

Non-Technical Summary
Altcar Moss Wellsite

June 2019



Altcar Moss Wellsite Planning Application	Non-Technical Summary	Aurora Energy Resources
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1. INTRODUCTION

This document provides a summary of the information in the Environmental Statement prepared by Aurora Energy Resources (“Aurora”) to accompany the planning application submitted to Lancashire County Council, for planning permission to drill and test two (2) exploratory boreholes from a site (the Altcar Moss wellsite) located at Sutton’s Lane, Great Altcar, Lancashire.

The Environmental Statement reports on the results of the Environmental Impact Assessment (EIA) conducted for the proposed development. An EIA looks at the current state of the environment (known as the baseline) and considers the potential impacts of the development. If the EIA predicts any likely significant impact on the environment from the proposed development measures to prevent or reduce the predicted impact are then described.

This Non-Technical Summary follows the structure of the Environmental Statement setting out:

- the site location;
- the description of the proposed development;
- the alternative sites considered;
- the Environmental Impact Assessment;
- Cumulative Impacts;
- Interactive Impacts; and
- The assessment of twelve (12) environmental topics.

1.1 AURORA

Aurora is a private UK company engaged in the exploration for oil and gas in North West England. It is the operator of four Petroleum Exploration and Development Licences in the area. The proposed development at Altcar Moss is in licence PEDL 164.

1.2 THE EIA PROJECT TEAM

The Environmental Statement has been prepared by Aurora with the assistance of Zetland Group Limited, a planning, safety and environmental consultancy specialising in the exploration and production of petroleum onshore UK. The Environmental Statement presents the results of technical studies undertaken by specialist consultants, having been commissioned by Aurora. The EIA Project Team is shown within Table 1.1.

Organisation	Area of Expertise & Input into the EIA
Aurora Energy Resources	Aurora. Providing technical expertise to inform the development description, seismicity assessment and environmental topics.
Zetland Group Limited	Planning, safety and Environmental Consultant. Providing Town Planning, EIA coordination, Public Health, and Waste.
Socatec	Air Quality and Greenhouse Gases Assessment.
Allen Archaeology Limited	Archaeological Assessment.
Ecology Services Limited	Ecological Assessment.
DRaW (UK) Limited	Landscape and Visual Assessments.
Strenger	Lighting Assessment.
RPS Limited	Noise Assessment.
Local Transport Projects	Traffic and Transport
Envireau Water	Hydrogeology, Contamination and Flood Risk

Table 1.1: EIA Project Team

1.3 AVAILABILITY OF THE ENVIRONMENTAL STATEMENT

The full Environmental Statement is available for viewing on the Lancashire County Council website <https://www.lancashire.gov.uk/council/planning/>, or during normal office hours at:

Lancashire County Council.
County Hall
Preston
Lancashire
PR1 0LD
Tel: 0300 1236701

Copies of all submission documents are available for download from the project website:
www.aurora-energy-resources.com/altcar-moss.html

2. SITE LOCATION AND GEOLOGICAL SUMMARY

2.1 SITE LOCATION

The application site is currently farmland, located immediately to the northwest of Sutton's Lane, Great Altcar. The site is within Great Altcar Parish, in the borough of West Lancashire.

Figure 2.1 shows the location of the application site, which includes both the wellsite and the access track. The dotted line shows the area within which the horizontal borehole (a subsurface working) will be located.

Access to the site is via the Formby Bypass (A565), Lord Sefton Way (B5195) and Sutton's Lane.

The application site area measures 1.72 hectares, including the access track.

The site has been selected for its geological suitability, its location close to good highway infrastructure and its distance from local property or sensitive environmental sites.

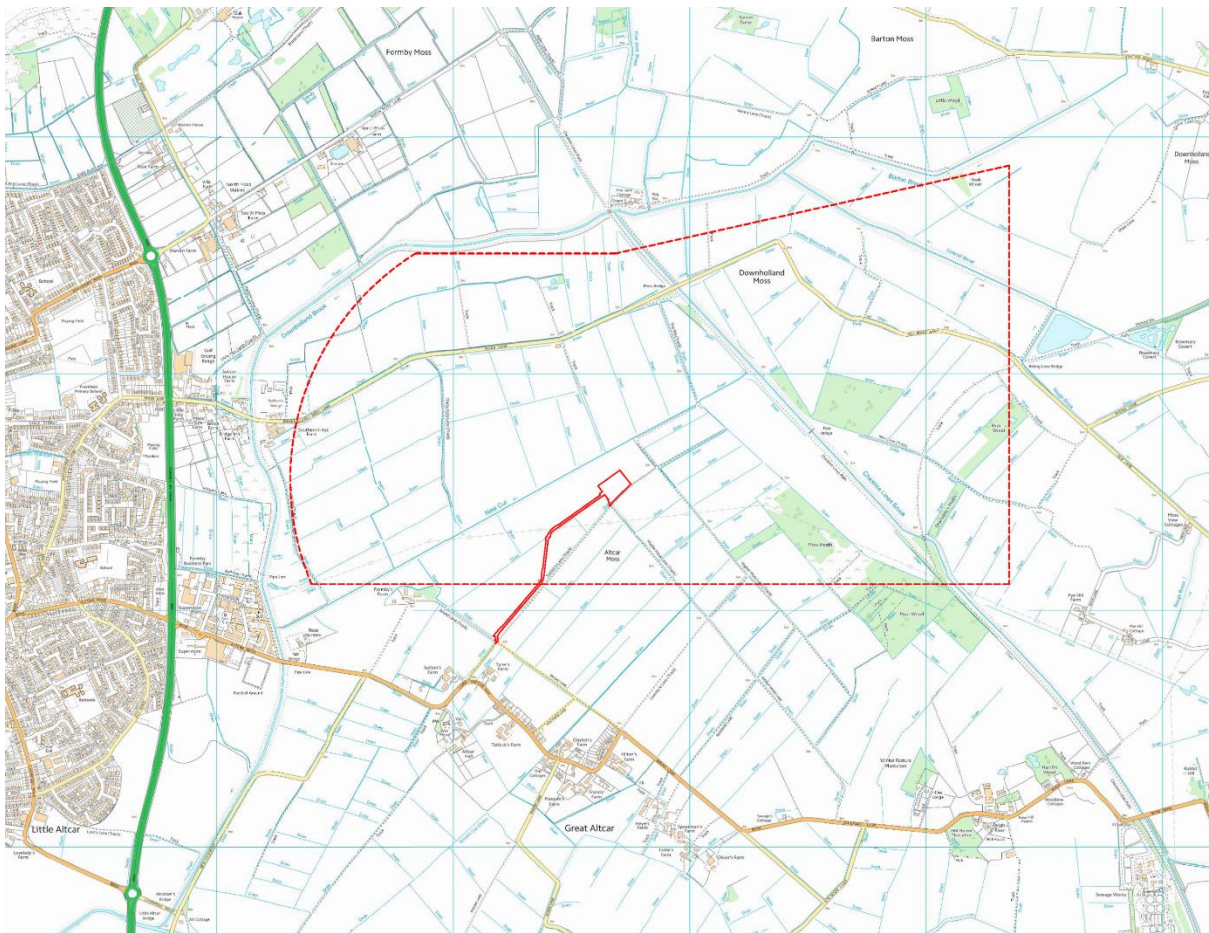


Figure 2.1: Site Location

2.2 GEOLOGICAL SUMMARY

West Lancashire has a history of petroleum exploration dating back over 80 years to the discovery of the Formby shallow oil field which was in production from 1939-1965. Offshore, in the East Irish Sea there are numerous producing gas and oil fields.

Over 80, mostly shallow, onshore wells have been drilled in the local area. A number of deeper wells have also been drilled.

The target for the proposed boreholes at Altcar Moss is an almost 900m thick section of shales, limestones and sandstones, of Carboniferous-age, called the Bowland/Hodder Unit. These comprise the Upper and Lower Bowland Shales and the underlying Hodder Mudstone. The nearby Formby-1 well drilled in the 1940s to a total depth of 2,341m proved the presence of natural gas in this section.

The Table 2.1 below shows the depth and thickness of each geological section expected to be encountered in the vertical borehole. The second borehole will be drilled horizontally within the Bowland/Hodder Unit at a level to be determined from the results of the initial borehole.

Age	Geological Unit	Thickness (m)	Depth TVDGL (m)
Holocene -Recent	Superficial Deposits	18	0
Triassic	Mercia Mudstone Group	297	18
	Sherwood Sandstone Group	670	315
Permian	Manchester Marls	90	985
	Collyhurst Formation	575	1075
Carboniferous	Millstone Grit Group	380	1650
	Upper Bowland Shale	55	2030
	Lower Bowland Shale	315	2085
	Hodder Mudstone	510	2400
	Bowland High Group	~1000	2910
	Total Depth		2960

Table 2.1: Vertical Borehole: Expected Stratigraphy

3. THE DEVELOPMENT PROPOSAL

3.1 THE PROPOSAL

Aurora is proposing to drill and test two exploratory boreholes from the Altcar Moss wellsite. The purpose of the boreholes is to establish whether the target Carboniferous-age shale formations contain oil and gas and, if so, whether they have the potential to be commercially productive. For clarity, commercial production of oil and gas would be subject to a separate planning application.

The proposed project has been divided into eight phases. Each phase is described below.

3.1.1 Phase 1 Access Track and Wellsite Construction Works

Access to the wellsite will be from Lord Sefton Way onto Sutton's Lane. After approximately 220m vehicles will then turn north west onto private land where a new access track will be constructed of pre-made track panels, travelling for a distance of approximately 815m to the wellsite entrance.

Any highway improvement works to Sutton's Lane will be agreed in advance with the County Highways Authority.

The construction of the wellsite will involve the use of a piling rig to install precast concrete driven piles to provide for a stable base on which the drilling cellar can be built. The concrete drilling cellar will be constructed in the centre of the active area which comprises a reinforced concrete slab on which the drilling rig and well testing equipment will be located.

A waterproof barrier will then be laid across the active area of the wellsite and a ditch will be dug around the perimeter to prevent any surface spills reaching the underlying soils and to collect any 'run-off' water from the site. The waterproof barrier will be covered by layers of geotextiles and aggregate to protect it.

Once the wellsite is constructed a 3m high security fence will be installed around the wellsite.

On completion of the wellsite construction, a small drilling rig will install the initial conductor casing for each borehole to a depth of approximately 40m.

The construction of the wellsite and access track is estimated to take approximately sixteen weeks to complete. It is proposed that works during Phase 1 will only take place during the following times:

- 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.

3.1.2 Phase 2 Drilling and Coring of a Vertical Borehole

An oilfield drilling rig with a mast height of up to 60m and other equipment will then be brought to the site to drill the vertical borehole to a depth of approximately 3000m.

The aim of this initial well is to drill through to the base of the target shales. Core samples will be collected so that the shales can be analysed.

At various points during the drilling, additional steel casings will be cemented in place to support the borehole and to provide a barrier between the borehole and the surrounding rock. The borehole becomes narrower at each casing point and the final section is expected to be 216mm (8 1/2") wide.

The design of the borehole will be approved by an independent well examiner and the design submitted to the Health and Safety Executive for review.

The drilling of the first borehole is estimated to take approximately five months to complete and will require 24-hour working, seven days per week.

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

Following the drilling of the vertical borehole, the second borehole will be drilled vertically down to the target zone within the shales and then horizontally within this zone for up to 1,500m.

The drilling of the second borehole is also estimated to take approximately five months to complete and will require 24-hour working, seven days per week.

3.1.4 Phase 4 Hydraulic Fracture Stimulation of the Vertical and Horizontal Boreholes

Once both boreholes have been drilled the drilling rig will be removed and the equipment for the hydraulic fracture stimulation phase will be brought to the site.

The hydraulic fracture stimulation will be undertaken in accordance with a Hydraulic Fracture Plan, approved by the Oil and Gas Authority. 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 limited number of additives, all of which will be non-hazardous to groundwater and approved for use by the Environment Agency.

A number of separate hydraulic fracture stages will be completed in each borehole.

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.

Once the hydraulic fracture stimulation has been completed the hydraulic fracturing equipment will be demobilised from the site.

The hydraulic fracture stimulation phase is estimated to take approximately sixty days to complete. Whilst this phase requires 24-hour working, the operation of the pumps for each fracture stage would only take place between 07:00 and 19:00.

3.1.5 Phase 5 Initial Flow Testing

Once the hydraulic fracture stimulation operations are complete, initial flow testing of each of the boreholes will take place.

Flowback fluid and liquid hydrocarbons recovered from the testing operation will be stored in 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 to a shrouded ground flare located on site for incineration.

The purpose of the initial flow tests 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.

The initial flow testing is estimated to take approximately sixty days to complete and will require 24-hour working, seven days per week.

3.1.6 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 a further extended well test.

The extended flow test is estimated to take approximately ninety days to complete and will require 24-hour working, seven days per week.

Assuming that the results of the initial and extended flow tests are positive, the boreholes will be safely suspended for future use. Any future use e.g. commercial production will require the submission of a further planning application.

3.1.7 Phase 7 Decommissioning and Borehole Abandonment

In the event that the exploratory drilling and testing proves unsuccessful in determining that commercial production can be achieved, the boreholes will be decommissioned, consisting of plugging and safe abandonment in accordance with current guidelines.

A smaller workover rig will be mobilised to site to undertake the plug and abandonment operation.

Decommissioning and borehole abandonment is estimated to take approximately four weeks to complete and will require 24-hour working, seven days per week.

3.1.8 Phase 8 Wellsite Restoration

Following completion of the decommissioning and abandonment works, the wellsite will be restored to its pre-development condition. This will consist of two principal phases, wellsite restoration and aftercare and monitoring. The wellsite restoration will include the replacement of the soils, which have been stored on the site during operations.

The restoration of the Altcar Moss wellsite, including access track is anticipated to take approximately eight weeks to complete. Work will take place during the hours agreed for wellsite construction.

4. SITE SELECTION

When selecting the proposed development location, Aurora considered a range of issues, including geological, environmental and social considerations.

It was important that the site should be within the area of the 3D geophysical survey acquired in 2016 and reasonably close to the Formby-1 well that was drilled in the 1940s and which is an important control point that reached the target Carboniferous-age shales.

Having identified the area for the initial exploration wells, Aurora identified and considered any potential environmental restrictions to screen potential drilling sites. This analysis took into consideration protected sites, the distance to local property, road infrastructure and other environmental data for the area.

Through this process, a number of potentially suitable sites were identified within the designated area and these were screened again against what were felt to be the key remaining constraints namely distance from local property and quality of the available access route.

5. ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment (EIA) is undertaken for certain developments to check that the development will not have a significant negative effect on the environment.

Before an EIA is conducted, the topics to be assessed may be agreed with the local planning authority.

For each topic the existing condition or baseline is described against which any impacts from the proposed development can be assessed.

The scale of any impact and the sensitivity of the environment affected is assessed for each topic to identify any likely significant effects.

Possible mitigations, actions to lessen the impact, are identified and any remaining effect recorded. Mitigations should in most if not all cases mean that the development no longer has a likely significant effect on the environment.

The cumulative impact of the proposed development in combination with other projects is also considered for each topic

The assessments included in the EIA are conducted by qualified people in most cases independent professional consultancies.

The results of the assessment are included within an Environmental Statement (ES) and in this non-technical summary submitted with the planning application.

5.1 AIR QUALITY

An independent air quality assessment has been undertaken and the impact on local air quality has been assessed for all phases of the proposed development.

The main sources of pollutant releases during site operations will be from the use of diesel fuel in generators and vehicles and from the flaring of any produced natural gas during the testing phases.

Maximum air quality impacts from the site operations will occur within the wellsite site boundary with any impact reducing significantly with distance from the site.

At the nearest properties and along the Cheshire Lines path, where frequent human exposure might be expected, air quality impacts are considered insignificant based on Environment Agency assessment criteria.

At the nearest ecological sites, the impact on air quality as result of the proposed development is also expected to be insignificant.

Any potential Radon emissions from the testing phase have also been assessed and even in the worst-case scenario are predicted to be well within Environment Agency limits and are therefore considered to be not significant.

Construction activities associated with Phase 1 are likely to give rise to dust emissions. It is expected, based on Institute of Air Quality Management methodology, that with adequate mitigation measures in place the risk of dust impact from all project operations will be 'negligible'.

Increases in road traffic from the construction activities, site operation and final site restoration are assessed to have a neutral impact on air quality based on Highways Agency guidance.

5.2 CULTURAL HERITAGE

The assessment of cultural heritage has included consideration of the impact on archaeological remains and designated heritage assets within a 1 km radius of the wellsite.

The proposed development will not remove any historic field boundary, being aligned with the current enclosure system.

Impacts during the construction phase on previously unrecorded archaeological remains are possible although currently the assessment has indicated a low potential for the existence of any such remains.

Archaeological investigations are recommended during site construction in order to identify any possible remains.

The settlement of Great Altcar to the southwest of the proposed wellsite contains seven Listed Buildings and is designated as a Conservation Area. The Listed Buildings are all slightly beyond the 1 km study area. They comprise the local Church, War Memorial, Lychgate and four farms or farm buildings. The proposed wellsite is not anticipated to significantly impact on the setting of the Listed Buildings and Conservation Area.

5.3 ECOLOGY

The ecology chapter of the Environmental Statement assesses the potential impacts of the proposed development on habitats and species, with particular reference to any protected habitats or species.

An initial habitat survey established that there were no sensitive or protected habitats in the vicinity of the application site.

Based on a review of the records during the desk-top study and an assessment of available habitats at the proposed site a number of species (including brown hare, badger, red squirrel, hedgehog, otter, western marsh harrier and all amphibians, reptiles and invertebrates) were scoped out of the impact assessment. Further, specially commissioned surveys or assessments have been used to assess the impact of the proposed development on a range of other species and groups including water vole, bats, breeding birds, barn owl and overwintering birds in particular pink-footed geese.

The mosslands are recognised as providing supporting habitat for a range of overwintering birds at the nearby Ribble and Alt Estuaries SPA, a protected European site. A Shadow Habitat Regulations Assessment has therefore been conducted and is included along with the application. This assessment concluded that there would be no significant impact on the qualifying species associated with the European sites as a result of the proposed development.

The assessment of other species-specific studies concluded that the proposed development will not result in any significant adverse impact on any of the species listed above.

5.4 GREENHOUSE GASES

A baseline for greenhouse gases has been established using publicly available data. The additional contribution to greenhouse gas emissions from all phases of the proposed development has been estimated and assessed.

Embedded mitigation is incorporated into the development proposals through the design and construction of the boreholes in accordance with the applicable regulations and the short-term temporary duration of the proposed development.

Additional mitigation is provided by way of competent supervision, best industry practice and monitoring.

The estimated maximum release of greenhouse gases during the proposed development is assessed as equal to only 0.018% of total UK greenhouse gas emissions in 2017.

It is therefore assessed that there will be no likely significant effect as result of greenhouse gas emissions from the proposed development and only a negligible change in the baseline conditions at the national level.

5.5 LANDSCAPE

The application site is located within Altcar Moss, a flat low-lying area of reclaimed land used for arable farming. The flat open landscape is interrupted in places by frequent transmission line towers and other vertical structures.

The proposed development would temporarily introduce tall equipment, lighting and activity into a relatively tranquil landscape, reducing the semi-rural qualities of Altcar Moss. However, the effects would be fully reversible at the end of the temporary development.

The proposed development would be visible from a relatively wide area, particular during the drilling phases. However, due to the temporary nature of the operations the visual impact of the proposed development is assessed to be not significant and there would be no residual effects.

Following restoration of the wellsite and access road there would be no lasting change to the character of the landscape.

5.6 LIGHTING

Lighting will be required for all phases of the proposed development, with 24-hour working proposed from Phase 2 through to Phase 7.

The application site surroundings are rural in nature and within a district of low brightness.

During Phase 1, access track and wellsite construction works, operations will generally be undertaken during day-light hours, however, temporary task lighting may be required during the periods of early morning and dusk to supplement low levels of daylight. As such very low lighting impact from Phase 1 is anticipated.

During Phases 2 to 7, the drilling, hydraulic fracture stimulation, testing and borehole decommissioning phases, 24-hour working will require lighting of the wellsite. Given the distance between the wellsite and the nearest residential properties the light spill, glare and sky glow will be very low.

The final phase, wellsite restoration, will generally be undertaken during day-light hours, however, temporary task lighting may be required during the periods of early morning and dusk to supplement low levels of daylight. As such very low lighting impact from Phase 8 is anticipated.

During all phases, lighting will be kept to the minimum required for safe operations and downwards facing lights will be used where possible to minimise light spill from the site.

5.7 NOISE

This chapter of the Environmental Statement is concerned with the potential noise impacts from the proposed development at the closest properties to the site.

Based on the results of the study it is concluded that wellsite construction and restoration noise will be well below the relevant criteria set out in British Standards and will not result in a significant impact.

During the drilling phases, modelling shows that noise generated will be below the noise limits contained in Minerals Planning Practice Guidance at all times.

Drilling operations may cause a temporary minor increase in noise levels at the nearest properties at night but noise levels will be well below the World Health Organisation criteria for onset of sleep disturbance. It is therefore concluded that the impact will not be significant.

Noise from hydraulic fracture stimulation, which will only occur during the daytime, will be below the noise limits contained in the Minerals Planning Practice Guidance. Furthermore, the operations will not result in a change in existing noise levels except at Formby's Farm, where noise from hydraulic fracturing will be just perceptible. It is therefore concluded that temporary noise from hydraulic fracture well stimulation operations will not result in a significant noise impact.

Noise due to initial flow testing and extended well testing will be well within the Minerals Planning Practice Guidance noise criteria during the daytime, evening and night and will not result in a noticeable change in noise levels during the daytime or evening. At night, it is possible that the change in noise would be perceptible, but noise levels will still be lower than the World Health Organisation criteria for onset of sleep disturbance. It is therefore concluded that the temporary noise change will not be significant.

5.8 PUBLIC HEALTH

The public health chapter within the Environmental Statement aims to address comments raised by during pre-application and scoping discussions with the Council. The chapter summarises the conclusions of the other chapters with regard to any possible impacts on public health.

A baseline community profile has been defined from publicly available data from Public Health England. In addition, project specific baseline environmental monitoring has been undertaken for a range of factors that have the potential to impact local communities, including noise, lighting, naturally occurring radiation, seismicity, flood risk, air quality, water quality and traffic.

A series of embedded mitigation bespoke to the project and location were subsequently identified and adopted as part of the project design to consider local circumstance and sensitivities for each stage of the proposed development.

Embedded mitigation exists in European and English legislation for the management of extractive waste from the prospecting for oil and gas and is subject to environmental permitting by the Environment Agency.

Monitoring of noise, air quality and water quality will be undertaken in accordance with schemes agreed by the relevant regulator and are inherently set to protect the environment and community health. Monitoring results will be made available for public view to demonstrate compliance and address community concerns.

A Community Liaison Group will be established for the duration of the project to provide a forum for dialogue between the Applicant and the local community, including on concerns around public health.

Following an assessment of all credible environmental health pathways directly attributable to the proposed development, potential impacts are categorised in a range from Neutral to Neutral/Slight and it is concluded that there will be no significant public health impact as a result of the proposed development.

5.9 SEISMICITY

The site is located in an area of low historic seismicity with only two earthquakes recorded in the British Geological Survey's catalogue within 20 km.

Hydraulic fracture stimulation aims to create a network of small fractures in the rock to enable the hydrocarbons to flow to the borehole. Microseismic events from the creation of these fractures can be detected by sensitive instruments but cannot be felt at the surface. Larger events resulting from the reactivation of existing faults and fractures, known as induced seismic events, may also be detected and these may on occasion also be felt at the surface.

Vibration at the surface as a result of any induced seismic event will be well below the level that may cause even cosmetic damage to the most sensitive properties.

Before hydraulic fracture stimulation operations can begin, a hydraulic fracture plan for each borehole must be approved by the Oil & Gas Authority. This plan will include details of system to be used to regulate the response to induced seismicity recorded as a result of hydraulic fracture stimulation.

With the controls contained in the hydraulic fracture plan in place, it is considered that induced seismicity will not have a significant effect on local properties, infrastructure or well integrity.

There is no mechanism for surface subsidence to result from the proposed hydraulic fracture stimulation operations.

5.10 TRAFFIC AND TRANSPORT

Aurora has commissioned an assessment that considers the traffic and transport impact of all phases of the proposed development.

All HGV vehicles will access the site using a specified route, turning north east from Lord Sefton Way onto Sutton's Lane and after approximately 220m turning north west onto private land where a new access track will be constructed. When exiting the wellsite, HGVs will use the same route.

All companies making deliveries to the site will be instructed on the designated route which will be strictly enforced. Temporary signs will ensure that the access route is clearly defined for all drivers. All sub-contractors will be provided with a summary of the traffic management requirements as part of their terms of engagement.

As far as possible, deliveries to the site would be scheduled to avoid peak traffic periods.

The impact of the increase in vehicle movements associated with the proposed development on severance (social impact on community), driver delay, pedestrian/cyclist delay and road safety is assessed to be not significant.

5.11 WASTE

The management of waste is regulated by the Environment Agency, through the issuing of environmental permits.

The Environmental Statement sets out how waste will be produced, managed on site and subsequently disposed of using the Waste Hierarchy of prevention, re-use, recycle, recover or disposal.

The assessment of impact associated with waste generated during the development considers the volume of each waste generated and compares the volumes against the receiving capacity of Environment Agency approved waste treatment facilities within Lancashire and the neighbouring counties.

Sufficient capacity to receive all wastes from the proposed development has been identified and accordingly, the assessment considers that waste from the proposed development will result in a negligible change to the existing baseline conditions.

5.12 WATER RESOURCES AND FLOOD RISK

The Altcar Moss site has been assessed for any likely significant effects relating to water including flood risk, impact on water resources and risks of surface or groundwater contamination.

The wellsite is designed to protect surface water and shallow groundwater and to manage runoff. Any contaminated water from bunded areas of the site will be removed by tanker to an Environment Agency-approved treatment works.

Surface water and groundwater monitoring will take place at the site to show that no contamination has occurred.

All water required for the hydraulic fracture operations will be sourced from the mains water network. This will not impact on the water supply to local residents.

Flood risk from surface water is considered very low, provided that surface water is managed appropriately. The Flood Risk Assessment for the site concludes that there would be no additional risk of flooding to neighbouring land or properties as a result of the proposed operations.

The assessment considers that the risks to water associated with all the phases of the proposed development are reduced to the lowest levels practically possible and are not significant in EIA terms.