

EIA SCOPING REQUEST

ALTCAR MOSS WELLSITE

PEDL164

AURORA ENERGY RESOURCES LIMITED

JANUARY 2018

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1. INTRODUCTION

1.1 The Applicant

Aurora Energy Resources Limited (the Applicant) is a private UK company engaged in the exploration for oil and gas in North West England. It is the operator of Petroleum Exploration and Development Licences (PEDLs) 164, 261,262 and 267.

The Applicant is currently evaluating the hydrocarbon potential within PEDL 164, with specific emphasis on the Bowland Shale/Hodder Mudstone sequence. Having acquired a new 3D geophysical survey across an area of interest within PEDL 164, in 2016, the Applicant is now proposing to drill and test two (2) exploratory boreholes from a site located at Sutton's Lane, Great Altcar, Lancashire. Hereafter referred to as the Altcar Moss wellsite.

1.2 EIA Scoping Request

The Applicant is requesting a scoping opinion from Lancashire County Council, the relevant Mineral Planning Authority, under Part 4, Regulation 15(1) of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations).

To enable the Mineral Planning Authority (MPA) to provide a scoping opinion and in accordance with the Regulation, the Applicant has included the following information within this Scoping Request:

- (i) *A plan sufficient to identify the land;*
- (ii) *A brief description of the nature and purpose of the development, including its location and technical capacity;*
- (iii) *An explanation of the likely significant effects of the development on the environment; and*
- (iv) *Such other information or representations as the person making the request may wish to provide or make.*

1.3 The Proposal

The Applicant is proposing to construct a wellsite, of approximately 1 hectare in area, within which it will drill and core a vertical borehole, followed by the drilling of a second borehole, with a horizontal section approximately 1,500m in length. Both boreholes will then undergo hydraulic fracture stimulation. Each borehole will then be separately flow tested and, subject to the results obtained, the horizontal borehole may then undergo an extended well test (up to 90 days). In the event that the exploratory works are unsuccessful, both boreholes will be decommissioned and the site restored. If successful, any future planned works would be subject to a separate planning application. For clarity, stimulation of the boreholes will involve high volume hydraulic fracture stimulation, as defined by Section 4B(1) of the Petroleum Act 1998.

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The development will consist of the following eight (8) phases:

- **Phase 1 – Wellsite Construction:** Access way improvement works, followed by the construction of a level hardstanding and drilling cellars, with underlying impermeable membrane and surface water containment system.
- **Phase 2 – Drilling and Coring of a Vertical Borehole (Borehole #1):** Mobilise surface conductor rig. Drill and set conductor casing to a depth of approximately 70mTVDGL, followed by demobilisation. Mobilisation of a drilling rig (mast height up to 60m) and ancillary equipment, the drilling and coring of a single vertical borehole to a depth of approximately 3,200mTVDGL, followed by demobilisation of the drilling rig and ancillary equipment.
- **Phase 3 – Drilling of a Horizontal Borehole (Borehole #2):** Mobilise surface conductor rig. Drill and set conductor casing to a depth of approximately 70mTVDGL, followed by demobilisation. Mobilisation of a drilling rig (mast height up to 60m) and ancillary equipment, the drilling of a borehole vertically to a level within the target shale formation and then horizontally for approximately 1,500m, followed by demobilisation of the drilling rig and ancillary equipment.
- **Phase 4 – Hydraulic Fracture Stimulation of the Vertical and Horizontal Boreholes:** Mobilisation of a workover rig and/or coil tubing unit, hydraulic fracture stimulation equipment and well test equipment. Hydraulic fracture stimulation of each borehole will be undertaken in turn. The planned number and volume of hydraulic fracture stimulation stages in each of the boreholes will be included in the planning application but will only be finalised after the initial borehole results are available. A final hydraulic fracture plan for each borehole will be submitted to the Oil & Gas Authority and the Environment Agency for approval. Demobilisation of the hydraulic fracture stimulation equipment.
- **Phase 5 - Initial Flow Testing:** A number of separate zones within the hydraulically-fractured interval in the vertical borehole will be flow tested to ascertain if stabilised flow of hydrocarbons can be established from the various units within the Bowland Shale/Hodder Mudstone sequence. Each tested zone may comprise more than one fracture stage. Once initial flow testing of the vertical borehole is complete, initial flow testing of the horizontal borehole will be undertaken. Initial flow testing of the boreholes is expected to take up to sixty (60) days. Produced gas is to be incinerated on site via ground flare. Any liquid hydrocarbons would be separated and stored on site prior to removal by tanker to a refinery for sale.
- **Phase 6 – Extended Well Test (Horizontal Borehole):** The production of natural gas under flow test for a period of up to ninety (90) days. Produced gas to be incinerated on site via ground flare. Any liquid hydrocarbons would be separated and stored on site prior to removal by tanker to a refinery for sale.
- **Phase 7 – Decommissioning and Borehole Abandonment:** Decommissioning of all surface equipment followed by borehole abandonment, including the mobilisation and demobilisation of a workover rig and/or coil tubing unit and ancillary equipment.
- **Phase 8 – Wellsite Restoration:** Wellsite restoration to pre-development condition, as agreed with the MPA and Landowner, followed by a five (5) year aftercare scheme.

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A detailed description of the purpose and nature of the development is provided in Chapter 3 of this Scoping Request.

1.4 The Petroleum Licensing System

Petroleum resources in the UK are vested in the Crown and the right to explore for and produce petroleum is controlled by the Oil & Gas Authority, under a licensing system. Onshore, companies are granted a Petroleum Exploration and Development Licence (PEDL) under the Petroleum (Production) (Landward Areas) Regulations 1995. This licence grants the licensee the exclusive right *“to search and bore for and get petroleum within the licence boundary”*. The Licence within which the proposed development is to be undertaken is PEDL 164.

1.5 The Need for Petroleum Development

In 2016, the UK obtained over 80% of its primary energy demand from fossil fuels, predominantly from oil and gas; over 40% of which was imported.

Previously self-sufficient for gas, the UK became a net importer in 2004, as North Sea supply declined. The UK imports approximately half its current gas requirement and this import dependency is estimated to rise to over 70% by 2030.

Following exploration efforts by Cuadrilla Resources, a 2013 study by the British Geological Survey, for the Department of Energy and Climate Change, highlighted potentially significant gas resources contained within Carboniferous-age shales and associated reservoirs in Northern England. It is considered that the successful development of this new source of indigenous gas supply would have a significant beneficial economic impact on the UK through increased tax receipts, job creation and the development of a local supply chain.

The UK has a globally recognised reputation in the regulation of oil and gas activities both onshore and offshore stretching back many decades. Hence the development of indigenous hydrocarbon resources not only increases security of supply but also ensures that the UK is not overly dependent on the import of oil and gas from countries with less stringent regulatory regimes.

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2. SITE LOCATION AND DESCRIPTION

The site comprises worked farm land, immediately to the northwest of Sutton's Lane, Great Altcar. The site is located within Great Altcar Parish, in the district of West Lancashire.

Access to the site is via the A565, turning east onto the B5195 Altcar Road, which turns into Lord Sefton Way. A brick built unrestricted bridge traverses Downholland Brook. When entering the village of Great Altcar (indicated by road sign and 40mph limit sign), the road bends sharply to the north. Immediately prior to the road bending to the east, continue north on Sutton's Lane, which is public highway. The proposed wellsite is located 950m along Sutton's Lane.

A second access route to the site, via Broad Lane, will also be assessed, providing an alternative means of accessing the site should this be required.

The land upon which the proposed site is to be constructed lies within Flood Zone 3 and benefits from local flood defences. It is not within a groundwater Source Protection Zone (SPZ), the closest SPZ (Zone 3 total catchment area) being some 1.5km to the east.

Downholland Moss Site of Special Scientific Interest (SSSI) is located approximately 80m north of the site. The SSSI designation reflects the geological importance of the site for establishing relative sea level changes in northwest England during the period from about 8,000 to 4,000 years BP. Downholland Moss is also noted for its surface microtopography, which demonstrates roddons, sandbanks and tidal creek features.

Site location plans, which show both the location of surface works and the area in which the proposed subsurface works will be confined, (Ref: ZG-AER-ALT-PA-01 and ZG-AER-ALT-PA-02) are provided as Appendix 1.

3. THE DEVELOPMENT

The proposed Altcar Moss wellsite is located approximately 900m south east of the historic Formby Oilfield. This oilfield was discovered in 1939 and produced oil, predominantly from a depth of circa 40mTVDGL, until it was abandoned in 1965 and the site restored. More than 80 shallow exploration, appraisal and production wells were drilled in this period, both at the Formby Oilfield itself and across the wider area. The Applicant drilled two shallow wells in the area in 2012 to investigate the potential to redevelop the abandoned oilfield. Following drilling, these sites were successfully restored to agricultural use. A deep well, Formby-1, was drilled at the Formby Oilfield in the 1940s to explore for the presumed source of the shallow oil seen at Formby. This well, which was drilled to a depth of 2,341mTVDGL, encountered gas within the Bowland Shale. An earlier borehole, the Altcar Borehole, was located approximately 50m north of the proposed site. This borehole was drilled in the early 1890s to a depth of 333mTVDGL with the aim of exploring for a source of brine.

The Applicant is proposing to drill and test two (2) exploratory boreholes from the Altcar Moss wellsite. The purpose of the boreholes is to establish whether the target formations contain hydrocarbons and, if so, whether they have the potential to be commercially produced. For clarity, commercial production of hydrocarbons would be subject to a separate planning application.

The drilling and testing of the two (2) exploratory boreholes consists of eight (8) distinct phases. Each phase is set out below, together with an indication of operating hours and duration.

3.1 Phase 1 – Wellsite Construction Works

To accommodate the drilling and testing of the exploratory boreholes, a wellsite must first be constructed, together with improvement works to the access route, which in the case of this development, involves improvement works to Sutton's Lane and to Broad Lane, which will be agreed in advance with the County Highways Authority and set out in the planning application and environmental statement.

In advance of the wellsite being constructed, a temporary compound will be constructed adjacent to Sutton's Lane, in which temporary office accommodation, welfare facilities, storage and parking will be provided. Temporary Heras fencing will secure the site during the construction phase.

A new access way from Sutton's Lane into the proposed wellsite will be constructed, which will include an extension to the existing culvert across the drainage ditch.

A geotechnical evaluation of the underlying subsoils has been undertaken. This assessment will inform the final site design and subsequent construction method. Based on the information received to date, the intention is to construct the wellsite on top of the existing land, retaining the topsoil in situ. Full details of the proposed construction method will be included within the planning application and environmental statement.

Once the wellsite has been constructed to a level platform, a containment ditch will be excavated to a depth of 1m around the perimeter of the active area of the wellsite, the area within which the drilling rig and well testing equipment will be located.

Two (2) drilling cellars will be constructed in the centre of the active area. When constructed, the drilling cellars provide a containment area within which the wellheads are to be installed. The area will be excavated to a depth of up to 6m and a large diameter casing (starter casing) cemented into position. A reinforced concrete base will surround the large diameter casing, upon which a series of pre-cast concrete chamber rings will be installed. A concrete jacket will be formed around the

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outside of the chamber rings, creating a fully sealed wellhead containment system. The surface of the drilling cellars will incorporate a reinforced concrete slab to provide additional support for the proposed drilling rig sub-base equipment.

To facilitate the control and discharge of clean surface 'run-off' water (rain water), a Class 1 bypass separator will be installed adjacent to the open containment ditch, together with associated pipework and isolation valves.

A cess tank will be installed in the non-active area of the wellsite, the area within which the office accommodation and welfare facilities will be located. The cess tank will contain foul water and sewage for subsequent offsite treatment at an approved sewage water treatment works.

Following construction of the drilling cellars, interceptor and cess tank, an impermeable membrane will be installed across the active area of the wellsite and perimeter containment ditch. The impermeable membrane will be protected above and below by a layer of non-needle punch geotextile. The impermeable membrane provides tertiary containment, in the unlikely event of an accidental spill during the exploratory drilling and testing phases.

A layer of non-needle punch geotextile will be laid across the non-active area of the wellsite.

Above the impermeable membrane (active area) and non-needle punch geotextile (non-active area), aggregate material will be imported to the site, laid and compacted to provide a hard standing of sufficient load bearing capacity to accommodate the siting of the drilling and well testing equipment.

Once the wellsite is constructed, temporary Heras fencing will be replaced with a 3m high steel mesh security fence, vehicle access and pedestrian access gates. Additional security may be installed, consisting of a secondary security fence around the perimeter of the active area and pole mounted CCTV cameras and lighting.

The Phase 1 works will be subject to a detailed quality assurance and quality control (QAQC) plan.

Duration

Phase 1 works are expected to take forty (40) days to complete.

Hours of Operation

Phase 1 works will be restricted to the following hours of operation:

- Monday to Friday 07:00 hrs to 19:00 hrs;
- Saturday 07:00 hrs to 13:00 hrs; and
- Sunday and Bank Holiday No works permitted.

3.2 Phase 2 – Drilling and Coring of a Vertical Borehole (Borehole #1)

On completion of the Phase 1 works, a water well type drilling rig and ancillary equipment, including temporary office accommodation, welfare facilities, diesel power generation, compressor and portable lighting towers, will be mobilised to site. The water well type drilling rig will drill a large diameter borehole to a depth of approximately 70mTVDGL and install a nominal 660mm (26") conductor casing, grouted back to surface with cement. Once the conductor casing has been installed, the drilling rig and ancillary equipment will be demobilised from site.

An oilfield drilling rig and ancillary equipment will then be mobilised to site. The actual drilling rig to be used at the Altcar Moss wellsite has not been confirmed and will be subject to availability. With

this in mind, the environmental statement will assess the maximum characteristics of the potential drilling rigs capable of drilling the type of boreholes proposed within this development.

A typical oil field drilling rig will have a mast height of up to 60m and will consist of the following ancillary equipment:

- Containerised diesel power generation (electric, hydraulic and/or direct drive);
- Switch control rooms;
- Fluid storage tanks, mixing tanks and active tanks;
- Fluid pumps;
- Drill cuttings separation and storage;
- Diesel fuel storage;
- External lighting (fixed and portable); and
- Office accommodation and welfare.

Typically, up to two (2) cranes are required to erect the drilling rig. In addition, supporting services will also be required, including:

- Geological logging services;
- Coring services;
- Casing running services;
- Cementing services; and
- Wireline services.

A typical drilling rig layout and equipment details will be included with the planning application.

Once the drilling rig and ancillary equipment has been rigged up and commissioned, drilling of the vertical exploratory borehole will commence. The borehole will be drilled and constructed in accordance with a detailed drilling programme, prepared in advance, having been subject to independent well examination in accordance with Regulation 18 of the Offshore Installation and Wells (Design and Construction, etc) Regulations 1996 and submitted to the Health and Safety Executive in accordance with Regulation 6 of the Borehole Sites and Operations Regulations 1995. Other applicable guidance in the context of borehole construction are:

- Oil & Gas UK Guidelines for the Suspension and Abandonment of Wells;
- Oil & Gas UK Well Life Cycle Integrity Guidelines; and
- United Kingdom Onshore Oil and Gas UK Onshore Gas Well Guidelines, Exploration and Appraisal Phase.

The borehole will be constructed in a number of hole sections, each reducing in diameter the deeper the borehole becomes. Drilling fluid, known as ‘mud’, is pumped down the inside of the drill pipe and out through nozzles in the drilling bit. The purpose of the mud is fourfold. It cools the drilling bit; it circulates the drill cuttings to surface for subsequent offsite disposal; it provides temporary stability to the borehole wall prior to running casing; and it provides primary well control by way of hydrostatic pressure, purposely weighted to create a pressure overbalance.

On completion of the first hole section, the section is lined with steel casing, which is grouted into position using cement. A wellhead is then installed on the casing, which provides an interface between the well casing and safety equipment known as ‘blowout preventers’, which are installed on the well as secondary well control. Drilling then continues in a smaller diameter hole section and the operation is repeated until the well reaches its intended depth, which in the case of the vertical borehole is approximately 3,200m.

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A water-based mud system will be used when drilling the near surface and drilling any formation that has a potential for groundwater with a resource value. Once the borehole is at a suitable depth and all potential groundwater resources are adequately protected and isolated from the borehole by the steel casing, a low toxicity oil-based drilling fluid will be used. An oil-based drilling fluid provides greater control and stability of the formations being drilled.

At certain intervals in the borehole construction, cores will be cut in order to acquire samples of the target formations. Cores are acquired by using a special drilling tool known as a core barrel. The core barrel is a cylindrical tube with a cutting bit on the end. Unlike a conventional drilling bit, which has a large surface cutting area, the core barrel cutting area is the outer edge of the cylindrical barrel, thus keeping the uncut section of formation intact, inside the core barrel. The core is then brought to the surface for subsequent analysis and testing.

At various stages in the borehole construction and in accordance with the detailed drilling programme, wireline logging and formation integrity testing will be carried out. Wireline logging will include, amongst other things, cement bond logs to confirm that a good cement seal exists at each casing stage. Formation integrity tests are essentially a pressure test of the formation immediately below the casing to ensure the formation where the casing has been set has pressure integrity. It is carried out once the casing has been cemented, immediately after drilling out the base of the casing.

Waste generated as a result of the drilling phase will consist of extractive wastes, in the form of drill cuttings, drilling muds and excess cement, and non-extractive wastes, in the form of used oils, oily rags, excess casing, packaging, household waste, foul water and sewage.

On completion of the drilling of the vertical borehole, the borehole will be suspended using a combination of mechanical plugs and brines. The drilling rig and ancillary equipment will be demobilised from site. No activity, other than general security and maintenance, will be carried out at the site while the Applicant evaluates the geological data it has acquired. This data will be used to inform the target formation for the horizontal borehole.

Duration

Phase 2 works are anticipated to take up to five (5) months to complete.

Hours of Operation

Phase 2 works will require 24 hour working, to ensure hole stability and well control.

3.3 Phase 3 – Drilling of a Horizontal Borehole (Borehole #2)

Following a detailed evaluation of the geological data acquired during the drilling of the vertical borehole (Phase 2), a second borehole will be drilled from the site. The second borehole will be drilled down to the target zone and then horizontally within this zone for approximately 1,500m.

Equipment used and the method of construction, including the drilling and setting of the surface conductor casing, will be similar to that used to drill and construct the vertical borehole.

Duration

Phase 3 works are anticipated to take up to five (5) months to complete.

Hours of Operation

Phase 3 works will require 24 hour working, to ensure hole stability and well control.

3.4 Phase 4 – Hydraulic Fracture Stimulation of the Vertical and Horizontal Boreholes

A typical hydraulic fracturing operation will consist of the following equipment:

- Coil tubing unit (approximately 25m in height);
- Containerised diesel power generation (electric, hydraulic and/or direct drive);
- Fluid storage tanks;
- Proppant Silos (approximately 13m in height);
- Mixing tanks;
- Fluid pumps;
- Fluid separation and storage;
- Diesel fuel storage;
- External lighting (fixed and portable);
- Control room; and
- Office accommodation and welfare.

Typically, up to two (2) cranes are required to erect the hydraulic fracturing equipment.

In addition, a well test package will also be mobilised to site and will consist of the following equipment:

- Surface safety valve;
- Bath heater;
- Three (3) phase separator;
- Surface flow lines;
- Ground flare; and
- Well test lab.

The exact completion technology and provider to be used at Altcar Moss during this phase is still to be finalised and the details will be included in the planning application.

It is envisaged that the coil tubing unit will be sufficient for all downhole mechanical operations during this phase. However, as a contingency, it is planned that a workover rig would be available to be mobilised to site if required. The actual workover rig to be used at the Altcar Moss wellsite has not been confirmed and will be subject to availability. With this in mind, the environmental statement will assess the maximum characteristics of the potential workover rigs suitable for use within this development.

A typical workover rig will have a mast height of up to 37m and will consist of the following ancillary equipment:

- Containerised diesel power generation (electric, hydraulic and/or direct drive);
- Switch control rooms;
- Fluid storage tanks and mixing tanks;
- Fluid pumps;
- Fluid separation and storage;
- Diesel fuel storage;
- External lighting (fixed and portable); and
- Office accommodation and welfare.

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Typically, one (1) crane is required to erect the workover rig.

The expected number and size of the hydraulic fracture stimulation stages proposed for each of the boreholes and the total expected volumes of fluid, proppant and additives to be used will be included in the planning application but the final configuration will only be established after the initial drilling and wireline logging results for each borehole are available. A final hydraulic fracture plan for each borehole will be submitted to the Oil & Gas Authority and the Environment Agency for approval before any hydraulic fracture stimulation operations commence.

The hydraulic fracturing fluid to be used at Altcar Moss will comprise almost entirely of a mixture of water and sand. A very small percentage of the fluid will comprise a small number of additives, all of which will be non-hazardous to groundwater and approved for use by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016. The additives are used for a number of reasons, including pH control, friction reduction, bacterial control and to inhibit corrosion.

During each hydraulic fracture stimulation stage, the hydraulic fracturing fluid is pumped under pressure into the formation. As the fluid pressure increases, it fractures the formation and pushes the hydraulic fracturing fluid into the fractures. When the pressure is released, a proportion of the hydraulic fracturing fluid flows back from the formation, leaving behind the sand, which props open the fractures, allowing hydrocarbons to flow around the sand grains and into the borehole.

Between 25% and 50% of the hydraulic fracturing fluid will flow back to surface following the hydraulic fracturing of each zone (flowback fluid). The remaining 50% to 75% will be retained within the formation. Flowback fluid returned to surface from earlier stages may be treated on site and reused in the subsequent stages. Any flowback fluid not treated and reused in the subsequent stages will be removed from site via road tanker to a suitably permitted waste water treatment facility.

Hydraulic fracturing operations are subject to a number of regulatory regimes, including those regulated by the Oil & Gas Authority and the Environment Agency, both of which require a detailed hydraulic fracture plan to be submitted and approved in advance of the operation commencing. The hydraulic fracture plan will include the use of real-time monitoring of induced seismicity and fracture height growth (microseismic monitoring).

On completion of the hydraulic fracturing operation, the hydraulic fracturing equipment will be removed from the site.

Waste generated as a result of the hydraulic fracture stimulation phase will consist of extractive wastes in the form of flowback water, proppant, liquid hydrocarbons and natural gas, which are subject to a mining waste permit under, under Environmental Permitting (England and Wales) Regulations 2016. Flowback water is likely to contain naturally-occurring radioactive material (NORM), with radionuclide concentrations exceeding the value specified in Table 1, Part 3 of Schedule 23 of Environmental Permitting (England and Wales) Regulations 2016. Non-extractive waste generated will consist of used oils, oily rags, packaging, household waste, foul water and sewage.

Duration

The duration of Phase 4 works will be dependent on the final number of hydraulic fracture stages in each borehole although it is not expected to exceed sixty (60) days in total.

Hours of Operation

Whilst Phase 4 operations will require 24 hour working, the operation of the pump units to perform the actual hydraulic fracture stimulation will only be carried out during times to be agreed with the MPA and will typically last for a period of up to 4 hours per hydraulic fracture stage.

3.5 Phase 5 – Initial Flow Testing of the Vertical and Horizontal Boreholes

Once the hydraulic fracture stimulation operations are complete, up to 5 (five) separate zones within the hydraulically fractured interval in the vertical borehole will be individually flow tested to ascertain if stabilised flow of hydrocarbons can be established from the various levels within the Bowland Shale/Hodder Mudstone sequence. Each tested zone will comprise a number of fracture stages.

Once initial flow testing of the vertical borehole is complete, initial flow testing of the horizontal borehole will be undertaken. It is planned that all hydraulic fracture stages in the horizontal borehole would be flow tested together to provide information on the flow potential of the targeted zone under production conditions.

Initially, any flow of hydrocarbons from a particular zone will be comingled with the returning flowback fluid. This fluid, comprising predominantly water, will be separated from the natural gas and liquid hydrocarbons (if present) by way of three (3) phase separation. Flowback water and liquid hydrocarbons will be diverted from the separator to dedicated storage tanks on site for subsequent removal from site via road tanker to a suitably permitted waste water treatment facility and refinery respectively. Natural gas will be diverted from the separator to a ground flare located on site for incineration.

The flaring of natural gas is an activity which is regulated by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016. The ground flare would be similar to those used at other hydrocarbon exploration sites and will typically be up to 12m in height. The flame would be enclosed within a cylindrical tube.

The purpose of the initial flow test is to determine whether natural gas and liquid hydrocarbons (if present) can flow to surface from a particular zone, and if consistent flow rates and pressures can be established.

If natural gas and/or liquid hydrocarbons do flow to surface and consistent flow rates and pressures are established in the horizontal borehole, this borehole will be subject to an extended well test, as described in Phase 6.

During the initial flow tests, the wellsite will be manned and a number of office accommodation and welfare facilities will be provided.

On completion of the initial flow tests, the boreholes will be suspended and the flow test equipment will be removed from site unless retained for Phase 6. A workover rig (as described in Phase 4 above) may be required to mobilise to site to suspend the boreholes.

Waste generated as a result of the flow test phase will consist of extractives wastes in the form of residual flowback water, liquid hydrocarbons and natural gas, which are subject to a mining waste permit under, under Environmental Permitting (England and Wales) Regulations 2016. Residual flowback water is likely to contain naturally-occurring radioactive material (NORM), with radionuclide concentrations exceeding the value specified in Table 1, Part 3 of Schedule 23 of

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Environmental Permitting (England and Wales) Regulations 2016. Non-extractive waste generated will consist of used oils, oily rags, packaging, household waste, foul water and sewage.

Duration

Phase 5 works are anticipated to take sixty (60) days to complete.

Hours of Operation

Phase 5 works will require 24 hour working.

3.6 Phase 6 – Extended Well Test of the Horizontal Borehole

If the initial flow test indicates that natural gas and/or liquid hydrocarbons will flow to surface at consistent flow rates and pressures, the horizontal borehole will be subject to an extended well test.

Equipment required to undertake the extended well test will be similar to that used during the initial flow test, however, the ground flare may differ in appearance, due to it being sized for known flow rates and pressure. It is unlikely to be greater than 12m in height.

During the extended well test, the wellsite will be manned and a number of office accommodation and welfare facilities will be provided.

On completion of the extended well test, the horizontal borehole will be suspended and the flow test equipment will be removed from site. A workover rig (as described in Phase 4 above) may be required to mobilise to site to suspend the borehole.

Waste generated as a result of the extended well test phase will consist of extractives wastes in the form of residual flowback water, liquid hydrocarbons and natural gas, which are subject to a mining waste permit under, under Environmental Permitting (England and Wales) Regulations 2016. Residual flowback water is likely to contain naturally-occurring radioactive material (NORM), with radionuclide concentrations exceeding the value specified in Table 1, Part 3 of Schedule 23 of Environmental Permitting (England and Wales) Regulations 2016. Non-extractive waste generated will consist of used oils, oily rags, packaging, household waste, foul water and sewage.

Duration

Phase 6 works are anticipated to take ninety (90) days to complete.

Hours of Operation

Phase 6 works will require 24 hour working.

3.7 Phase 7 – Decommissioning and Borehole Abandonment

Phase 7 will comprise the decommissioning of all surface equipment followed by the plugging and safe abandonment of the boreholes.

In the event that the exploratory drilling and testing proves unsuccessful in determining that commercial hydrocarbon production can be achieved, the boreholes will be decommissioned, consisting of plugging and safe abandonment in accordance with current guidelines, which at the time of submitting this scoping request are the Oil & Gas UK Guidelines for the suspension and abandonment of wells. The design and construction of the boreholes will have taken into account

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the guidelines for well abandonment, therefore, the well abandonment operation will typically relate to the internal section of each borehole.

A workover rig (as described in Phase 4 above) will be mobilised to site to undertake the plug and abandonment operation.

Cement plugs will be set in the boreholes at predetermined depths to ensure that all distinct permeable zones penetrated by the borehole(s) are isolated from each other and from surface by a minimum of one permanent barrier. Permeable zones penetrated by the borehole(s), which are hydrocarbon-bearing or over-pressured and water-bearing require two (2) permanent barriers from surface, the second barrier being a back-up to the first. Cement plugs (barriers) will extend above and below the permeable zone(s). Either a mechanical or high viscosity fluid plug will be positioned within the internal casing string immediately below the required cement depth, which prevents the cement from moving or slumping during setting.

Waste generated as a result of the decommissioning phase will consist of extractive wastes in the form of drilling muds, brines and excess cement, and non-extractive wastes, in the form of used oils, oily rags, excess casing, packaging, household waste, foul water and sewage.

Once the boreholes are abandoned and the equipment used to undertake the operation removed from the wellsite, the casing within the drilling cellars will be cut off at a depth of approximately 1.5m below the expected ground level post restoration. A steel plate is welded over the top of the casing to prevent soil from entering the borehole.

Duration

Phase 7 works are anticipated to take four (4) weeks to complete.

Hours of Operation

Phase 7 works will require 24 hour working.

3.8 Phase 8 – Site Restoration and Aftercare

On completion of the decommissioning phase (Phase 7), the wellsite will be restored to its pre-development use, which in the case of the Altcar Moss wellsite is agricultural use.

The restoration work is effectively a reverse of the construction works (Phase 1).

All concrete hard standings will be broken up and removed from site for recycling. The Class 1 bypass interceptor and cess tank will be carefully excavated and removed from site.

Subsoil excavated for the construction of the drilling cellars will be placed into the base of the drilling cellars in order to protect the abandoned borehole. All reinforced concrete hand standings will be broken up and materials segregated. The concrete chambers (drilling cellars) and jacket surround will be broken up, leaving the lowest pre-cast concrete ring in situ. All broken up concrete and steel reinforcement will be removed from site for recycling. The remaining subsoil excavated for the construction of the drilling cellars will be placed into the former drilling cellar excavation and compacted in manageable layers.

Surface aggregates will be inspected prior to removal. Areas where surface contamination is identified will be removed for subsequent offsite treatment and reuse. The remaining surface aggregates will carefully be removed for subsequent offsite reuse.

Once the surface aggregate has been removed, the impermeable membrane and non-needle punch geotextile will be exposed. The perimeter containment ditch will be inspected and any contained fluids removed by vacuum tanker. The impermeable membrane will be inspected for signs of contamination with affected areas being removed and disposed of accordingly. Following inspection, the impermeable membrane and non-needle punch geotextile will be removed and placed into large skips for subsequent offsite recycling and/or disposal.

Any subsoil excavated to construct the perimeter containment ditch will be replaced. The soil will then be deep tine cultivated in strips, using a low ground pressure bulldozer drawing a winged, straight legged tine cultivator to a depth of 600mm at 1,000mm centres. The deep tine cultivated sub-soil will not be traversed by any machinery.

Topsoil reinstatement works will be managed in accordance with DEFRA's '*Construction Code of Practice for the Sustainable Use of Spoils on Construction Sites*'.

On completion of the wellsite restoration works, the land will be subject to a scheme of aftercare. Annual inspections will be made for a period of five (5) years and remedial works undertaken (if required).

Duration

Phase 8 works are expected to take thirty (30) days to complete.

Hours of Operation

Phase 8 works will be restricted to the following hours of operation:

- Monday to Friday 07:00 hrs to 19:00 hrs;
- Saturday 07:00 hrs to 13:00 hrs; and
- Sunday and Bank Holiday No works permitted.

4. ENVIRONMENTAL IMPACT ASSESSMENT

4.1 The Need for Environmental Risk Assessment

4.1.1 Regulations

The Applicant has considered the proposed Altcar Moss development in relation to the EIA Regulations. The development does not fall under Schedule 1 of the EIA Regulations. The development may be considered under Schedule 2, Section 2 (d) of the EIA Regulations, which states:

(d) Deep drillings, in particular—

(i) geothermal drilling;

(ii) drilling for the storage of nuclear waste material;

(iii) drilling for water supplies; with the exception of drillings for investigating the stability of the soil.

(i) In relation to any type of drilling, the area of the works exceeds 1 hectare; or

(ii) In relation to geothermal drilling and drilling for the storage of nuclear waste material, the drilling is within 100 metres of any controlled waters.

(e) Surface industrial installations for the extraction of coal, petroleum, natural gas and ores, as well as bituminous shale.

The area of the development exceeds 0.5 hectare.

4.1.2 National Policy

The National Planning Practice Guidance (NPPG) was published by the Department for Communities and Local Government in March 2014. With regard to Environmental Impact Assessment (EIA) for hydrocarbon extraction, the guidance states in Paragraph 119 that:

‘Applications for the exploratory and appraisal phases will fall under Schedule 2 to the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. An Environmental Impact Assessment is therefore required if the project is likely to have significant environmental effects.’

The Applicant is keen to demonstrate that the proposal does not have a significant environmental effect and is proposing to undertake an EIA; the resulting environmental statement will be submitted with the planning application.

This scoping request seeks agreement from the MPA on the content and extent of matters to be covered by the EIA and the resulting environmental statement.

4.2 Content of the Environmental Statement

Schedule 4 of the EIA Regulations, lists information for inclusion within environmental statements. This information should include:

1. A description of the development, including in particular:

(a) a description of the location of the development;

(b) a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;

(c) a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;

(d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.

2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

4. A description of the factors specified in regulation 4(2) likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

5. A description of the likely significant effects of the development on the environment resulting from, inter alia:

(a) the construction and existence of the development, including, where relevant, demolition works;

(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

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(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

(g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(2) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project, including in particular those established under Council Directive 92/43/EEC(a) and Directive 2009/147/EC(b).

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to EU legislation such as Directive 2012/18/EU(c) of the European Parliament and of the Council or Council Directive 2009/71/Euratom(d) or UK environmental assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

9. A non-technical summary of the information provided under paragraphs 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

The Applicant will structure the environmental statement to meet the requirements of Schedule 4.

The environmental statement will outline its purpose and its statutory context and explain the need for the development and the consideration of reasonable alternatives. Following on from this, the environmental statement will report in detail any likely significant environmental effects for each

identified topic and put forward detailed mitigation where required. The environmental statement will be supported by technical appendices prepared by specialist consultants, covering noise, seismicity, hydrogeology, and any other reports requested by the MPA. A Non-Technical Summary will provide a concise and easily understood summary of the findings of the environmental statement and the basis for these findings.

4.3 Environmental Impact Approach

In undertaking an EIA of the proposed development, the Applicant, having regard to the EIA Regulations and relevant guidance documents, proposes the following stages:

- The submission of a scoping request (this document) to the MPA, seeking its agreement on the key environmental effects of the proposed development and the content of the environmental statement;
- A summary of the EIA Regulations and relevant national and industry guidance;
- An assessment of the baseline site conditions and the immediate locality around the site;
- The consideration of reasonable alternative sites and the reasons for site selection;
- An assessment of the cumulative effects of the development;
- Formulation of the methodology used to assess the likely significant environmental effects;
- Consultations with the public and key stakeholders;
- Topic based assessment of the key impacts of the development to include:
 - Details of baseline conditions;
 - Consideration of the potential environmental effects;
 - Where effects not considered likely to be significant, a justification of why they should be 'scoped out' of the environmental statement; and
 - For environmental effects that are considered likely to have the potential to be significant, details of the baseline information to be collected, including methods and appropriate study areas, likely sensitive receptors and proposed survey and assessment methodology, and details of any mitigation measures which can reduce or eliminate the environmental impact;
- Any other details of supporting material to be submitted with the environmental statement; and
- Preparation of the environmental statement.

4.4 Evaluation to determine the Significance of Impacts

From the consideration of the proposed development, national and local planning policy and the EIA team's knowledge and experience, fourteen (14) topics have been identified for possible inclusion within the environmental statement.

In order to determine whether potential impacts are likely to be significant and therefore need to be included within the environmental statement, each possible impact (topic) has been considered in terms of direct and indirect effects, secondary, cumulative, transboundary, short, medium and long-term, permanent or temporary, positive and negative effects of the development. In line with the EIA Regulations, the effects will be considered with regard to the existence of the development, the

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use of natural resources associated with the development and the emission of pollutants, creation of nuisance and the elimination of waste.

4.5 Likely Significant Effects

On the basis of its work to date, the evaluations conducted for similar projects in the area, and the mitigations to be implemented as best practice and to satisfy all conditions under the necessary permits and consents, the Applicant does not believe that any of the fourteen (14) identified topics have the potential to cause a Likely Significant Effect on the environment as envisaged in the EIA Regulations. However, notwithstanding the above, in recognition of the continued public interest in proposed developments that include hydraulic fracture stimulation and, in line with commitments made by UKOOG, the industry body, the Applicant has identified eleven (11) topics that will be assessed within the environmental statement.

To aid the MPA in its consideration of the content of the environmental statement, each impact is considered in detail below. Each impact will include establishing a baseline condition, including methodology where required. It will also provide details of any consultation that has or will be undertaken as part of the preparation of the environmental statement and details of the methodology proposed to assess the environmental impact of each topic.

4.5.1 Air Quality

Schedule 4 of the EIA Regulations identifies air as an aspect of the environment with the potential to be significantly affected by development. Nearby human and ecological receptors could be subject to an impact on local air quality as a result of the development. The Applicant will assess the potential impacts of the proposed development on local air quality and set out mitigation where required.

Baseline

The proposed wellsite is located to the north east of the village of Great Altcar and approximately 850m from the nearest residential property. The immediate locality is in agricultural use with scattered farms. The proposed site is approximately 1.5km from the outskirts of the town of Formby.

The nearest sensitive receptor is Tyrers Farm, approximately 850m to the south west of the proposed wellsite. The nearest statutory designated nature conservation site is the Down Holland Moss SSSI, which is 90m from the proposed site. It should be noted that this SSSI designation is geological.

The proposed site lies within West Lancashire. The Borough Council has declared a single Air Quality Management Area (AQMA) within the Borough at Moor Street, Ormskirk. The AQMA was declared in 2010 as the progress report for air quality indicated that in the Moor Street location the annual air quality objective for nitrogen dioxide would be likely to be exceeded. The AQMA lies approximately 9.2km to the east of the proposed wellsite.

Consultations

Consultation will be undertaken with, Local Stakeholders, Lancashire County Council, West Lancashire Borough Council Environmental Health Officer and the Environment Agency.

Potential Effects

The proposed development could give rise to a negative impact on quality through emissions from the development phases. These include emissions from flaring, vehicles and equipment on the site and from dust arising during the construction and restoration phases, from the movement of vehicles on the aggregate site surface. There is potential for fugitive emissions during flow testing, if unmitigated.

Methodology for Assessment of Environmental Impact

The methodology for assessing the environmental impact of the development on air quality will involve a review of available air quality data from DEFRA, the Environment Agency, Lancashire County Council and West Lancashire Borough Council. Each phase of the proposed development will be reviewed including vehicle movements and mitigation incorporated into the design where required. The initial flow test (Phase 5) and extended well test (Phase 6) will involve flaring and this will be assessed by atmospheric dispersion modelling (ADMS 5).

It is recognised that some operations have the potential to generate elevated concentrations of organic compounds. A site walk over assessment will be undertaken during each phase of operations using appropriate portable monitoring equipment (e.g. photo ionisation detector (PID)). The area covered will be the general site and site fence line. The identification of substantial short term methane and VOC concentrations may prompt an increase in frequency of the ongoing passive diffusion tube sampling programme or an expansion in coverage. A site visit to view the site and surrounding land will be undertaken.

The methodology will involve:

- A site visit, and the identification of the nearest sensitive receptors both human and ecological;
- The baseline data for the area from DEFRA air quality archive data and meteorological data;
- A review of both local and national policy will be undertaken;
- A review of the likely emissions from each phase of the development based on the duration, equipment, modelling of flare emissions and vehicle movements; and
- Additional mitigation measures if required.

4.5.2 Cultural Heritage

Schedule 4 of the EIA Regulations identifies architectural and archaeological heritage as an aspect of the environment that should be considered as part of an EIA. Whilst not specific to EIA, the National Planning Policy Framework (NPPF) sets out the Government's planning policies and provides guidance as to how these should be applied. Heritage assets are an irreplaceable resource and it is important to understand their significance and the impact the development could have upon them.

The Applicant will undertake a Heritage Impact Assessment to inform the environmental statement.

Baseline

The baseline assessment will focus on identifying heritage assets which have the potential to be affected by the development. This will be achieved by referencing the relevant Historic Environment Record. A baseline archaeological assessment will be undertaken to assess the impact of the proposed development on archaeology.

A desk-based assessment will be undertaken to identify heritage assets within a distance to be agreed with Historic England and the MPA.

Consultation

Consultation will be undertaken with Lancashire County Council Archaeologist, Historic England and West Lancashire Borough Council Building Conservation Officer.

Potential Effects

The proposed development could potentially have a negative effect on architectural and archaeological heritage unless mitigation steps are taken. This could be through ground works associated with the site construction (if heritage assets are present on the site), induced seismicity (unlikely to result in structural damage) and/or damage to heritage assets from traffic and associated vibration.

Methodology for Assessment of Environmental Impact

A Heritage Impact Assessment will be undertaken to consider the impact of the proposed development on identified heritage assets within a distance to be agreed with Historic England and the MPA. This will involve a review of the relevant policy and guidance documents including the NPPF, The Historic England Good Practice Advice, The Setting of Heritage Assets and Historic England Advice Note, 2015, and Sustainability Appraisal and Strategic Environmental Assessment, 2016.

Within the study area heritage assets including both designated and undesignated assets will be identified using the relevant historic environment record. Once identified, each asset will be evaluated and one of five values from very high to negligible assigned.

Seven (7) impacts with regard to cultural heritage will be considered these include:

- Visual Impact;
- Noise;
- Dust;
- Vibration;
- Light;
- Odour; and
- Induced seismicity.

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For each of the seven (7) impacts, their magnitude will be categorised into one of five categories based on anticipated change. These categories will be major, moderate, minor, negligible, and no change.

From this an assessment of the likely significance of the impact will be made, combining the value of the heritage asset and the magnitude of the impact.

4.5.3 Ecology

Schedule 4 of the EIA Regulations identifies fauna and flora as aspects of the environment with the potential to be significantly affected by development.

An independent Phase 1 Habitat survey was carried out across the immediate locality of the proposed wellsite in accordance with standard methodology (JNCC 2010) in June 2015. This study found the area to be arable farmland of low botanical value. The 2015 report identified that there are one (1) statutory and six (6) non-statutory protected sites within 2 km of the proposed wellsite. These are:

- Downholland Moss Site of Special Scientific Interest (SSSI);
- Downholland Moss Biological Heritage Site (BHS);
- Downholland and Associated Brooks (BHS);
- Cheshire Lines and Associated Habitats (BHS);
- Formby Moss (BHS);
- Moss Heath (BHS); and
- Altcar Withins (BHS).

The site lies within several Natural England Impact Risk Zones, including Downholland Moss SSSI, Sefton Coast Special Area of Conservation, Ribble and Alt Estuaries Special Protection Area, Ainsdale Sand Dunes National Nature Reserve, Cabin Hill Local Nature Reserve (LNR), Ravenmeols Hills LNR and Birkdale Hills LNR.

Eight (8) European and/or Statutory protected species were identified within 2km of the site.

An updated Phase 1 Habitat Survey will be undertaken to accompany the application, assessing the impact on ecology both on and within 2km of the proposed wellsite.

Baseline

An updated ecological impact assessment will be undertaken to assess the impact of the proposed development on ecology.

An updated desk-based study, including interrogation of online databases and with the local records centre, will be undertaken to update the 2015 ecological survey and identify Statutory and Non-Statutory designated sites of nature conservation importance within 2km, and records of protected and/or notable species within 1km of the site.

Given that over two years has elapsed since the initial Phase 1 Habitat survey was undertaken, an updated extended Phase 1 Habitat survey will also be undertaken to record the nature and extent of

vegetation and habitats within and adjacent to the site and assess the potential of these to support protected and notable flora and fauna.

Consultation

Consultations will be undertaken with Lancashire County Council Ecologist, West Lancashire Borough Council Ecologist, Natural England and the Wildlife Trust for Lancashire.

Potential Effects

The potential effects as a result of the proposed development are loss of habitat through the wellsite construction, and impacts on protected and notable species.

Methodology for Assessment of Environmental Impact

The Applicant has commissioned an ecological survey update to inform the environmental statement.

An updated desk study will be undertaken to determine whether any additional relevant ecological data has been collected in the period since the June 2015 survey work was completed. The desk study will be extended to include additional sources of data to inform the EIA.

The following sources will be referenced:

- Natural England, Multi Agency Geographical Information Centre (MAGIC) database;
- Local Biodiversity Action Plan;
- Natural Environment and Rural Communities (NERC) Act 2006;
- Mario Map;
- LERN (Local Records Centre); and
- Wildlife Trust for Lancashire.

The updated Phase 1 Habitat survey of the proposed wellsite and its immediate surrounds will be undertaken to place it into the context with the local area. All habitats within the red line application boundary and adjacent habitats will be surveyed and mapped in accordance with the standard Phase 1 Habitat survey methodology (JNCC 2010). A standalone Phase 1 Habitat report will be produced and will form a technical appendix to the environmental statement. The data collected will form the baseline for ecological impact assessments that will be undertaken in accordance with standard CIEEM guidelines (IEEM, 2006).

To assist the MPA in meeting its obligations in respect of the Habitats Regulations, a Habitats Regulations Assessment 'Signposting' Document will be prepared and included as a Technical Appendix to the Ecology Chapter.

4.5.4 Hydrogeology and Contamination

Schedule 4 of the EIA Regulations identifies water as an aspect of the environment with the potential to be significantly affected by development. The Applicant will undertake a Hydrogeological Risk Assessment (HRA) to inform the environmental statement. A geotechnical

evaluation and geochemical analysis of the underlying soils has been undertaken to establish if there is any pre-existing soil contamination at the site.

Baseline

The HRA will define, through site visits and desk-based appraisal, the groundwater and surface water baseline. The baseline will include groundwater quality and chemistry, as well as dissolved and gases. Local groundwater abstractors and any sensitive surface water related features will be included in the baseline.

Consultation

With respect to the hydrogeological aspects specifically, consultations will be undertaken with the Environment Agency, West Lancashire Borough Council Environmental Health Officers and Natural England. Consultations made with other bodies as part of the EIA may also be referred to.

Potential Effects

Unmitigated the proposed development has the potential to affect soil condition, and water, both surface water and groundwater.

Methodology for Assessment of Environmental Impact

Consultants are to provide a HRA to inform the environmental statement following an accepted methodology.

The following relevant legislation and policy will be referenced, as a minimum:

- Water Framework Directive;
- Water Resources Act 1991, as amended;
- Environmental Permitting (England and Wales) Regulations 2016;
- Groundwater Protection Guides, Environment Agency, 2017
- Groundwater Directive;
- NPPF and NPPG;
- DECC: Guidance on the preparation of an environmental risk assessment of shale gas operations in Great Britain involving the use of hydraulic fracturing (Published by DECC in 2014, now Oil & Gas Authority); and
- UKOOG - UK Onshore Shale Gas Well Guidelines.

To establish a baseline the following sources will be referenced:

- Geological & topographic mapping;
- Environment Agency Records – licensed abstractions;
- BGS Water Wells Data base – historic abstractions;
- Private Water Supplies – unlicensed abstractions;
- Source Protection Zones;
- Groundwater dependent features identified from mapping and field survey; and
- Natural England MAGIC database.

Using the above information, a conceptual hydrogeological model will be developed.

A HRA will be carried out using the source-pathway-receptor approach using the DEFRA Green Leaves III methodology. The conceptual model will be used to identify hazards associated with each phase of development. From this, a risk assessment will be carried out for each phase. Where risks are identified, an appropriate scheme of hydrogeological mitigation will be put forward.

4.5.5 Landscape Character

Schedule 4 of the EIA Regulations identifies landscape as an aspect of the environment with the potential to be significantly affected by development. The Applicant will consider the impact of the development on landscape within the environmental statement.

Baseline

The development site is located within West Lancashire. It lies outside of any statutory or local landscape designation. A public highway, Sutton's Lane, runs parallel to the south east boundary of the site. The site is located within a coastal plain area, as identified in the Lancashire Landscape Character Assessment. Adjacent to the site are a series of approximately 50m high electricity pylons.

Consultations

Consultation will be undertaken with Lancashire County Council's Landscape Officer.

Potential Effects

The proposed development is within a relatively flat rural area. During the drilling phases (Phase 2 and Phase 3), when a drilling rig of up to 60m in height will be visible, during the hydraulic fracture stimulation (Phase 4), when the coil tubing tower or workover rig will be visible, during the initial flow test (Phase 5), during the extended well test (Phase 6) and decommissioning (Phase 7), when the workover rig will be visible, there will be a temporary impact on the landscape.

During periods of 24 hour working, lighting will be visible at the site from the local landscape.

Methodology for Assessment of Environmental Impact

Landscape impact will be considered within the environmental statement. A detailed Landscape and Visual Impact Assessment for each phase of the development will be undertaken to inform the landscape character chapter.

A study area and any viewpoints will be agreed with Lancashire County Council, Landscape Officer.

Reference will be made to the relevant guidelines including, 'Guidelines for Landscape and Visual Impact Assessment' (GVLIA), produced by the landscape institute of Environmental Management and Assessment (Third Edition 2013) and 'Landscape Character Assessment: Guidance for England and Scotland' by the Countryside Agency and Scottish Natural Heritage (April 2002).

The scope of the assessment will consider the likely significant effects of the proposed development on the landscape and visual amenity of the area.

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The drilling phases have the most significant potential for landscape impact, resulting from the drilling rig having a max height of 60m.

A desk-based study will reference Ordnance Survey 1:50,000 maps, relevant policies in the West Lancashire Local Plan, adopted in 2012, Landscape Strategy Lancashire, December 2000, and the Multi-Agency Geographical Information for the Countryside (MAGIC) database for designated sites and ancient woodland sites.

A site visit will also be undertaken to assess the landscape and visual impact of the wellsite from roads, tracks, footpaths and publicly accessible viewpoints, within the agreed study area.

Mitigation will be considered should any potential significant effects throughout the entire life cycle of the proposed development be identified.

4.5.6 Lighting

Full details of the lighting required for all development phases will be provided. During the drilling of the boreholes (Phase 2 and 3), hydraulic fracture stimulation (Phase 4) and flow testing (Phase 5 and Phase 6), the site will be in operation 24 hours per day. To ensure the impacts of any lighting at the wellsite are managed and mitigated, a number of measures will be implemented.

Lighting will be located in key areas around the site where it is required. Mobile tower lights will be positioned around the perimeter of the site and raised high and face downwards to reduce overspill. No lighting will be focused directly onto the public highway.

Screening will be used on the individual lighting units on site to limit any impacts arising from light spill, sky glow and visibility from local residencies. This will be achieved through the positioning of equipment onsite. Where possible, equipment will be positioned so as to provide screening.

Any lighting will be directed to the areas required to ensure its efficient use. In addition, lighting will be downward facing to minimise any light spill reducing spill and glare.

Where appropriate, lighting baffles will be used to prevent light spilling outside of the site. This will be reviewed during the set-up of each phase of development.

As part of the Applicant's commitment to ensuring its operations do not impact on local residents, a community contact number will be provided. This will allow local residents to contact a member of the Applicant's project team 24 hours a day. Any complaints received from local residents will be investigated and dealt with promptly.

Baseline

There is currently no lighting on the proposed wellsite. A baseline night time study will be undertaken to establish existing sources of night time light within a study area to be agreed with MPA.

Consultation

Consultations will be undertaken with Lancashire County Council and West Lancashire Borough Council's Environmental Health Officer.

Potential Effects

Lighting from the proposed development could impact on the amenity of nearby properties, the local landscape and ecological receptors.

Methodology for Assessment of Environmental Impact

A Lighting Management Plan, which will accompany the planning application, will provide full details of the lighting requirement for each phase of the development and mitigation measures to reduce light pollution from the site. The Lighting Management Plan will identify potential light sources and their location on the site.

The approach to the lighting assessment will identify sources of light from all phases of the development. These will be assessed against the night time baseline and the significance of the effects considered upon on:

- Nearby residential properties;
- The ecology of the area surrounding the site, linking to the Ecology Chapter with the Environmental statement;
- The local highway network, linking to the Traffic and Transport Chapter with the Environmental Statement; and
- Landscape, linking to the Landscape Chapter within the environmental statement.

Where the assessment identifies any potential for significant impacts, appropriate mitigation will be implemented to reduce or remove the impact.

4.5.7 Noise

The planning application and environmental statement will be accompanied by a noise impact assessment. As part of the noise impact assessment, background noise measurements will be undertaken at positions representative of the nearest noise sensitive properties to the proposed wellsite. The background noise levels measured at these properties will be used to develop noise limits in line with NPPG.

For the assessment of noise impact due to the drilling and hydraulic fracture operations, noise model predictions will be completed based on the sound power level of the equipment associated with these operations. Predictions will be used to determine anticipated noise levels at the sensitive receptor locations and inform any mitigation requirements.

It is anticipated that, in consultation with the Lancashire County Council, West Lancashire Borough Council's Environmental Health Officer, noise monitoring measures would be put in place for the purpose of demonstrating that noise levels do not exceed the limits derived in accordance with NPPG, which may be additionally confirmed as a planning condition.

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It is emphasised that proposed operations would be temporary and, as such, comparable with temporary construction operations. Any minor adverse noise impact on nearby properties would therefore be temporary.

Baseline

A baseline noise assessment is to be undertaken to accompany the planning application and environmental statement.

It is likely that background noise levels in the environment around the proposed wellsite are in a low range, commensurate with the open countryside location. However, ambient LAeq. levels may be higher, particularly during the daytime, due to traffic on local roads and farming activity.

The expectation is that, due to low background noise, noise limits would be set in line with the NPPG advised absolute noise targets of LAeq, 1 hour 55dB(A) daytime and 42dB(A) night time at the nearest sensitive receptor.

Consultation

Consultation will be undertaken with Lancashire County Council and West Lancashire Borough Council's Environmental Health Officer.

Potential Effects

The proposed development will generate noise which could adversely affect nearby sensitive receptors both human and ecological.

Methodology for Assessment of Environmental Impact

In order to assess the magnitude of potential noise impact, sensitive receptors will be identified and a quantitative prediction provided for each of the identified impacts. Predictions will be based on measured or specified plant and equipment noise levels, associated with the development. Target noise limits will be established based on relevant standards and guidelines and an assessment made as to whether such targets can be met. Proposals for mitigation measures will be outlined, should these be required to meet defined noise targets.

The NPPF sets out the Governments planning policies for England. NPPG provides guidance on acceptable noise levels and sets appropriate targets for day time, evening and night time.

The baseline noise monitoring will establish an existing background noise level, which will be used to develop the background + 10dB(A) criterion, against which any noise generated from the proposed development can be firstly compared. Consideration will then also be given to the absolute noise limits specified in the guidance.

A predictive noise model will be prepared by a specialist noise consultant, using octave band noise data obtained for the proposed equipment. The model will be used to predict operational noise level at the nearest sensitive receptors, to establish whether these would meet noise limits derived in line with NPPG. Where predictive modelling indicates that environmental noise limits would be

exceeded, appropriate noise mitigation measures will be detailed and tested in the noise model. Full details of the noise mitigation measures proposed will be provided in the environmental statement.

A noise impact assessment report will be produced and will form a technical appendix to the environmental statement.

4.5.8 Waste

An assessment of the impact of the development upon waste will be undertaken to inform the environmental statement. Waste will be assessed for all phases of the development.

This section identifies the aspects of that work which could affect the environment or amenity, lists the main control measures required to prevent or minimise impact relating to that aspect and sets out the impacts on the environment and public health with the controls applied. This information is then used to assess those impacts which may be significant and require further work as part of the EIA.

Baseline

The proposed site is currently in agricultural use and therefore, no waste is generated from the site.

Consultation

Consultation will be undertaken with Lancashire County Council and the Environment Agency.

Potential Effects

Unmitigated, the waste produced from the proposed development could result in contamination to the site and adjacent land.

Methodology for the Assessment of Environmental Impact

In addition to requiring planning permission, there is a requirement to obtain environmental permits from the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016.

In support of environmental permit application, a Waste Management Plan will be prepared. Extracts from the Waste Management Plan will be used to inform the assessment of environmental impact.

The following European and English legislation will be referenced under the waste topic heading in the Environmental Statement:

- The EU Revised Waste Framework Directive 2008/98/EC;
- Waste (England and Wales) Regulations 2011, as amended;
- Environmental Permitting (England and Wales) Regulations 2016; and
- The Radioactive Substances Act 1993.

In the absence of an established methodology for the assessment of the environmental effects of waste generation, the Applicant proposes the following approach closely linked to the Waste

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Management Plan and the Environmental Risk Assessment, both a requirement of the environmental permitting regime.

The waste topic will contain:

- Confirmation of sources of waste;
- Details of the development of a waste quantity prediction model;
- Confirmation of current and applicable classifications of waste;
- Details of waste facilities, contractors and opportunities for re-use or recycling;
- A summary of the Waste Management Plan for the site (subject to Environmental Permit requirements);
- A summary of the Waste section of the Environmental Risk Assessment;
- A quantitate assessment of likelihood of the significant effects on the environment as a result of waste generation to include direct and indirect effects; and
- Details of mitigation to reduce any environmental impacts arising from waste associated with the proposed development.

4.5.9 Seismicity

Induced seismicity, as a result of hydraulic fracture stimulation, has been widely discussed due to concerns that the process could trigger reactivation of pre-existing natural faults in close proximity to the boreholes.

Mitigation includes locating the focus of hydraulic fracture stimulation away from those mapped faults, as identified on the latest 3D geophysical data, that are considered to have an increased risk of reactivation. However, as the success of hydraulic fracture stimulation depends on both opening up existing natural fractures and by generating new fractures and given the intrinsic relationship between faults and fractures, it may be impossible to mitigate this risk entirely. Consequently, guidelines for a monitoring process have been established by the Oil & Gas Authority, their advisors and other stakeholders with which the Applicant will comply.

Baseline

A desk-based characterisation of the baseline will be established using regional stress data and background seismicity data available from the British Geological Survey and recent 3D geophysical survey data acquired by the Applicant. This information is consistent with the information required to be included with a Hydraulic Fracture Plan, which must be submitted to the Oil & Gas Authority and the Environment Agency for approval.

The Hydraulic Fracture Plan will include the acquisition of baseline seismicity monitoring, which in turn will assist the Applicant in developing mitigation, which is referred to as a 'Traffic Light System'. When undertaking the monitoring of a hydraulic fracturing operation, the baseline characterisation helps distinguish between a naturally occurring seismic event and an induced seismic event.

It is proposed that the horizontal borehole will be used as a monitoring borehole when undertaking hydraulic stimulation in the vertical borehole and vice versa when undertaking hydraulic stimulation in the horizontal borehole.

Consultation

Consultation will be undertaken with the Oil & Gas Authority, the Environment Agency and the British Geological Survey.

Potential Effects

Hydraulic fracture stimulation could trigger minor induced seismic events by reactivation of existing faults close to the boreholes. Studies conducted following such events seen during the hydraulic fracture stimulation of the Preese Hall-1 borehole, in PEDL 165, concluded that maximum potential magnitude of such an event in this area was ~3.0 ML; which given the depth of the event would be unlikely to cause structural damage to property or infrastructure at the surface.

Methodology for Assessment of Environmental Impact

The Applicant will commission seismic consultants to provide a methodology and undertake baseline monitoring and monitoring during the hydraulic fracture operations. This methodology will be submitted as a technical appendix to the environmental statement.

4.5.10 Traffic and Transport

The wellsite will be accessed from Sutton's Lane, with an alternative access (Broad Lane) also being assessed. Access to the site is via the A565, turning east onto the B5195 Altcar Road, which turns into Lord Sefton Way. A brick built unrestricted bridge traverses Downholland Brook. When entering the village of Great Altcar (indicated by road sign and 40mph limit sign), the road bends sharply to the north. Immediately prior to the road bending to the east, turn north on Sutton's Lane, which appears to be a track but is an adopted highway. The proposed wellsite is located 950m along Sutton's Lane.

Full details of vehicle movement for all phases of the operation will be provided with the environmental statement. The largest number of vehicle movements is anticipated during wellsite construction and site restoration (Phases 1 and 8), although the drilling of the boreholes (Phases 2 and 3) and hydraulic fracture stimulation (Phases 4) will generate a number of vehicle movements, principally associated with the mobilisation and demobilisation of the equipment.

Baseline

Traffic surveys will be undertaken on the local highway networks to inform the transport assessment. Locations of the surveys will be agreed with the Local High Authority.

A route condition survey will also be undertaken, the method and extent of the survey will be agreed with the Local Highway Authority.

Consultation

Consultation will be undertaken with the Lancashire County Council as the Highways Authority and the local community.

Potential Effects

Transport related effects could include the impact of traffic generated by the development on the local highway network. This includes the traffic flow, highway user safety, congestion, noise and vibration, air quality through vehicle emissions and condition of the local highway.

Methodology for Assessment of Environmental Impact

As part of the environmental assessment, criteria for assessing the impact of the development on traffic and transport will be defined, which will be based on the IEMA *Guidelines for the Environmental Assessment of Road Traffic* and NPPG *Travel Plans, Transport Assessment and Statements in Decision Taking*. The impact on the current condition of the access routes to and from the proposed wellsite will form part of the assessment criteria.

From the assessment, mitigation requirements will be identified. In accordance with the EIA Regulations, the likelihood of significant impacts will be considered with regard to both direct and indirect impacts during all development phases.

4.5.11 Water Resources and Flood Risk

An assessment of the impact of the development upon water resources and flood risk will be undertaken to inform the environmental statement.

The existing agricultural use of the proposed wellsite has an extremely low demand for water consumption. The proposed development will increase the demand for water consumption. Water will be either obtained from a new mains supply or will be transported to site by road tanker.

Baseline

The proposed wellsite is located within Environment Agency indicative Flood Zone 3 classified as having a 'High' probability of flooding from fluvial/tidal sources (1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year).

In accordance with the NPPF and the associated NPPG, the planning application will be accompanied by a flood risk assessment, as the site area exceeds 1 hectare within an Environment Agency Flood Zone 3 location. The environmental statement will be supported by this assessment. The baseline for the assessment will be established using various sources of information, including the following:

- Environment Agency Flood Map Data;
- Envirocheck Screening Report;
- Topographical Survey Data;
- Landowner drainage plans; and
- Wellsite construction drawings.

Potential Effects

Water related effects could include the impact on regional demand for water, risk of flooding and risks to groundwater.

Consultation

Consultation will be undertaken with United Utilities (Lancashire) with respect to water requirements and the impact of such demand on the overall water consumption for the area.

Consultation will be undertaken with the Environment Agency with respect to flood risk and development within a Flood Zone 3, areas benefitting from flood defences.

Methodology for Assessment of Environmental Impact

The Applicant will undertake a desk-based water resources assessment. This will consist of an assessment of the impact on water resources during all phases of the development. The assessment will consider the demand for water, primarily during the hydraulic fracture stimulation (Phase 4) and its impact on regional demand.

The Applicant will undertake a flood risk assessment. The assessment will assess the risk from all sources of flooding to and from the wellsite. Section 10 NPPF provides national policy in relation to development and flood risk and retains key elements of Planning Policy Statement 25: Development and Flood Risk (PPS 25) (DCLG, 2010). The Section 10 of the NPPF is supported by Section 7: Flood Risk and Coastal Change of the NPPG.

Section 7 of NPPG emphasises the need for a risk-based approach, based on the source-pathway-receptor model. The source-pathway-receptor model firstly identifies the causes or sources of flooding to and from the wellsite on a review of local condition and consideration of the effects of climate change.

The nature and likely extent of flooding arising from any one source is considered, for example, whether such flooding is likely to be localised or widespread.

The flood risk assessment will be prepared in accordance with the site-specific flood risk assessment checklist, outlined within Section 7 of NPPG.

4.6 Topics to be Scoped out of the Environmental Statement

Three (3) of the fourteen (14) topics assessed have been scoped out of the environmental statement. These topics do however remain material to the consideration of the proposal, and will be addressed with the wider documentation submitted alongside the planning application. These topics are as summarised below.

4.6.1 Community and Socio Economics

The surface location of the proposed site is located within a rural, predominantly agricultural area of scattered farms and villages. The closest settlements are the village of Great Altcar (1km), the town of Formby (1.5km) and the village of Haskayne (3km)

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There will be no significant socio-economic effects during the proposed temporary development.

The proposed development will generate employment both directly, in terms of jobs arising from operations at the site, and indirectly through supply chain and use of local services. Given this proposal is for exploration only, any employment will be time limited, and whilst a material benefit, in totality is unlikely to be significant. The planning application will be supported by information that sets out the employment/economic output benefits of the proposal.

4.6.2 Greenhouse Gas Emissions

The proposed development will generate greenhouse gases from the emissions from plant and equipment transported to and used on site during all phases; the flaring of natural gas during the initial testing phase (Phase 5) and the extended well testing phases (Phase 6); and any unmitigated fugitive emissions. From studies of other similar wellsites, these greenhouse gas emissions are anticipated to be low and, in terms of environmental impact, will be unlikely to have a significant effect. Therefore, an assessment of greenhouse gases has been scoped out of the environmental statement.

4.6.3 Land Use and Agriculture

The proposed site will take 1 hectare of Grade 2 land out of agricultural production for a temporary period of time. Following restoration, the site will be returned to its current agricultural use. Wells have been drilled in the local area previously with no significant long-term impacts on land use. Therefore, it is considered that whilst there will be a short-term impact on land use and agricultural production this is not likely to give rise and any significant environmental effect, and is therefore scoped out of the environmental statement. However, agriculture and land use will be assessed within the planning statement.

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5. CONCLUSION

This scoping request has been submitted under the EIA Regulations to allow Lancashire County Council to provide a scoping opinion.

The Applicant is proposing to construct a wellsite, within which it will drill and core a vertical borehole, followed by the drilling of a second borehole, with a horizontal section approximately 1,500m in length. Both boreholes will then undergo hydraulic fracture stimulation. Each borehole will then be separately flow tested and, subject to the results obtained, the horizontal borehole may then undergo an extended well test (up to 90 days).

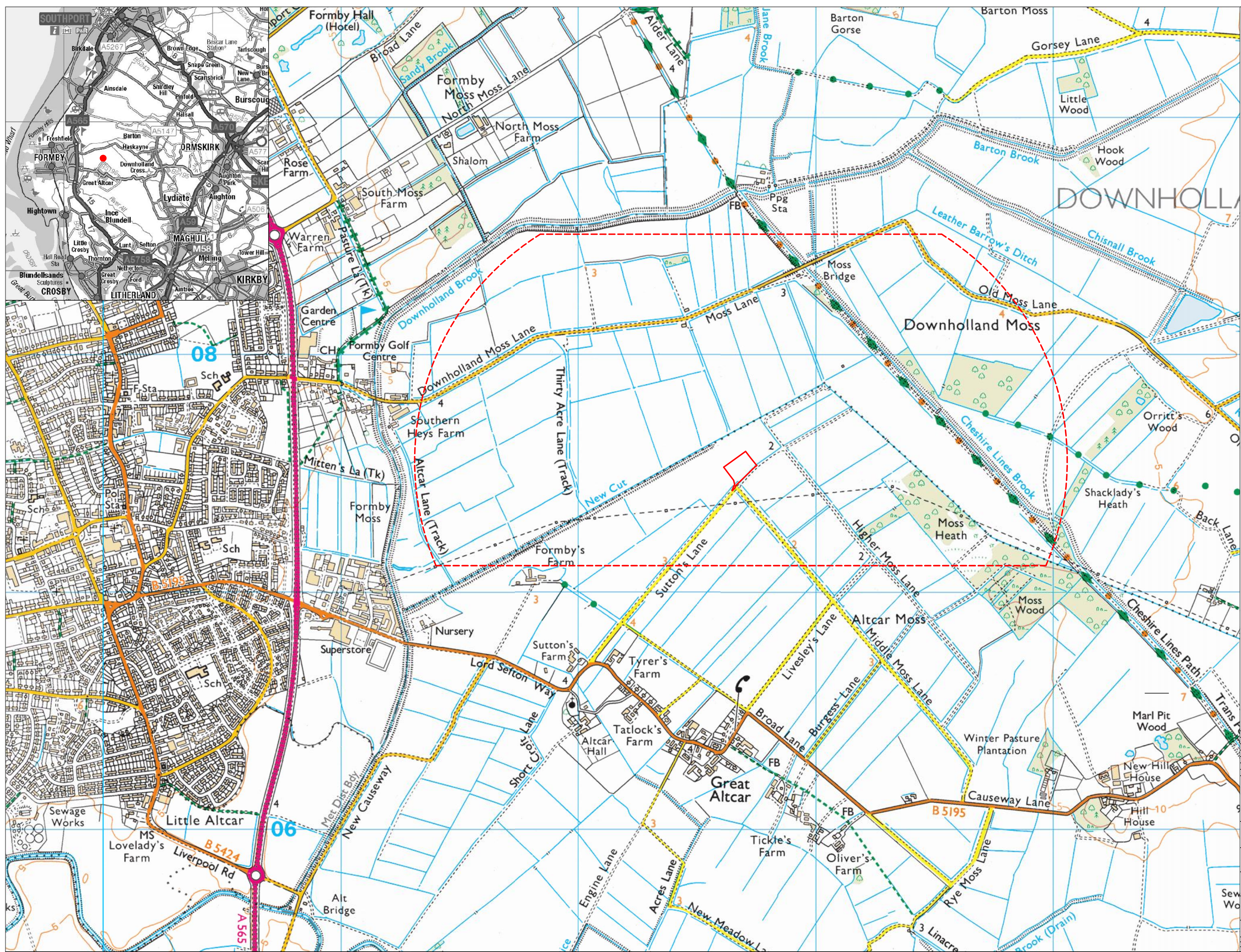
The nature of the development proposals is such that the Applicant will be submitting an environmental statement with the planning application. Having considered the proposals against the requirements and guidance contained in the Town and Country Planning EIA Regulations, the Applicant considers that all potential topics relevant to the environmental impact of the development have been covered within this scoping request.

The document details the Applicant's intended approach to EIA and details how data will be obtained from baseline monitoring and during operations in order to assess the environmental impact. Where appropriate, methodologies for the assessment of impact are also put forward for consideration by the MPA.

The Applicant considers that all the environmental issues have been identified and seeks to agree this with the MPA. The Applicant has detailed the baseline data to be relied upon, survey methodology and methods for the evaluation and the criteria for determining significance. Again, agreement on this approach is sought with the MPA. The Applicant considers that this scoping request provides a robust and defensible basis upon which to assess the environmental impact of the proposed development.

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APPENDIX 1 – SITE LOCATION PLANS



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KEY:

- PLANNING APPLICATION BOUNDARY
- EXTENT OF SUBSURFACE WORKS
- SITE LOCATION

REVISION HISTORY				
REV	DATE	BY	DETAILS	
0	JAN18	JF	ORIGINAL FOR ISSUE	JF
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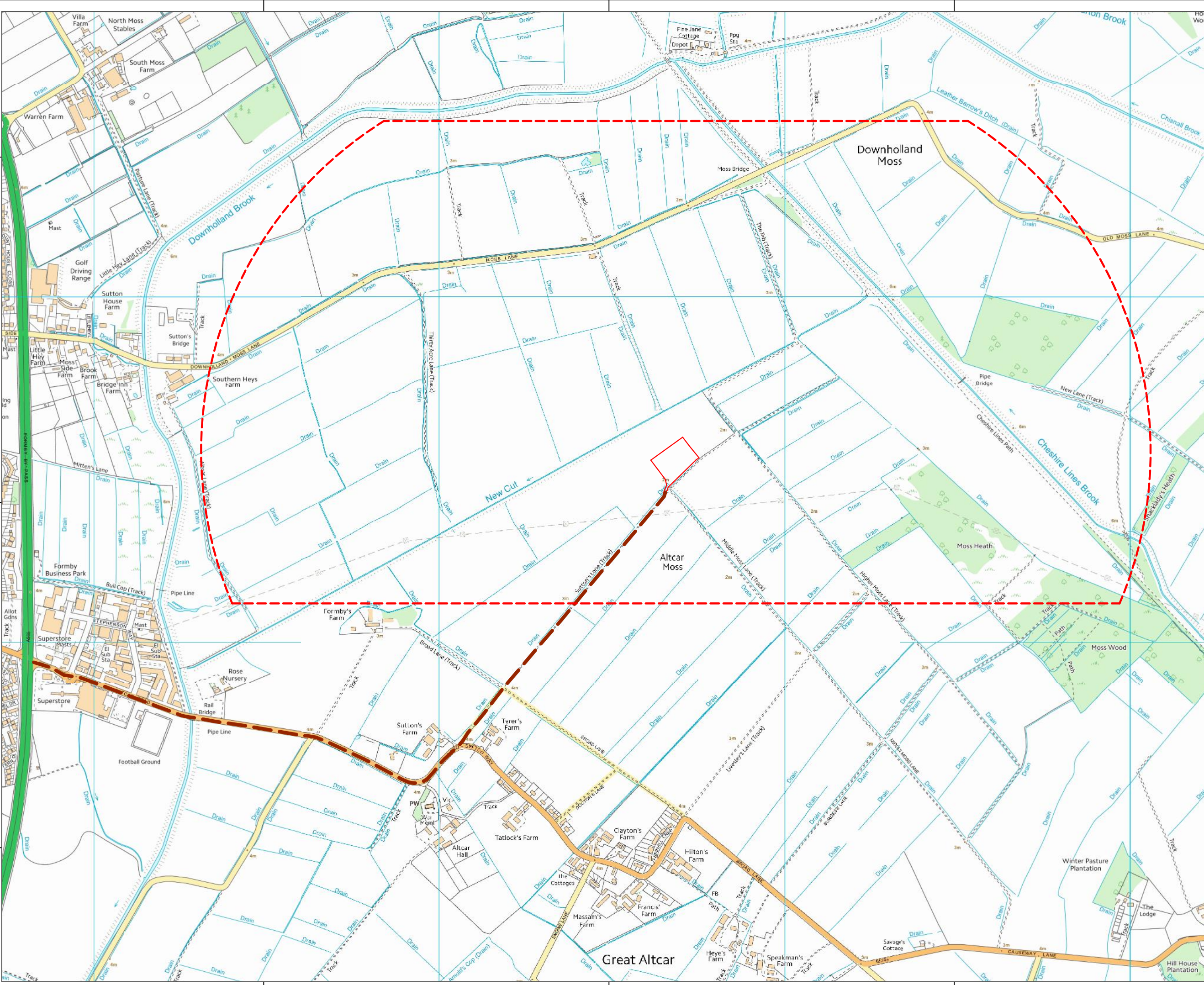
PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: LOCATION PLAN

CLIENT: AURORA ENERGY RESOURCES

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Size: A2
Sheet: 1 of 1

DWG. No: ZG-AER-ALT-PA-01



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KEY:

PLANNING APPLICATION BOUNDARY

EXTENT OF SUBSURFACE WORKS

PRIMARY ACCESS ROUTE

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PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: LOCATION PLAN

CLIENT: AURORA ENERGY RESOURCES

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