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**Plans**

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Borehole Location Plan	1/12500	PEDL217/PLANNING/LLANDOW2/LOC110313
Site Layout Plan	1/250	PEDL217/PLANNING/ LLANDOW2/SITELAYOUT110313
East – West Cross Section	1/250	PEDL217/PLANNING/ LLANDOW2/E-WSEC110313
North - South Cross Section	1/250	PEDL217/PLANNING/ LLANDOW2/N-SSEC110313
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**Appendices**

<b>Description</b>	<b>Scale</b>	<b>Reference</b>
Details of Site Office	1/10000	APPENDIX I
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## 1. Introduction

This application is submitted by Coastal Oil and Gas Limited.

The applicant seeks consent for one borehole for the purpose of testing strata for the possible production of methane on land in Llandow Industrial Estate South West of Cowbridge in the Vale of Glamorgan.

The application is for the purpose of drilling to take samples of Carboniferous, Devonian aged strata to enable laboratory testing with a view to the utilisation of methane as a clean energy supply. This is a continuation of an ongoing sampling and testing program across South Wales, Bristol, Somerset and Kent.

The proposed borehole is on land as indicated on the accompanying plan marked "Borehole Location Plan". The borehole is aimed generally at the Devonian aged strata. Samples will be tested as part of the process. If the borehole proved positive in terms of test results, a further planning application may be submitted to extract and utilise methane as a clean energy source for the local area or for electrical generation. Any methane produced could also be used as a lower cost, clean vehicle fuel as an alternative to petrol.

It should be noted that the Company has a permission for an exploratory borehole on land to the north east, on the Llandow Business Park. This site targets a separate geological structure in the Devonian Sandstones. There is a geological fault separating the two sites.

**This application is for exploration works only and does not entail any fracking.**

*It must be stressed that if this borehole was determining the coal in-situ i.e. a mineral exploration hole, it could be carried out under the terms of a General Development Order if it was not proposed to drill for 24hrs and subject to the height of the rig: petroleum exploration (Coal Bed Methane is classed as petroleum) requires a planning permission to be granted before work commences. In practice there is no difference in the drilling techniques apart from the fact that drilling for CBM will employ more and better safety precautions. The technical aspects of the drilling will have to be assessed and approved in writing by the Health and Safety Executive Oil and Gas Division, The Coal Authority and the DECC before work starts.*

## 2. Supporting Information

The information contained within this supporting documentation to the formal Planning Application is given to help promote the understanding of the operations involved and thereby to assist in the planning process. The supporting documentation has been expanded to include additional information, which will only be relevant to certain individual consultees. Others, who may be interested in the development scheme, will be able to better understand the concept of the overall project by reference to this document.

This supporting documentation and site design has been prepared giving consideration to the purposes of the current legislation governing planning and environmental matters. The aim being, to ensure as far as is practicably possible, that the development will not knowingly permit the introduction into the environment of any substances or energy liable to cause hazards to human health, harm to living resources and ecological systems, loss of any amenity, or interference with the legitimate use of the environment by the general public and especially those that are neighbours to the development.

### 3. The Applicant

Coastal Oil and Gas Limited is based at the Bridgend Business Centre, Bridgend, South Wales. It is principally involved in the exploration of UK onshore gas reserves. It has a 50% interest in 99.9 km<sup>2</sup> of Petroleum Exploration and Development Licence (PEDL 217) which is part of a licence holding in South Wales of 1052.4 km<sup>2</sup>. The remaining 50% is held by Adamo Energy (UK) Limited a wholly owned subsidiary of Eden Energy Limited of Perth, Australia. Coastal Oil and Gas Limited is approved as an operator for this licence by the Crown.

### 4. Gas Quality

Geological modelling shows that the Llandow Business Park sits on a geological structure that could be a trap for Devonian conventional gas; the Devonian Measures are renowned for USA gas production. The borehole will be designed to test the presence of this gas.

International drilling and testing of similar gas resources has proved a resultant high quality, clean gas.

### 5. Gas Availability

#### 5.1 Testing

During the drilling samples will be taken for testing and analysis on site and in independent laboratories. The well will also be logged with geophysical tools. Permeability tests will be undertaken in the boreholes.

#### 5.2 Gas Quality

Previous drilling in South Wales proved very high quality gas reserves of some 90-98% Methane, up to 5.3% Ethane and no Hydrogen Sulphide, a very high quality, clean gas.

### 6. Regulation of Onshore Oil and Gas

The Petroleum (Production) Act 1934, as amended by Section 18 of the Oil and Gas (Enterprise) Act 1982, provided for exploration of and production of onshore hydrocarbon resources. The Act vests ownership of petroleum underground in the Crown and empowers the Secretary of State for Energy to grant to such persons as he thinks fit, Licences to search, bore for and get petroleum.

The main objectives of the Licensing regime are to further the general Government policy of establishing the extent of the Country's indigenous hydrocarbon resources. The regime is also intended to provide a framework within which the search for and production of oil and gas onshore can be undertaken in a safe and orderly manner, and to provide a satisfactory balance of safeguards and rights between the Government and Licensees. This regime also maintained unproved acreage on short licence and provided a satisfactory longer-term licence for production.

The Petroleum (Production) (Landward Areas) Regulations 1995, introduced on 30 June 1995 comprises a single exclusive and unitary licence now known as a "PEDL", Petroleum

Exploration and Development Licence. Licences are awarded for an initial period of six years although some flexibility may be allowed and then, if required and commitments are met, for further terms. Additional acts were passed in 1998 and 2007 to provide further and better governance.

Planning permission will be required before the deep drilling of exploratory wells can be undertaken. DECC will require proof that the necessary planning permission has been obtained for deep drilling and production also that all necessary consultations have been completed before authorising commencement of these activities.

There had been considerable debate between the industry and the former British Coal, as to the ownership of the gas, in this case Coal Bed Methane and Coal Mine Methane. For the avoidance of any doubt Coal derived Methane was confirmed as a Crown Mineral (hydrocarbon) by virtue of Section 9 of the Coal Industry Act 1994.

Forecast future energy shortages are putting pressure on unconventional gas producers to develop suitable fields.

## 7. The Site

### 7.1 Location

The site is located near Llandow Industrial Estate, South West of Cowbridge in the Llandow community council's areas of Vale of Glamorgan Borough Council. The national grid co-ordinates for the site are:-

Eastings 295230 Northings 171746

Shown on the Borehole Location Plan –

PEDL217/PLANNING/LLANDOW2/LOC110313



Figure 1: Location of site

## 7.2 Current Use

The land currently not used, previously it has been used for storage of waste for recycling.

## 7.3 Ownership

The site is in private ownership and this application is made with full consent of the landowner.

## 7.4 Site Infrastructure

The site requires minimal moving of material apart from that required to tidy the area. There is an existing, level concrete base and no further ground preparation will be required for drilling or siting cabins/offices.

## 7.5 Ground Conditions

Initial investigation shows that the land is comprised of a small thickness of glacial material overlying the Porthkerry Formation (Lower Lias) of Jurassic age. The thickness of the Jurassic limestone is around 20-50m thick. Under the Jurassic limestone is a small thickness on Carboniferous limestone. A detailed survey will be conducted during the development process.

## 7.6 Access

The proposed access from the main highway network will be the same as the Llandow Business Park off the Llantwit Major Road, the B427068 onto an un-named road past the Llandow Karting Centre and onto the Industrial estate. Access through the estate will be along Tumulus Way then right onto Gluepot Road into the site. To minimise risk the proposal for site access is to travel in very early in the morning when traffic is minimal. The drill rig is a standard lorry size or track mounted and carried on a trailer. Albeit heavy traffic, such as the rig, drill pipe and cabins, will only travel to the site once and from the site once; site entry will be from the south via the A4050, A4226 and B4265 to avoid Llysworney Village. Once on site, traffic will consist of cars and vans at the beginning and end of shift and deliveries. The rig does not require specialist escort. The vehicles create no more noise than other heavy goods vehicles. No additional highway amendments are required.

To make the overall drilling process more efficient, two drilling rigs will be utilised:-

- An initial drilling rig will set the surface casing to protect any groundwater near to the surface.
- The second drilling rig will set up over the borehole and drill and sample the coal measures.

A summary of proposed traffic flows into the site is as follows: -

<b><i>Drill rig</i></b>	<b>2</b>
<b><i>Drill Pipe</i></b>	<b>4</b>
<b><i>Casings</i></b>	<b>5</b>
<b><i>Tanks and other equipment</i></b>	<b>5</b>

<b>Survey equipment</b>	<b>1</b>
<b>Cabins</b>	<b>5</b>
<b>Tankers used water</b>	<b>3</b>
<b>Steel linings</b>	<b>2</b>
<b>Foul sewerage tanker</b>	<b>1 per week</b>
<b>Skips</b>	<b>4 per week</b>
<b>Drilling supplies (transit)</b>	<b>3 per week</b>
<b>Personnel (cars/vans)</b>	<b>2/3 per 12 hr shift</b>

It is therefore proposed that the existing road infrastructure be utilised and that no additional highway amendments are required.

**7.7 Environment Agency - Flood Risk**

The Environment Agency do not class the site as being in a flood plain, the scheme is in an area that is unlikely to flood.

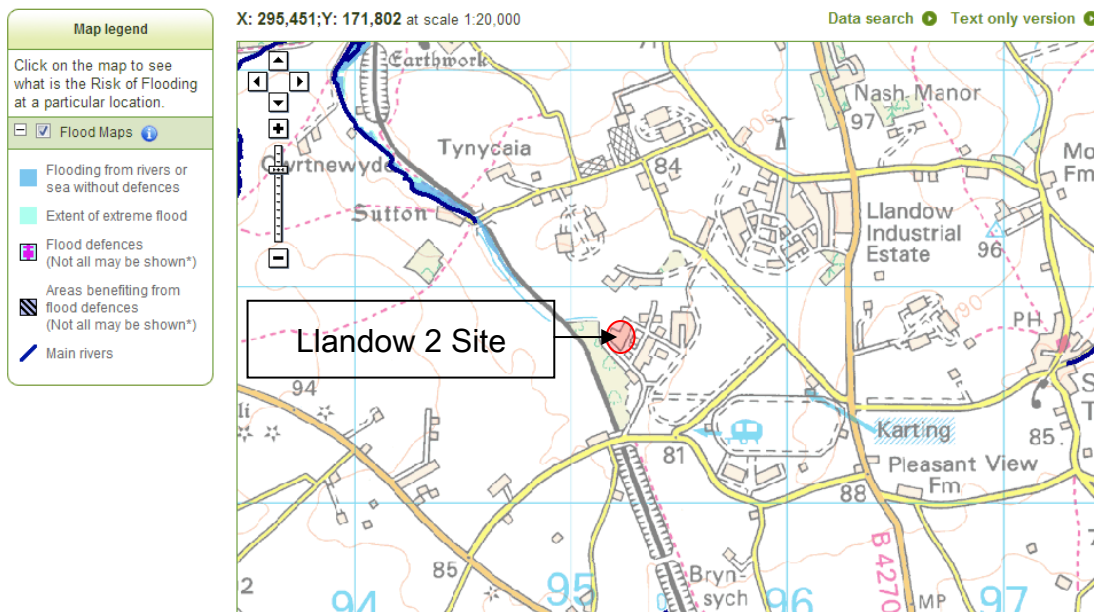


Figure 2: Potential for flooding from Rivers and Sea. Taken from the Environment Agency Website

**7.8 Area**

The enclosed area of the application site is 0.199 hectares.

The areas are made up as follows: -

ITEM	AREA (HA)
Drilling Compounds Zone 1	0.070
Portable Apparatus and Parking	0.129
Total Area per Borehole Site	0.199

## 7.9 Planning Policy

### National Policies

The Department of Energy and Climate Change (DECC) published the Overarching National Overarching National Policy Statement for Energy EN-1 in July 2011

**Para 3.6** states that fossil fuel power stations play a vital role in providing reliable electricity supplies: they can be operated flexibly in response to changes in supply and demand, and provide diversity in our energy mix. They will continue to play an important role in our energy mix as the UK makes the transition to a low carbon economy,

**Para 3.7** states that -Fossil fuel generating stations contribute to security of energy supply by using fuel from a variety of suppliers and operating flexibly. Gas will continue to play an important role in the electricity sector – providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply

**Para 6.3** states that- Some of the new conventional generating capacity needed is likely to come from new fossil fuel generating capacity in order to maintain security of supply, and to provide flexible back-up for intermittent renewable energy from wind.

**Energy Wales: A Low Carbon Transition ( March 2012)** states - Gas will be a key transitional fuel because greenhouse gas emissions from gas are significantly less than coal subject to the method of extraction. Gas is a flexible, responsive and reliable source of energy which can play a key role in the transition to a genuinely low carbon energy system.

### Local Policy

#### Vale of Glamorgan Unitary Development Plan

The site is situated in the countryside and the most relevant policies are considered to be the following.

#### Policy MINS1-MINERAL EXPLORATION

Proposals to carry out mineral exploration will be permitted unless there would be an unacceptable impact on any of the following

- (i) Landscape Character
- (ii) Visual Amenity
- (iii) Nature Conservation
- (iv) Residential Amenity
- (v) The Glamorgan Heritage Coast
- (vi) Surface Water and Ground Water Resources
- (vii) Scheduled Ancient Monuments and Historic Landscapes

#### Policy ENV29- PROTECTION OF ENVIRONMENTAL QUALITY

Development will not be permitted if it would be liable to have an unacceptable effect on either people's health and safety or the environment:

- (i) By releasing pollutants into water, soil or air, either on or off site; or
- (ii) From smoke, fumes, gases, dust, smell, noise, vibration, light, or other polluting emissions

#### ENV27- DESIGN OF NEW DEVELOPMENT

Proposals for new development must have full regard to the context of the local natural and built environment and its special features, new development will be permitted where it:

- (i) Compliments or enhances the local character of buildings and open spaces

- (ii) Meets the council's approved standards of amenity and open space, access, car parking and servicing
- (iii) Ensures adequacy or availability of utility services and adequate provision for waste management
- (iv) Minimises any detrimental impact on adjacent areas
- (v) Ensures existing soft and hard landscaping features are protected and complemented by new planting, surface or boundary features
- (vi) Ensures clear distinction between public and private spaces
- (vii) Provides a high level of accessibility, particularly for public transport, cyclists, pedestrians and people with impaired mobility
- (viii) Has regard to energy efficiency in design, layout, materials and technology: and
- (ix) Has regards to measures to reduce the risk and fear of crime.

It is considered that the proposal complies with the above policies.

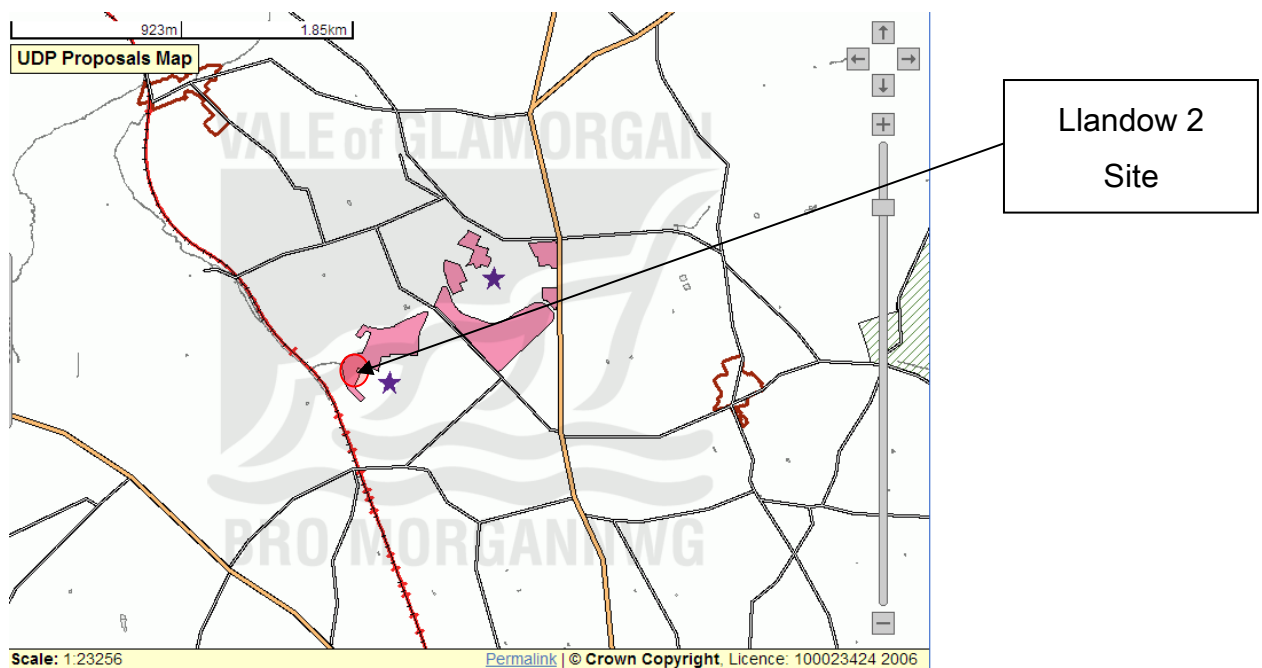


Figure 3: Extract from Vale of Glamorgan Councils UDP

### 7.10 Job Creation

For the duration of the site works there will be approximately 15 people employed. These jobs will generally be contractors that are used to work on the drilling rig and the geologist to sample and test the samples. Where ever possible local services and suppliers will be used to help maintain local jobs.



## 8. Details of Proposal

### 8.1 The Construction of the Exploration Borehole

The borehole will be constructed to comply with current legislation and applicable codes and rules. The hole will be constructed under the governance of the Health and Safety Executive Oil and Gas Division. A final Department of Environment and Climate Control permission in the form of a Well Operation Notice is required before work can commence.

The works for the boreholes will include: -

- ❖ Install 2m diameter concrete ring up to 3m deep
- ❖ Drilling a surface conductor hole at approximately 30cm diameter a sufficient distance into rock head.
- ❖ Cementing the surface completion in place.
- ❖ Pressure testing the surface completion.
- ❖ Drilling at approximately 25cm diameter into the strata, steel casing will be set to the necessary depth to protect any groundwater present.
- ❖ The drilling will then leave site, to await the arrival of rig 2.
- ❖ Drill to into the Devonian Measures and collect chipping samples utilising suitable Well Head Protection and Diversion System to a suitable vent system.
- ❖ Utilising suitable monitoring systems
- ❖ Geophysical logs will be completed in the borehole
- ❖ Upon completion of the drilling, casing will be installed in the borehole with a suitable well head assembly fitted
- ❖ Pump tests to indicate the permeability and suitability of the strata to produce gas will be undertaken

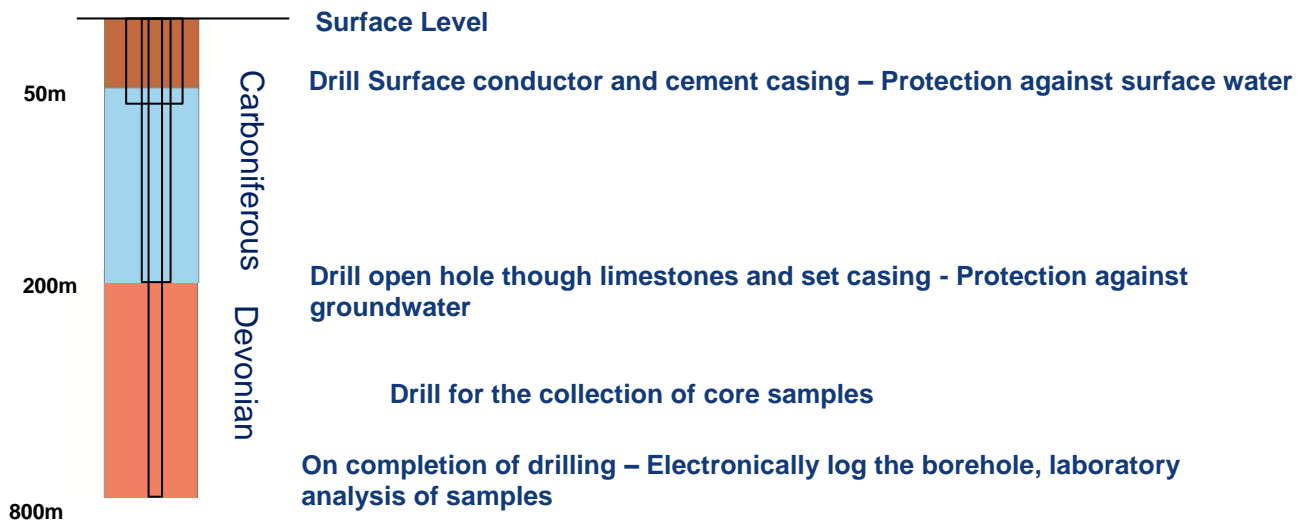


Figure 4: Proposed Section of the borehole

### 8.2 Site Layout

The layout of the proposed borehole site is included in this application and indicated on the attached plan reference: -

PEDL217/PLANNING/LLANDOW2/SITELAYOUT110313

### 8.3 Summary of Geology

The British Geological Survey (BGS) map Sheet 262 (Bridgend) maps the area as Jurassic Limestone area is situated to the Vale of Glamorgan and is underlain by the Carboniferous Limestones. The general dip of the strata seams is towards the south.



Figure 5: Surface Geology around the site

### 8.4 Mine workings

There are no recorded mine workings in the immediate area.

## 8.5 Gas Control

Gas control during drilling will be effected by a number of valve arrangements. The arrangement is centred appropriate well head protection and diversion system to a suitable vent system. The system will be HSE approved and has been used for drilling similar holes previously.

## 8.6 Monitoring Operations

The levels of Methane, Oxygen, Carbon Monoxide and Hydrogen Sulphide will be continually monitored on at the site. Drilling will be 24 hours per day. The site will be manned at all times.

During the drilling of the borehole the levels of the drilling fluids are constantly monitored by the drilling crew and tests on the fluids are made during the drilling of a length of drill rod. The properties tested by the drill crew are

- Density of the fluid
- Viscosity of the fluid
- Colour of the fluid
- Sand Content of the fluid

## 8.7 Noise

A Noise Report has been submitted with the application. The nearest noise sensitive property lies approximately 350 metres from the site.

The Report concluded that predicted noise levels at residential properties and the caravan park fall below MTAN1 night-time noise limits and the World Health Organisation (WHO) night-time sleep disturbance threshold criteria of 30dB(A) within bedrooms.

Predicted noise levels at the bat roost are only 32dB(A) Leq, and are therefore not assessed significant compared with existing noise sources around the roost; including those associated with the neighbouring waste recycling centre, or wind/rain in trees

To reduce the site noise to a minimum, additional screening around the noise sensitive equipment and around the site will be implemented. Soft noise absorbent matting will be used on the site fencing and around the main sources of noise. (Please see Appendix VII – Echo Barrier)

## 8.8 Lighting at Night

The lights will be on stands no more than 3m in height, the lights will be hooded and down pointing so that light cannot spill over the site boundary. No lights will be allowed to point directly at an existing dwelling or onto the highway. Please see attached plan titled Lighting layout plan PEDL217/PLANNING/LLANDOW2/LIGHTLAYOUT11033. The lights will be positioned so that they do not cause distraction to drivers on the roads. The lighting will be positioned to cause no disturbance to wildlife within the adjoining vegetation.

## 8.9 Surface water protection

In order to prevent the discharge of surface water from the site a cut off ditch and a submerged sealed interceptor tank will be constructed on the southern boundary across the lowest point.

Please see attached drawing PEDL217/PLANNING/LLANDOW/CUTOFF110313 – Pollution Prevention Measures showing the location of the cut off ditch. A 10,000 gallon bowser will be kept onsite to allow the interceptor to be regularly emptied in the event of rain / surface run off. The bowser that the tank is pumped into will be sent off site to a licensed facility when it has been filled.

## 8.10 Ground Water protection

There are no other recorded boreholes drilled in the local area.

Any shallow ground water will be cased off to stop the flow of ground water into the borehole.

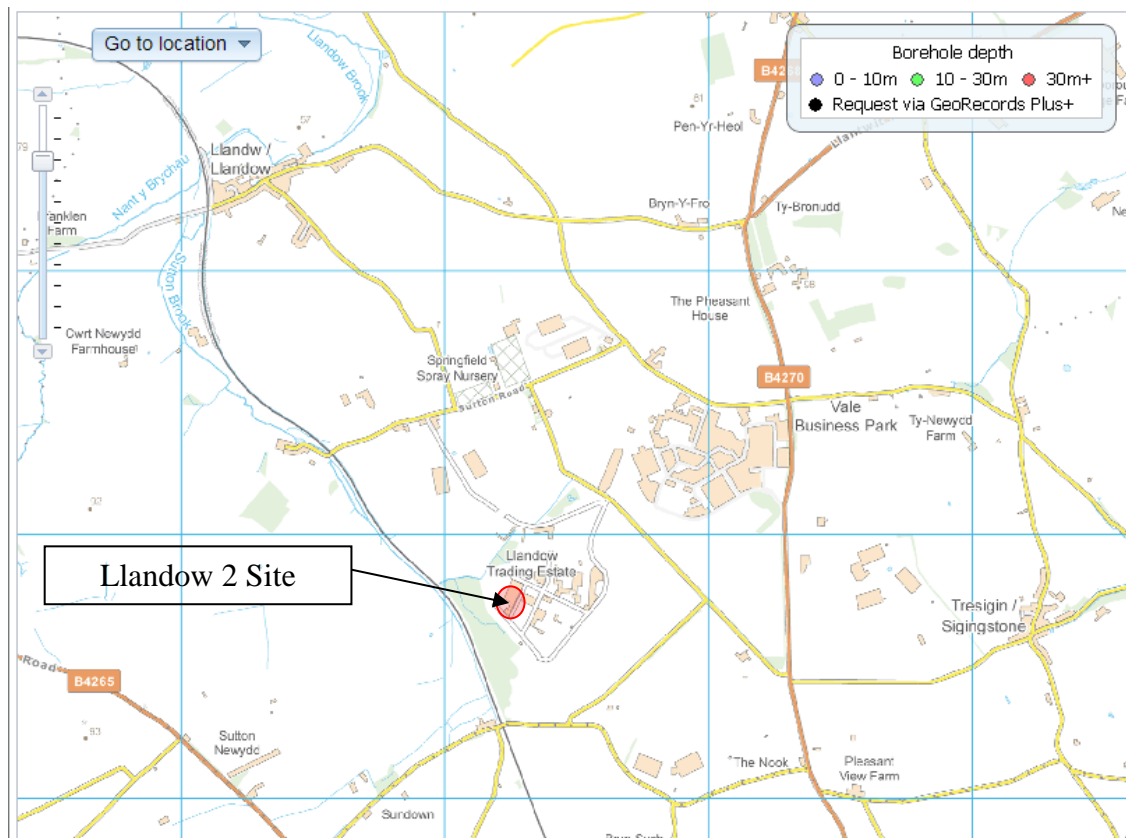


Figure 6: Boreholes listed on the BGS database

It has been known that farms use the local streams for the feeding of livestock.

The surface groundwater will be sealed off using steel casing and cement to a level below the groundwater encountered in the boreholes above.

This site is not in the catchment area that has been identified for the Schwyl Aquifer that has been identified by the Environment Agency.

The Carboniferous Limestone is a rock type that formed in a shallow tropical sea around 350 million years ago. Over time the rock forming process greatly reduces, the primary porosity and permeability (ability to allow water to pass through the rock) of the Limestone. Within such an aquifer it is the secondary network of solution-enlarged fractures (conduits) that provide the majority of the water bearing horizons. The circulation of groundwater within the aquifer relies on the interconnectivity of these fractures/conduits. Movement of groundwater can also be enhanced or impeded by tectonic activity, with folding and faulting potentially creating areas of high or low permeability. As Carboniferous Limestone is known to have a low primary porosity, the flow type is likely to be dominated by fracture/fissure flow. Only the uppermost 100m of the aquifer is likely to be effective in transmitting water, below this depth the fractures are likely to become too tight, due to the overburden pressure, to allow water to travel along them.

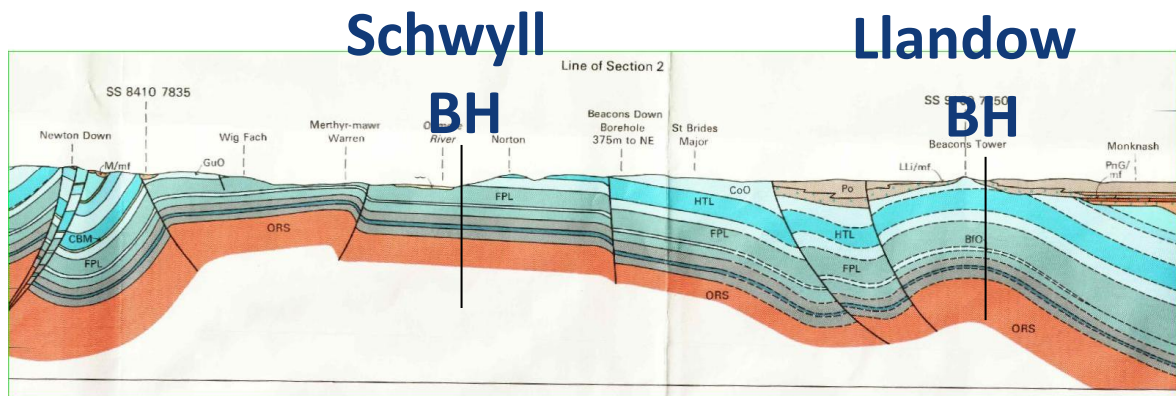


Figure 7 – Geological Cross section (Published by the British Geological Survey)

The cross section above (Figure 7) shows the locations of the proposed site in Llandow and the water extraction point at Schwyll and the relationship of the geological formations and faults between them. The surface geology at the Schwyll extraction point is the Black Rock Limestone group that is around 300m thick, with the Friars Point Limestone (FPL on figure 7) as part of this group. Between Schwyll and Llandow the geology generally dips to the south then up and over a large Anticline. At the surface in Llandow there are Jurassic aged rocks of the Porthkerry Formation these rest unconformably on the Carboniferous Limestones. The main target for the exploration in the Llandow borehole is the Cwmyniscoy Mudstone in the Lower Limestone Shale Formation, and the Devonian Old Red Sandstones.

The BGS states that several major tectonic episodes have affected South Wales since the Late Devonian. The most significant of these in terms of the local area is the Variscan deformation which occurred towards the end of the Carboniferous some 300-280 million years ago. This deformation folded and fractured the ground to give rise to the anticlines and faults that are seen today.

Between the drilling site in Llandow and the Schwyll catchment there are sub parallel NNE-SSW trending Normal Faults that are associated with the Variscan folding. At a number of localities these faults are exposed at the surface, they have been described by the BGS and show that the younger Jurassic stratum is down thrown against the Carboniferous Limestones, this indicates that the throw on the faults are substantial and all stratum would be displaced across the fault. In the fault zone there is up to 1.5 metres of fault breccia of clays and Carboniferous Limestone, this would act as lower permeability

pathways for the groundwater to flow, this suggest that the fluids would flow along the faults and not across the faults.

The BGS reports that there is a similar trending sequence of faults some further 2-2.5km to the north. This represents an additional barrier to fluid transport.

### **8.11 The storage of oils or Chemicals (Including Drilling fluids)**

The storage of all oils and Fuels will be within a bunded fuel tank where the volume of the bund is 1.5 times the capacity of the tank. During fuel transfer absorbent matting will be placed below the fuel fill point to catch any drips. Drip trays lined with absorbent matting will be placed under the drilling rig at all times.

The storage of drilling fluids, prior to mixing the drilling fluids are in powder form in bags. These will be stored in the drilling store shown on the site layout plan.

### **8.12 The Disposal of foul water**

The site toilet will be a hired ‘portaloo’ type and will be emptied weekly by a licensed operator.

### **8.13 The disposal of drilling fluids**

The main purpose of the drilling fluids is to cool and clean the drilling bit and to assist with the lifting of the drilling cuttings to the surface. The drilling fluid also provides a hydrostatic head, this prevents formation fluids (Groundwater) entering the borehole. The drilling fluids will comprise of a viscosifier to increase the viscosity of the fluid to increase the ability to lift the cuttings to the surface. Appendix 4 shows the specification of Purebore which is a typical additive to the drilling fluids.

The water / fluids used for drilling are contained in a closed loop system; the volume of fluid required will depend on the depth of the well. The drilling fluid will be held in tanks on the surface so that they can be checked for levels and leaks. The returning cuttings are removed from the drilling fluids by:-

- Shaker screen – the drilling fluid is passed over a fine vibrating sieve of various sizes to allow the drill cuttings to pass into a covered skip for disposal and the drilling fluid to drop through and return to the closed loop system. This separates the solid drill cuttings from the fluid so that it can be re-circulated back down the wellbore.
- Cyclone – The drilling fluid is spun in a hydro cyclone, “closed system” to remove the finer grained material from the system. The fine drilling cuttings drop out into a covered skip for disposal at a licensed facility.

The drilling fluids are then re-circulated back in the system. As all drilling fluids are maintained in a closed loop system this can easily be monitored for leaks. In the event of a loss of fluid to the system the source of that loss will be investigated. If there is a leak to a tank / pipe then this will be repaired as soon as practical. The tanks will be placed so that they can be observed by the drilling crew and site staff. In the event that there is an increase in drilling fluid that may allow a spillage from the tanks, drilling will cease until

additional tanks can allow for the increase in fluid or the additional fluid is tankered off site to an appropriate facility. The drilling fluid will not be allowed to enter any existing water courses. At the end of the drilling operation all excess drilling fluid will be tankered off site to a licensed disposal facility.

The volume of the borehole at 800m will be 15m<sup>3</sup> the total volume of fluid in the closed loop system will be approximately 20m<sup>3</sup> (4,400 gallons). The drilling fluids will be constantly monitored by the drilling crew.

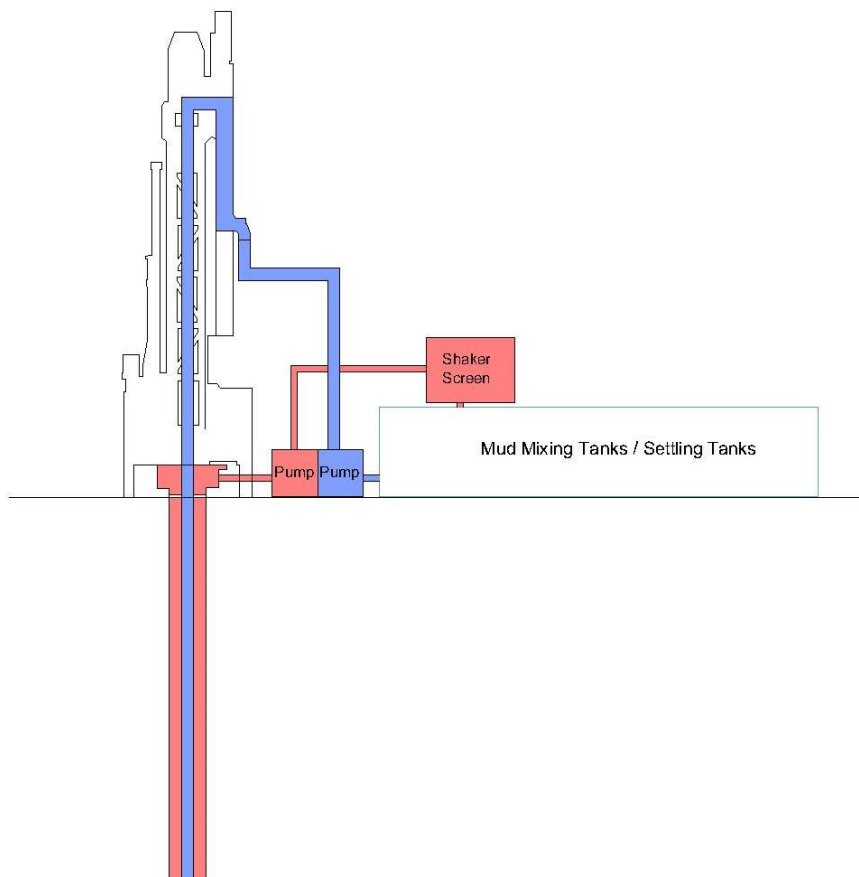


Figure 8: Close Loop System for the drilling fluids

## 8.14 Vibration

Perceived Risk Level – Zero

Reasons;

1. Experience from drilling previous sites near housing and industrial premises
2. Early stage drilling is through soft overburden that will absorb vibration
3. Once the limestone is entered by the drill bit vibration will be cushioned by the overburden and distributed through low ground pressure tracks on the drill rig

## 8.15 Visual Amenity

The site is not prominent in the landscape and is shielded by a tree line to the west. The site lies within an existing industrial estate and is partly screened by other buildings. The compound will be similar in appearance to other parts of the Estate and any views of the drilling rig will be fleeting and the structure will not be dissimilar to other temporary structures/masts that are located in such areas. The rig and equipment will only be in place

for a short period of time and in this respect it is not intended to carry out any specific landscaping, as there would be insufficient time for any meaningful establishment.

### 8.16 Ecology

A walkover habitat survey has been submitted with the application. (Appendix VI)

- The site is a 100% concrete hard-standing.
- The site has no wildlife interest at all.
- No trees or scrub or water bodies are present.
- No protected habitats were found on site.
- Apart from birds (all protected) no other protected species were found on site.
- The site is sub-optimal for most groups of wildlife.
- No protected bats or barn owls were present.
- No protected badgers were present on site.
- It is unlikely that reptiles or amphibians are present.
- The proposed development would not have to remove any habitats or destroy any hedgerows in gaining access.
- The proposed development will not see any land lost.

### 8.17 Restoration

On completion of the drilling steel casing will be installed into the well and a suitable well head assembly installed. If the testing is unsuccessful the borehole will be abandoned in accordance with Environment Agency and Health and Safety Executive practices. The surface will be restored to a condition similar to or better than prior to commencement of work and to the satisfaction of the planning officer and landowner.

If the borehole is shown to be not productive then it will be filled in accordance with the advice published by The Environment Agency - the Decommissioning Redundant Boreholes and Wells. This sets out the scope and legal framework for the decommissioning of borehole under the Water Resources Act 1991. This states '*Boreholes and wells that are no longer required therefore need to be made safe, structurally stable and backfilled or sealed to prevent groundwater pollution and flow of water between different aquifer units*'. This process is managed by completely filling the borehole with a similar density material that was removed i.e. cement.

The report states '*The following objectives may apply, although additional objectives may also be applicable;*

- *Remove the hazard of an open hole (safety issues).*



- Prevent the borehole acting as a conduit for contamination to enter groundwater.
- Prevent the mixing of contaminated and uncontaminated groundwater from different aquifers.
- Prevent the flow of groundwater from one geological horizon to another.
- Prevent the wastage of groundwater from overflow to artesian boreholes.

If required cement will be mixed on the surface in a grout mixer then pumped to the base of the borehole via a tremmy pipe. The tremmy pipe will be lifted out of the borehole in stages and more cement will be pumped into the borehole. The volume of the borehole will be confirmed by the results of the geophysical logging. The casing that has been cemented in place in the borehole will be left in situ. The multi stage filling will ensure that the borehole is completely filled. The cement will have similar density to the surrounding rock. The filling of the borehole will seal the hole to stop the vertical migration of groundwater.

If the testing is successful then the well head will be adequately secured and an additional planning application for longer term pilot production will be submitted

### 8.18 Permissions to Drill

All permissions to drill will be in place before work commences.

*Permissions required are: -*

Petroleum Licence from the DECC - (In place PEDL 217)  
 Planning Permission from The Vale of Glamorgan Borough Council  
 Approval for Drilling from the Health and Safety Executive  
 Well Operations Notice from DECC

### 8.19 Timescales

*Summary of Time Scale*

	<b>Weeks</b>
Drilling and associated operations	8
Establishment and Site Clearance	4
Laboratory Testing	4
Gas Testing	36

### 8.20 Hours of Work

Hours of work during the site establishment and site clearance period will be 10 hours per day 08.00 hrs until 18.00 hrs and drilling period will be 24 hour, seven days per week.

## 9. Conclusions

It must be emphasised that this is a short term sampling and testing facility and that there will be no detrimental impacts from this scheme. On completion of these short term works, if production is considered a viable option, further planning applications will be made or the land restored to its original or a better condition.