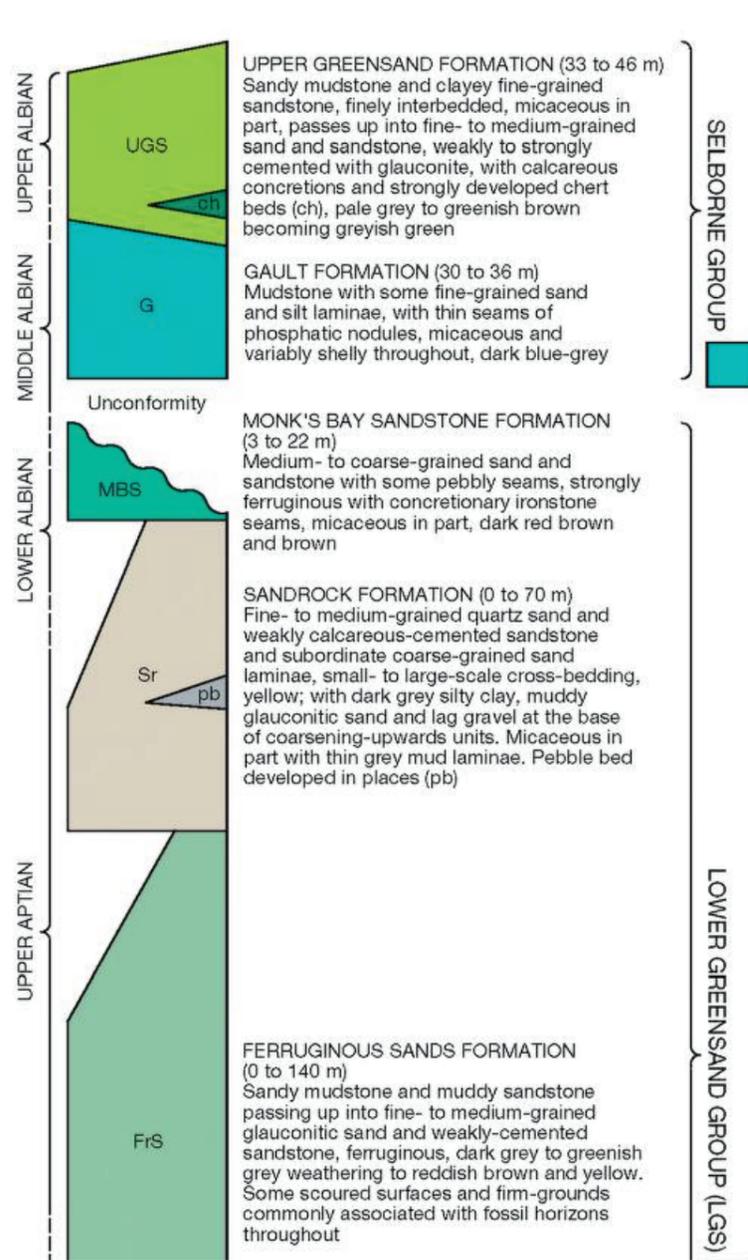
- LGS - Lower Greensand Group, Undifferentiated.
- Pb - Purbeck Group
- PI - Portland Group
- KC - Kimmeridge Clay Formation
- Cr - Corallian Group
- OxC - Oxford Clay Formation
- Kys - Kellaways Formation
- Cb - Cornbrash Formation
- GtO - Great Oolite Group
- InO - Inferior Oolite Group
- PnG - Penarth Group
- BAn - Blue Anchor Formation
- MMG - Mercia Mudstone Group
- SSG - Sherwood Sandstone Group

For Bedrock Geology descriptors see "Bedrock Geology Key Overleaf"

KEY

For site bedrock geological setting see "Geological Setting" overleaf

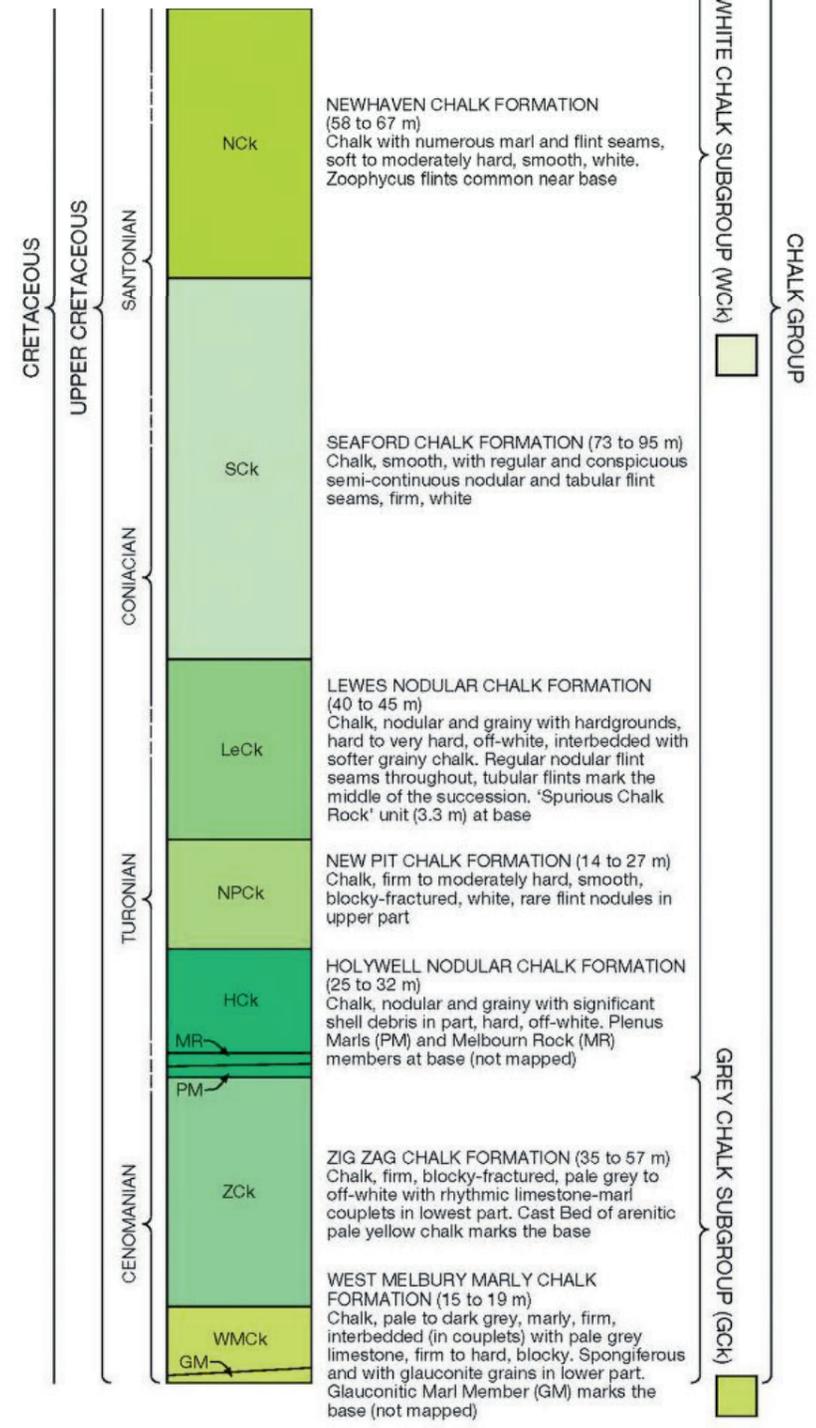
LOWER CRETACEOUS



SELBORNE GROUP

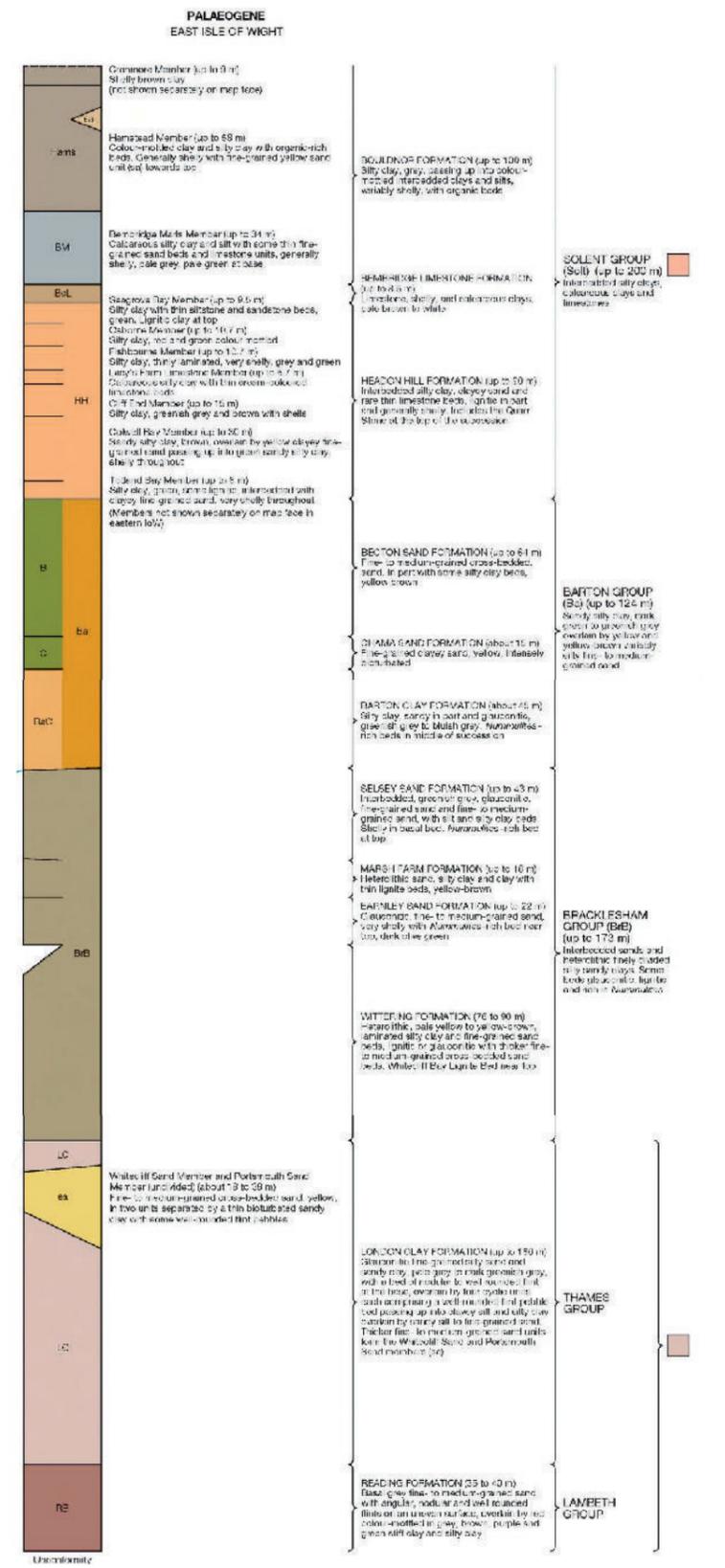
LOWER GREENSAND GROUP (LGS)

UPPER CRETACEOUS



WHITE CHALK SUBGROUP (WCK)

GREY CHALK SUBGROUP (GCK)



Appendix D: Ecological Habitat Assessment and Protected Species Surveys Complete in 2018

SURVEY	DATE	SCOPE AND METHOD	SUMMARY OF RESULTS	LIKELY MITIGATION REQUIREMENTS
Extended Phase 1 Habitat	March 2018	All habitats within the well site boundary and within 250m where accessible.	Well site located in improved grassland habitat of limited ecological value.	Not required
Great Crested Newts	March 2018	Initial Habitat Suitability Index (HSI) assessment of all ponds within 250m of the well site.	No ponds within 250m of the well site. No further surveys work required.	Not applicable
Dormouse	May – Nov 2018	Surveys using nest tubes placed every 20m in the hedgerows surrounding the well site and checked in July, September and November	Suitable potential habitat for dormouse in hedgerows adjacent to highway verge.	Where present in hedgerow sections to be removed, a European Protected Species Mitigation (EPSM) licence will be obtained from Natural England. Hedgerow clearance will be carried out in a two-stage process Stage 1: cut to ground level in winter (to avoid breeding birds and above ground dormouse nests), and Stage 2: grub out stumps the following spring to avoid hibernating dormouse (in nests at ground level/in amongst hedgerow roots). Compensatory hedgerow planting to be incorporated within the scheme. There is no risk of significant fragmentation/isolation effects on dormouse population due to minor extent of hedgerow removal for access (<20m).
Bats	May – Oct 2018	Initial appraisal of the bat roost potential of adjacent trees.	There were no trees with bat roost potential within the zone of influence of the proposed development	Not applicable
		Monthly walked transect surveys (6 in total) plus monthly deployment of static detectors for a minimum of 5 nights per survey.	May 2018 transect and static deployment completed. The surveys recorded moderate levels of activity by common pipistrelle, and low levels of activity by soprano pipistrelle, serotine, noctule, barbastelle, and Myotis species (including possible Bechstein's bat).	Lighting design to minimise light spill beyond site boundary.
Breeding birds	March 2018	Habitat appraisal	Ground nesting birds likely to be present in arable habitats. Hedgerows provide nesting habitat for a range of woodland species.	Seasonal restrictions on site clearance activities to avoid nesting bird season (March to August inclusive). Where this is not possible, pre-construction checks for nesting birds will be undertaken and appropriate stand-offs implemented around active nest sites.
Reptiles	March 2018	Habitat appraisal	Suitable potential habitat for reptiles in rough grassland mosaic habitat adjacent to the well site. Habitat to be avoided so no requirement for further surveys.	None required

