Cuadrilla Bowland Ltd
Temporary Shale Gas Exploration
Preston New Road, Lancashire

Planning Statement
Exploration Works Planning Application

PNR_PL_Planning Statement-Exploration Works
May 2014
Contents

1 Introduction 3
  1.1 Overview 3
  1.2 The Applicant 3
  1.3 The planning application 4
  1.4 Related Applications 5

2 Background to the proposal 6
  2.1 The Bowland Shale formation 6
  2.2 Exploration activity in the Bowland 6
  2.3 Planning history of exploration works within the licence area 8
  2.4 A targeted approach to exploration 10
  2.5 Other consents and permits 12
  2.6 Pre-Application Consultation 13

3 The Site and surrounding area 15
  3.1 Site locations 15
  3.2 Surrounding area 15
  3.3 Existing land use 15
  3.4 Landscape and topography 16
  3.5 Access 16
  3.6 Ecological context 18
  3.7 Geological and hydrogeological context 19
  3.8 Drainage 20

4 Description of the proposed development 21
  4.1 Overview of the proposed development site 21
  4.2 Installation of the surface and buried seismic monitoring arrays (subject of a separate application) 26
  4.3 Construction of the well pad and access track 26
  4.4 Groundwater monitoring wells (subject of a separate application) 26
  4.5 Well pad construction 27
  4.6 Drilling 30
  4.7 Hydraulic Fracturing 35
  4.8 Initial flow testing 41
  4.9 Extended Flow Testing (EFT) 42
  4.10 Decommissioning and restoration 44
  4.11 Environmental management 44
  4.12 Timescales 45
5 Key benefits and the justification for natural gas from shale

5.1 Energy security 47
5.2 Government support and national strategy 50
5.3 Comprehensive regulatory framework 53
5.4 Local socio-economic impact at the exploration stage 54
5.5 Production phase benefits 55
5.6 Environmental impact and mitigation 57
5.7 Environmental Risk Assessment 64

6 Accordance with planning policy

6.1 Relevant policy and guidance 65
6.2 The NPPF and Sustainable Development 66
6.3 Sustainable Use of Minerals 66
6.4 Energy 68
6.5 Transport and Access 70
6.6 Land use and Agriculture 71
6.7 Economic development 73
6.8 Flood risk 74
6.9 Biodiversity – check headings 74
6.10 Landscape character 76
6.11 Pollution 77
6.12 Noise 79
6.13 Cultural heritage 80

7 Conclusion

7.1 Accordance with the statutory development plan, national and emerging policy 82
7.2 Other Material Considerations 86

Appendices

Appendix A
Site Search

Appendix B
How the Proposals Respond to the Recommendations of the Royal Society

Appendix C
Site Restoration Plan

Appendix D
Sustainability Appraisal
1 Introduction

1.1 Overview

This Planning Statement has been prepared by Arup to support a full planning application submitted by Cuadrilla Bowland Ltd, the Applicant, to carry out temporary exploration of shale gas reserves and extended flow testing at a site near to Little Plumpton, in the Fylde district of Lancashire. The Applicant needs to undertake these exploration activities to be able to determine whether or not the Bowland Shale can provide a commercially viable source of natural gas.

The planning application is submitted to Lancashire County Council (as mineral planning authority) under Section 57 of the Town and Country Planning Act 1990. The application is accompanied by an Environmental Statement (ES) as required by the Town and Country Planning (Environmental Impact Assessment) Regulations 2011. This Planning Statement does not form part of the ES, but does cross refer to the ES in order to demonstrate compliance with planning policy and guidance. The planning application seeks approval for:

“Construction and operation of a site for drilling up to four exploratory wells, hydraulic fracturing of the wells, testing for hydrocarbons, abandonment of the wells and restoration, including provision of an access road and access onto the highway, security fencing, lighting and other uses ancillary to the exploration activities, including the construction of a pipeline and a connection to the gas grid network and associated infrastructure to land to the north of Preston New Road, Little Plumpton.”

The purpose of this Planning Statement is to provide a clear understanding of the proposed development for shale gas exploration and extended flow testing at a site at Preston New Road, near Little Plumpton, in line with relevant planning policy and other material considerations. It includes a review of relevant national and local planning policies. These include the National Planning Policy Framework (NPPF) and supporting guidance (NPPG) and the statutory development plan including the Fylde Local Plan, the Lancashire Minerals and Waste Core Strategy and the Lancashire Site Allocation and Development Management DPD.

1.2 The Applicant

Cuadrilla Bowland Ltd is a UK company based in Staffordshire. The head office is at Cuadrilla House, Stowe Court, Stowe Street, Lichfield, Staffordshire, WS13 6AQ.

Cuadrilla Bowland Ltd is engaged in the exploration and production of hydrocarbons in the Lancashire area and holds a Petroleum Exploration and Development Licence (PEDL 165) granted by the Department of Energy and Climate Change (DECC). Cuadrilla (through an affiliate company) also hold licence EXL 269 for exploration and production in the Fylde. The proposed Preston New Road Site exploration works are located within both license area PEDL 165 and EXL 269. The licences give Cuadrilla Bowland Ltd the right to explore for subsurface hydrocarbons by physical means within the licence boundaries.
For the purpose of this Planning Statement Cuadrilla Bowland Ltd, the Applicant, will be referred to as “Cuadrilla”.

1.3 The planning application

This Planning Statement forms part of a suite of documents submitted with, and in support of, the planning application. The documents submitted comply with national information requirements\(^1\) and Lancashire County Council’s validation checklist\(^2\).

The “application site” in respect of the “Exploration Works” comprises of four elements:

1. The well pad area, including the bunding, drainage and fencing associated with the well pad. The exploration works will be undertaken from this area and are referred to within this Statement as the “Exploration Site” or sometimes the “Site”

2. The “access road” to the site from the A583.

3. The land required for pipelines and connections to the gas grid network, referred to as the “Extended Flow Test (EFT) Works”.

4. The “underground works” associated with the drilling of the lateral wells and the hydraulic fracturing and testing associated with these wells.

The following forms, documents and drawings have been submitted with the planning applications:

**Planning Application forms, certificates and notices**

- National application forms for onshore extraction of oil and gas.

**Drawings for the Exploration Works**

- Location Plan (PNR-EW-001) – a solid red line shows the extent of the exploration site area and the land required for the extended flow test connection. A dotted red line showing the maximum extent of the proposed underground works and the maximum area from which gas will be extracted is shaded red. A blue line shows other land in which Cuadrilla Bowland Ltd has an interest.

- Location Plan – Surface Works – (PNR-EW-002) – shows a more detailed plan of the site area with a red line boundary for the extent of the works for the exploration site and extended flow test.

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\(^1\) As set out in Articles 6(1) of the Town and Country Planning (Development Management Procedure) (England) Order (2010) (as amended) and the National Planning Policy Guidance relating to Minerals (an online resource), March 2014.

Site Parameter Plan — (PNR-EW-003) shows the maximum extent of the area (in terms of the length and width) within which equipment required for all stages of the exploration works within the red line boundary will be located.

Site Parameter Plan Section — (PNR-EW-004) shows the maximum extent of the area (in terms of height above ground) within which equipment required for all stages of the exploration works within the red line boundary will be located.

Indicative Layout and Sections Plans- showing the site at different stages of development:
- Indicative Layout (PNR-EW-100)- Construction,
- Indicative Sections (PNR-EW-101)- Construction,
- Indicative Layout (PNR-EW-102)- Drilling, initial flow testing and extended flow testing,
- Indicative Layout (PNR-EW-103)- Hydraulic Fracturing, initial flow testing and extended flow testing,
- Indicative Layout (PNR-EW-104)- Extended Flow Testing,
- Indicative Layout (PNR-EW-105)- Decommissioning and
- Indicative Layout (PNR-EW-106)- Restoration

Documents
- Environmental Statement (ES) with Technical Appendices, including a framework for Environmental Operating Standards.
- Flood Risk Assessment
- Utilities Statement
- Statement of Community Involvement

1.4 Related Application
The “Exploration Works” application has been submitted alongside a related application, the “Monitoring Works” application.

The “Monitoring Works” application seeks approval for “the construction, operation and restoration of two seismic monitoring arrays comprising of 80 buried seismic monitoring stations and 10 surface seismic monitoring stations. The seismic monitoring stations will comprise underground installation of seismicity sensors; enclosed equipment and fenced enclosures. The surface array will also comprise monitoring cabinets. The application is also for the drilling of three boreholes, each installed with 2 monitoring wells, to monitor groundwater and ground gas, including fencing at the perimeter of the Preston New Road Exploration Site.”

A single ES has been submitted to cover both applications and assesses the environmental impacts of the proposals at the Preston New Road Site, including the exploration site and access, extended flow test works, the seismic arrays and the ground water and gas monitoring wells. All these elements associated with the exploration proposals for Preston New Road, including the below ground operations, are referred as the “Project” in this Statement. The findings of the environmental impact assessment (EIA) are presented in a way to allow for the environmental effects and proposed mitigation measures to be identified for all of these elements.
2 Background to the proposal

This section provides an overview of the background to the proposals which are the subject of the planning application.

2.1 The Bowland Shale formation

The Bowland Shale formation comprises what is commonly known as “shale gas” reservoirs where methane gas (or natural gas) is widely distributed within the shale. The gas is trapped within the shale rock and requires stimulation (hydraulic fracturing) to help the gas flow out of the rock and into wells drilled into the shale.

Cuadrilla needs to explore the potential flow rate of gas from the Bowland Shale formation to establish whether the gas can be extracted and whether it is economical to do so. Exploration initially involves construction of a well site and drilling the wells, taking geological samples, followed by hydraulic fracturing and testing. The testing will enable Cuadrilla to establish the rates of flow of natural gas from the shale rock and assess its economic viability.

The site will be abandoned and restored in accordance with this application unless the site is found to be economically viable as a gas production site and planning permission is subsequently secured for production works.

2.2 Exploration activity in the Bowland

The licence area and existing sites

The Department of Energy and Climate Change (DECC) issues Petroleum Exploration and Development Licences (PEDL) to oil and gas companies. The licences confer rights to the licenced oil and gas companies to pursue a range of oil and gas exploration activities and to “search for, bore and get hydrocarbons” within the geographical area covered by the licence. The licences do not confer any exemptions from other legal or regulatory requirements, such as the need to obtain consents for drilling and exploration activities, planning permission, landowner rights and health and safety approvals.

The Preston New Road project (both above and below ground elements) falls within licence areas PEDL 165 and EXL 269, as shown on figure 1. Cuadrilla’s other proposed exploration project at Roseacre Wood also falls within these two licence areas.
Figure 1: Exploration Licence Area and Cuadrilla’s Proposed Sites

Cuadrilla Elswick Ltd owns and operates an existing gas production facility at Elswick operated under licence (EXL 269). In addition there have been a number of other exploration sites where permission has been obtained and sites have been developed for exploration within the two licence areas. Table 1 below provides a summary of the status of Cuadrilla’s (and affiliated companies) existing sites in Lancashire.
2.3 Planning history of exploration works within the licence area

Following the granting of planning permission exploration for shale gas has been undertaken at a number of sites in Lancashire, including hydraulic fracturing at one of the sites (Preese Hall). The details of these permissions and exploration activity are set out in the table below.

Table 1: Planning history for exploration by Cuadrilla in Cuadrilla's licence areas

<table>
<thead>
<tr>
<th>Name and Address of Site</th>
<th>Planning Application and Permissions</th>
<th>Description of Proposal / activity undertaken</th>
<th>Current Planning Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land at Grange Road</td>
<td>Permission (05/10/0091) was granted on 21st April 2010 for exploration: On 20th December 2011 an application (05/12/0003) was submitted to vary condition 2 of the planning permission to extend the time limit for the completion of development from 18 months to 36 months. On 4th July 2012 a request was made to change the application to extend the time period to 20th May 2014.</td>
<td>Permission for temporary change of use from agriculture to site for drilling an exploratory borehole and testing for hydrocarbons including construction of a drilling platform and highways access point. Drilling activity commenced on 15th January 2011 and was completed by 13th May 2011. The site was not hydraulically fractured.</td>
<td>Application submitted on 16th May for seismic monitoring and pressure monitoring at the site.</td>
</tr>
<tr>
<td>Land at Anna’s Road, Westby, Fylde West</td>
<td>Permission was granted on 19th November 2010 (Ref 05/10/634) for exploration. Two planning applications were submitted, one for a time extension for a vertical well application (Ref 05/12/0729); and one to horizontally drill off the vertical borehole (Ref 05/13/0021). A request was made in December 2013 to extend the time period for restoration to 31st July 2014.</td>
<td>Permission for temporary change of use from agriculture to site for drilling an exploratory borehole and testing for hydrocarbons including construction of a drilling platform and highway access point. The site was drilled although not hydraulically fractured.</td>
<td>The time extension application was approved on 26th Feb 2014 to extend the timescales for completion of development and restoration of the site to 31st July 2014. The application for horizontal drilling has been withdrawn.</td>
</tr>
<tr>
<td>Banks Enclosed Marsh, Beccsall, West Lancs</td>
<td>Permission was granted on 21st October 2010 (Ref 8/10/0973) for</td>
<td>Planning permission for temporary change of use from agriculture to site for drilling an exploratory borehole &amp; testing for hydrocarbons</td>
<td>Application 02/12/1032 was not determined. Application</td>
</tr>
<tr>
<td>Location</td>
<td>Activity Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>North.</td>
<td>An application was submitted (Ref 08/12/1032) for a time extension to diagnostically test the shale from the borehole that has been drilled. Including construction of a drilling platform. The site compound has been constructed and a borehole drilled. No hydraulic fracturing activities have been undertaken. Registered on 28th March 2014 for pressure testing on the same site. (LCC/2014/0047).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preese Hall Farm, Weeton, Fylde West.</td>
<td>Permission was granted on 2nd November 2009 (Ref 05/09/0572) for exploration. Planning permission granted on 23rd January 2013 to vary condition 2 of permission 05/09/0572 to extend the time for the restoration of the site to 31st December 2013. (Ref 05/11/0431) Planning permission for temporary change of use from agriculture to construction of a drilling platform, upgrade of farm track and removal of hedges to create one of three passing places drilling of exploratory borehole and testing for hydrocarbons. This site was hydraulically fractured by Cuadrilla in spring 2011. The time extension application was approved on 26th Feb to extend the timescales for completion of development and restoration of the site to 31st July 2014.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land at HM Kirkham Prison, Freckleton, Fylde East.</td>
<td>Permission was granted on 15th June 2010 (Ref 5/01/0685) for exploration. Subsequent time extensions were granted in 2007 (Ref 5/07/0333) and June 2010 (Ref 5/10/0184). Permission was secured for mineral exploration operations associated with the construction of an exploration drilling site, mobilisation of drilling rig, setting up and drilling of exploration well, testing any discovered hydrocarbon bearing horizons and the completion and suspension of the well. The planning permission was not implemented and has now expired. Further planning permission would be required for further exploration activity on the site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land North of Hale Hall Farm, Wharles, Fylde East.</td>
<td>Permission was granted on 3rd March 2010 (Ref 5/9/0813) for exploration. Planning permission granted for temporary change of use from agricultural to site for drilling an exploratory borehole and testing for hydrocarbons, including construction of a drilling platform upgrade existing sewer works access and track. The planning permission has not been implemented and has now expired. Further planning permission would be required for further exploration activity on the site.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted development works – seismic arrays</td>
<td>Prior approval process to allow the installation of a seismic array. Cuadrilla has installed a series of shallow boreholes to house seismic monitoring equipment related to the operations at Anna’s Road and Beccsall. The planning permission has not been implemented and has now expired. Further planning permission would be required for further exploration activity on the site.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A moratorium on fracturing was initiated in May 2011 following two seismic tremors in the Blackpool area during 2011, associated with the Preese Hall site. The moratorium was lifted by the Secretary of State for DECC in December 2012. However since the date of the moratorium there has been no further exploration involving hydraulic fracturing within Cuadrilla’s licence area, in relation to the applications referred to in the table above.
2.4 A targeted approach to exploration

Following the moratorium on fracturing, Cuadrilla has undertaken more detailed geological investigations to help identify new exploration sites as described below.

Geophysical 3D Seismic survey

A 3-dimensional (3D) geophysical seismic survey was undertaken over an area of approximately 100 km², to better identify the locations of geological faults and potentially workable strata (see Figure 2). The 3D survey was completed in June 2012. Using advanced imaging technology, the seismic survey mapped the layers of rock in the area to depths in excess of 4km, significantly improving the knowledge of subsurface geology. The 3D seismic survey findings, combined with information from earlier drilling and other relevant data, have helped Cuadrilla to identify the most promising areas within the Bowland shale for this phase of exploration activity.
Figure 2  Extent of the 3D Seismic survey area (note that the Thistleton and Hesketh sites shown on this plan relate to sites previously operated by other exploration companies)

Site search

Environmental information combined with the findings of the 3D survey has been used as part of a comprehensive site search process to identify suitable sites for exploration (as described in Appendix A).

New exploration sites

Cuadrilla is proposing two new exploration sites within the Fylde area relating to Licence areas EXL 269 and PEDL 165. These are Preston New Road (the site which is the subject of this Planning Statement) and another site at Roseacre Wood (which is subject to a separate application), as shown on Figure 1 above.
2.5 Other consents and permits

The UK has a strict regulatory framework governing offshore and onshore oil and gas exploration and production. Any associated risks with shale exploration are heavily regulated and closely scrutinised by the relevant independent bodies.

In addition to obtaining planning permissions, a variety of consents and permits will also be required before different operational stages of the project can proceed (e.g. drilling and hydraulic fracturing). These are determined by regulatory regimes outside of the planning system.

Cuadrilla has been working closely with the regulators, The Department of Energy and Climate Change (DECC), the Health and Safety Executive (HSE) and the Environment Agency (EA), and Cuadrilla will comply with the requirements of these bodies. These include the requirements established by the Environment Agency under the Environmental Permitting Regulations 2010 (as amended). The Environment Agency, together with other regulatory bodies, have powers to impose conditions, halt operations, or require amendments if they are not satisfied with the proposals or operations. As the scheme progresses, the need for further consents and permits may change as a result of consultation with the appropriate authorities and changes in legislation or Government policy.

The principal consents and licences that are required from other bodies (in addition to planning permission from LCC) are set out in Table 2.

Table 2: Regulatory permissions and notifications for exploration works at the Preston New Road Site.

<table>
<thead>
<tr>
<th>Permission</th>
<th>Comments</th>
<th>Agency</th>
<th>Submission Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Permitting Regulations 2010 (as amended) Schedule 22</td>
<td>Permit required to cover the unlikely possibility of indirect discharge of hydraulic fracturing fluid into a groundwater unit.</td>
<td>Environment Agency</td>
<td>May/ June 2014</td>
</tr>
<tr>
<td>Environmental Permitting Regulations 2010 (as amended) Schedule 20</td>
<td>Permit required for managing extractive wastes which are defined under the Mining Waste Directive.</td>
<td>Environment Agency</td>
<td>May/ June 2014</td>
</tr>
<tr>
<td>Environmental Permitting Regulations 2010 (as amended) Schedule 23</td>
<td>Permit required for the temporary accumulation and disposal of flowback fluid and soil waste containing Naturally Occurring Radioactive Material.</td>
<td>Environment Agency</td>
<td>May/ June 2014</td>
</tr>
<tr>
<td>Environmental Permitting Regulations 2010 (as amended) Schedule 13</td>
<td>Permit required for the incineration (flaring) of hazardous waste (natural gas) greater than 10 tonnes per day.</td>
<td>Environment Agency</td>
<td>May/ June 2014</td>
</tr>
</tbody>
</table>
2.6 Pre-Application Consultation

Cuadrilla’s pre-application consultation process has been undertaken in accordance with best practice and Government guidance. Extensive consultation with a large number of stakeholders and the local community has been undertaken. This engagement has sought to encourage dialogue through an open and transparent process. The feedback received has influenced and improved the approach to the design of the sites, the technical work, assessments undertaken and the mitigation proposed.

The Statement of Community Involvement (SCI), submitted with the planning application describes the four key stages of consultation: the first two stages relating to general context and overview of the Shale Gas Exploration Project, including the project wide Environmental Risk Assessment work, and the next two stages relating to the technical work associated with the two new exploration sites.

The SCI also describes the other consultation and engagement activities that have been undertaken, including the engagement with key bodies and organisations (including both statutory and non-statutory bodies, Parish Councils and local politicians).

Other consultation tools and techniques were run in parallel with the exhibitions and events. This included a project website, use of a collaborative mapping tool, phone line and email communication and establishment of a Community Liaison Group. Again these tools and techniques and the feedback received are reported in the SCI.

The key findings from the consultation activities and how they have influenced and shaped proposals for the Preston New Road site and informed the technical work (such as the Environmental Impact Assessment) are also described in the
SCI. The SCI concludes that the consultation has resulted in a number of changes to the design of the site and the activities to be undertaken on the site in order to mitigate and reduce the impact of the project on local residents and the environment.
3 The Site and surrounding area

3.1 Site locations

The Preston New Road application site is located on agricultural land, with the A583 immediately to the south. The Exploration Site is currently an undeveloped greenfield site used for agricultural production and can only be reached by crossing fields.

The Exploration Site is located between Blackpool and Kirkham and is situated approximately 500 m west of the village of Little Plumpton and around one kilometre west of the village of Great Plumpton.

The Exploration Site is located between Moss House Lane and Preston New Road (A583). It is approximately two kilometres east of the M55/Preston New Road junction (Junction 4). The national grid reference for the centre of the proposed well pad is E337408, N432740. The wider context of the site is shown in Figure 2 above and Figure 4 below.

3.2 Surrounding area

The nearest residential properties are those located along Preston New Road to the south, Moss House Lane to the north and west, and Plumpton Lane to the east. Carr Bridge Brook runs westward 200m north of the Site. A number of small wooded areas and ponds are located in the vicinity.

Moss House Farm is located approximately 800m to the north-west of the Exploration Site, on the northern side of Moss House Lane.

About 240 metres to the south-west of the Exploration Site is Staining Wood Farm. A number of residential properties are located approximately 500m to the south east of the Site in the village of Little Plumpton and 900m to the east in the village of Great Plumpton. Another residential area is situated approximately 1,200m to the west at Carr Bridge.

3.3 Existing land use

The area where the well pad, access track and connection to the gas grid will be located is currently an undeveloped greenfield site used for agricultural activities.

The Exploration Site and access, extends to approximately 2.65 hectares (ha) and are located within a parcel of agricultural land of around 7.2 ha. The extended flow test pipeline and grid connection relates to an area of land of approximately 4.69 hectares, also entirely within agricultural land and bounded by the Preston New Road to the south. The total site area surface works is 7.34ha and the total area within which the below ground works will be located is 562ha.

There is a single farming interest associated with the land affected by the proposed development. This is a substantial, family based interest whose land holding extends to approximately 162ha. Approximately 65 per cent of the holding is owner-occupied, including the area affected by the proposed development. The holding is a grassland unit and engaged in dairying.
### 3.4 Landscape and topography

The site is surrounded by a combination of cow and sheep pasture and arable fields (see figure 3). Field boundaries are a combination of well-managed or poorly managed native hedgerows and timber and wire fencing. Hedgerow trees are largely absent in proximity to the Exploration Site, but mature trees are found in association with farmsteads, individual properties and along transport routes. The main deciduous woodland blocks visually prominent in the surrounding landscape are Staining Wood and Humber Wood to the south of the A583 Preston New Road, the woodland block to the southwest of Mossfield, Great Plumpton and the small triangular woodland block approximately 400m northwest of the Exploration Site adjacent to Carr Bridge Brook.

The topography around the application site is generally gently undulating and slopes towards the Carr Bridge Brook shallow valley which lies just to the north of the Site. At a height of 12-14m Above Ordinance Datum (AOD) the Exploration Site is on sloping ground between the A583 Preston New Road and Carr Bridge Brook. The land rises to the east and northeast either side of the shallow valley to approximately 25m AOD at Little Plumpton and 35m AOD at Great Plumpton. The land does not rise any higher than this within a 5km radius. Numerous field ponds and drainage ditches following field boundaries are evident in the surrounding area.

There are no areas designated for their landscape value (such as National Parks, Areas of Outstanding Natural Beauty or Registered Historic Parks and Gardens) within a 5km radius of the Exploration Site.

Figure 3: Views of the Preston New Road site and land required for the Extended Flow Test (taken from opposite Staining Wood Farm – looking north)

### 3.5 Access

To the south of the application site is Preston New Road, which is an A classified single carriageway road with road markings and a footway on one side and dedicated cycle lanes to each side. At its eastern end, Preston New Road connects to Preston. To the west of the site Preston New Road heads north, forming
Junction 4 of the M55. Preston New Road connects into Blackpool Town Centre becoming Whitegate Drive. The M55 motorway runs east-west at an approximate distance of 1km north of the site. The fields adjacent to the application site are surrounded by Moss House Lane to the north and west, and Plumpton Lane to the east.

The Exploration Site would be accessed by the A583 Preston New Road through the creation of a new access point, located half way between Humber Wood and buildings associated with Staining Wood Farm. Access to the land required to make the connection to the gas grid network for the extended flow test would also be from the A583 although approximately 800 metres west of the site access. Figure 4 shows the principal roads and public rights of way in proximity to the Site.

Figure 4: Principal Roads and Public Rights of Way

There are no National Trails (footpaths) or Long Distance Paths within 5km of the Exploration Site. The National Cycle Route 90, known as the Northern Loop, passes through the village of Great Plumpton at a distance of 1km from the Exploration Site.

The area surrounding the site has a reasonable level of provision of public rights of way (PRoW) throughout although connectivity of the network in the vicinity of the site is limited. There are no PRoW within 1km of the proposed well pad with the nearest being FP7 approximately 1.5km to the north of the well pad, on the other side of the M55.
3.6 Ecological context

An extended Phase 1 Habitat Survey and Species survey has been undertaken of land within the site and surrounding area, which provides a detailed account of the habitats and wildlife within the area.

The majority of habitat located within and surrounding the site comprises improved grassland either grazed by cattle or recently sown with an improved grassland seed mix, and are considered to be of low ecological value. A triangle of woodland is located approximately 400m to the north of the Exploration Site. An area of broadleaved woodland also exists to the south of the Site. The two woodland copeses are a moderate example of UK Biodiversity Action Plan (BAP) (low deciduous woodland) and Lancashire BAP (broadleaved and mixed woodland) priority habitat.

The majority of hedgerows identified within the area are intact relatively species-poor hedgerows dominated by hawthorn with occasional blackthorn, elder and wych elm. Narrow bands of tall ruderal herbs and rank grasses were identified along field boundaries and field drains. The pipeline route for the EFT runs through two field boundaries. Eight waterbodies were scattered around the arable and pasture farmland surrounding the site. None of the water bodies are located within the site boundaries.

It is reasonable to expect bats to use the land in the immediate vicinity of the application site, with sheltering features along field boundaries providing foraging sources for bats. However, surveys have also confirmed that there is no evidence to suggest that bats are roosting within the 3km radius surrounding the site.

All of the waterbodies located within the surrounding area were identified as sub-optimal in relation to breeding great crested newts, and the habitats identified within and surrounding the sites were also deemed as being of negligible value for terrestrial great crested newts.

No badger setts or signs were identified within the application site or within a 250m radius and there were also no signs of water voles within the surrounding area. In addition, no areas of suitable habitat for reptiles were identified.

In relation to breeding bird species, a number of notable species (i.e. Lancashire BAP provisional long list species) were identified in the area surrounding the site. However the 25 wintering bird surveys completed in 2013/2014 did not observe any wintering birds within the field that the development is to be located. The survey identified low numbers of species such as pink foot geese and whooper swan in the local area (this excluded one day when a large flock landed in the local area for a short period due to shooting in the local area). It was therefore, concluded that the surrounding area is not of significant value to wintering birds and no evidence was found to suggest that the surrounding fields had a functional link to the Special Protection Areas (SPAs).

There are no statutory designated ecological sites within the site boundaries or within a 3km radius. There is one statutory designation within a 5km radius surrounding the Exploration Site: - Marton Mere, Blackpool Site of Special Scientific Interest (SSSI) (and Local Nature Reserve (LNR)) located 3.2km north-west of the Exploration Site.
No non-statutory designations are located within the application site boundary and there are none within a 1km radius surrounding the site. Five Biological Heritage Sites (BHS) are located between a 1km to 3km radius surrounding the Exploration Site.

### 3.7 Cultural heritage

There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Registered Battlefields, Listed Buildings or Conservation Areas within 1km of the Exploration Site.

There are 34 Listed Buildings within a 5km radius of the Exploration Site. With the exception of Lytham Hall (Grade I) and an associated dovecote (Grade II*), all of the listed buildings within the 5km radius of the Site are Grade II. There are no listed buildings within 1km radius of the Exploration Site and the nearest listed buildings are:

- A grade II listed garage to the west of Westby House at approximately 1.1 kilometres
- Grade II listed Church of St Michaels at approximately 1.3 kilometres
- A residential property known as the White House at approximately 1.3 kilometres

Two Conservation Areas fall within the wider study area St Anne’s Road East, 4.5 kms south west of the Site and Wrea Green 2.3 km to the south east. Lytham Hall Gardens (Grade II Registered Park) falls partly within the 5km radius from the Exploration Site.

There is a slight possibility that hitherto unknown prehistoric assets, most probably of Bronze Age date, might be encountered within the footprint of the Site. Remains, if encountered, are likely to take the form of artefact scatters. Assets of this type would be of local interest, likely to survive in a partially fragmented state and be overall of low heritage value.

### 3.8 Geological and hydrogeological context

The principal characteristics of the geology of below the site are listed below.

- **Superficial deposits**, which are generally clay-rich and include some local water-bearing sand and gravel deposits that can support small scale groundwater abstraction. These deposits may also locally interact with wetlands and watercourses. The Environment Agency defines these superficial sand and gravel deposits as ‘Secondary A’ aquifers.
- **Underlying the superficial deposits**, the Mercia Mudstone Group, that comprises a thick unit of generally low permeability. The Mercia Mudstone Group is defined by the Environment Agency as a Secondary B Aquifer, but in this area it is not used and has no potential as a source of groundwater supply due to its hydraulic properties.
- **The Sherwood Sandstone Group**, which underlies the Mercia Mudstone Group, defined by the Environment Agency as a Principal Aquifer, however in the Fylde Peninsula (west of the Woodsfold Fault) the Sherwood Sandstone is
not used as a source of supply and contains saline groundwater of non-potable quality.

- The Manchester Marls at over 1.1km below ground level, which locally forms a seal to the underlying hydrocarbon bearing geological units.
- The Collyhurst Sandstone and Millstone Grit between 1.25 km to 1.5 km below ground level.
- The Bowland Shale and Hodder Mudstone, where hydraulic fracturing is proposed, located at depths of over 1.5 km below ground level.

3.9 Drainage

The two main rivers of the Fylde Peninsula are the River Ribble in the south and the River Wyre in the north, both of which flow westwards to the coast. The general area surrounding the Site includes a network of open agricultural drainage ditches that drain towards the north and west towards Carr Bridge Brook which is located approximately 200m north of the application site. Carr Bridge Brook flows west discharging into a Main Drain, which in turn discharges into the Ribble Estuary 6km south of the application site, and ultimately into the River Ribble south of the site at Lytham. There are several small ponds located around the site, and these (in addition to the drains) are likely to be used for drinking water by livestock and possibly as a source of local irrigation.

According to the Environment Agency Flood Map, the site lies outside of the floodplain and is located within Flood Zone 1 (Low probability) which indicates that the probability of fluvial flooding each year is less than 0.1% (1 in 1000) from the nearby watercourses.
4 Description of the proposed development

The exploration proposals for Preston New Road are the subject of two planning applications:

1. The exploration activities on the well pad site, underground activity associated with the drilling of the wells and the hydraulic fracturing, the initial flow testing and (if required) extended flow testing of the wells, including pipelines and connections to the gas grid for the extended flow testing (the “Exploration Works”); and

2. The seismic array to be positioned around the Site and monitoring wells for groundwater and ground gas (the “Monitoring Works”).

This section describes the proposals focusing on those works and activities that form part of this planning application for the Exploration Works. The ES provides a more detailed description of the proposals.

Further details of the seismic array and the monitoring boreholes can be found in a separate Planning Statement submitted in support of the “Monitoring Works” application, but are highlighted in italics in the section below to assist in the understanding of the Project.

4.1 Overview of the proposed development site

The total area of the surface works is 7.34 ha, of which 1.55 ha is a compacted crushed stone surfaced well pad from which the drilling, hydraulic fracturing and flow testing activities will be undertaken. A 173 m access track will also be constructed (area approximately 0.26 ha). The remainder of the application site will consist of surface water collection ditches, landscaped bunds (from topsoil and subsoil excavated during construction of the well pad) and fencing and the land required for the extended flow test pipeline and connection.

*Three pairs of groundwater monitoring wells will be installed around the perimeter of the well pad to a maximum depth of approximately 20-30 m.*

*In addition to the works described above 80 buried seismometer array points will be installed (up to 100 m below ground level) and 10 surface seismometer array points will also be installed in shallow pits (approximately 0.8 m below ground level).*

Up to four exploration wells will be drilled and tested from this well pad during the Project. The overall process is summarised in Table 3 and the activities are described in more detail in the subsequent sections of this chapter and illustrated in Figure 5.

Cuadrilla has developed several documents which describe a management framework to control operations that are safe and to minimise environmental impacts. Cuadrilla’s Health, Safety, Security and Environment (HSSE) Risk Management Framework provide the framework to effectively manage operational risks. Site operational health and safety will comply with the provisions of the Borehole Sites and Operations Regulations 1995 (BSOR), and the implementation of the site health and safety procedures, record keeping, monitoring and auditing will be regulated by Health and Safety Executive (HSE). Cuadrilla has also developed Environmental Operating Standards (EOS) to outline
the environmental embedded and site specific mitigation measures during site operations. These standards document Cuadrilla’s commitment to safeguarding human health and the environment. A document that sets out their rationale and how they will be implemented when consent is granted can be found in Appendix E of the Environmental Statement.

Table 3: Summary of the main elements of the Project.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install surface seismometer and buried</td>
<td>The surface array of up to ten sensitive surface seismometers and the 80 buried array seismometers and related devices will be installed, to monitor ground conditions and manage the seismic Traffic Light System (TLS). These two arrays will be installed so that baseline data can be collected before hydraulic fracturing occurs so that any effects of the subsequent hydraulic fracturing activities can be monitored. A separate planning application has been submitted for the arrays (the Monitoring Works Application).</td>
</tr>
<tr>
<td>seismometer and buried seismometer arrays.</td>
<td></td>
</tr>
<tr>
<td>Installation of the groundwater quality</td>
<td>Three pairs of groundwater monitoring wells will also be installed around the perimeter of the well pad. These also form part of the Monitoring Works Application.</td>
</tr>
<tr>
<td>monitoring wells.</td>
<td></td>
</tr>
<tr>
<td>Construct well pad and access track.</td>
<td>It is anticipated that it will take up to two months to construct the exploration well pad, drilling cellars, conductor casing, access track, fencing, and installation of the mains water connection (for site staff welfare, drilling and hydraulic fracturing activities).</td>
</tr>
<tr>
<td>Drill vertical section of Well 1.</td>
<td>The first well to be drilled will be a vertical well to a depth of approximately 3,500m below ground level. This well will provide data on the specific geology below the Site. From this data the target zones in the shale for horizontal wells will be identified.</td>
</tr>
<tr>
<td>Drill horizontal section of Well 1.</td>
<td>A horizontal well may be drilled laterally from the vertical section of Well 1 at between 1500-3500 m depth below the surface (the exact level to be determined). This could extend 2000m horizontally from the drilling cellar.</td>
</tr>
<tr>
<td>Hydraulic fracturing.</td>
<td>The vertical or horizontal sections of Well 1 will be hydraulically fractured to create a network of minute cracks within the shale. Hydraulic fracturing will be carried out in a number of stages along the well. Hydraulic fracturing will occur within the horizontal sections of Wells 2, 3 and 4.</td>
</tr>
<tr>
<td>Initial Flow Testing.</td>
<td>Natural gas and flowback fluid from the hydraulically fractured well will be tested for a period of 90 days) to establish the flow rates of gas and liquid, and confirm the chemical composition of both. The initial flow test will involve burning the gas in two flares located within the boundary of the Site. Natural gas produced during the initial flow test will be flared in accordance with the DECC consent to flare gas. Flowback fluid, separated in a closed separation system from the natural gas, will be transported off site to an Environment Agency permitted treatment centre for treatment and disposal. It is likely that flow testing and hydraulic fracturing activities will run in parallel providing there is sufficient gas flows from the well.</td>
</tr>
<tr>
<td>Constructing connection to the gas grid for</td>
<td>If the quantity and flow rate of natural gas from the initial flow test is sufficient, equipment required to connect the wells to the national gas grid will be constructed and installed. Two gas pipelines will be constructed from the well to existing gas grid pipelines.</td>
</tr>
<tr>
<td>Extended Flow Testing.</td>
<td></td>
</tr>
<tr>
<td>Extended Flow Testing (EFT).</td>
<td>Extended Flow Test could last between 18-24 months per well. Natural gas produced during this stage will not be flared. Instead, it would be treated and piped into the gas grid.</td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>Drill Horizontal Wells 2, 3 and 4. Hydraulically fracture and flow test.</td>
<td>The next well (2) will be drilled vertically from the surface of the well pad to a level within the shale, from where drilling would be continued horizontally. This will be repeated for Horizontal Wells 3 and 4. Each of these horizontal wells will then be hydraulically fractured and flow tested (as described above for Horizontal Well 1). Likewise, if the flow of gas is sufficient the well may be subject to further Extended Flow Testing (as describe above for Horizontal Well 1), with natural gas produced being fed into the gas grid.</td>
</tr>
<tr>
<td>Decommissioning and site restoration.</td>
<td>Following completion of the exploratory drilling, hydraulic fracturing and flow testing work, the Site would either be restored to its original condition (restoration) and the wells plugged and abandoned, or an application to undertake shale gas production activities prepared and submitted LCC. If the wells are no longer required they would be plugged, abandoned and monitored in accordance with the legislation applicable at that point in time.</td>
</tr>
</tbody>
</table>
Surface works and below ground works

The exploration activities can be split into surface works and below ground works. The surface works include construction and operation and restoration of the well pad, access track and, in due course, any infrastructure required to connect the Site to the gas grid during EFT. The likely maximum extent of the surface works is illustrated in Figure 6.

The below ground works include the vertical and horizontal wells plus the extent of new fractures in the rock. At this point in time the proposed alignment of the horizontal sections of the wells is not known as this is dependent on results from geological data from vertical Well 1. Figure 7 shows the area in which the horizontal wells will be located and encompasses the fractures that will be created.
Figure 6: Extent of the surface works for the Exploration Works.

Figure 7: Maximum extent of the below ground works

(Contains Ordnance Survey data © Crown copyright and database right 2014) (Not to scale)
4.2 Installation of the surface and buried seismic monitoring arrays (subject of a separate application)

As noted in section 4.1, two seismic monitoring arrays will be implemented as part of the Project. The seismic events induced by hydraulic fracturing do not typically exceed magnitude 0 $M_L$ and very rarely exceed 0.5 $M_L$. Data from the surface array will be used to mitigate the level of induced seismicity from hydraulic fracturing operations so that they are below 1.5 $M_L$ (this is a level of magnitude that will not damage buildings or infrastructure and is unlikely to be felt by people). The buried array will provide data on the location, extent and direction of the fractures that occur within the shale rock during hydraulic fracturing. This will allow the hydraulic fracturing process to be refined throughout the hydraulic fracturing activities.

4.3 Construction of the well pad and access track

Equipment

To construct the well pad general earth working equipment will be used. In addition to this the following equipment will be present:

- Truck mounted drilling rig to drill the shallow section of the conductor casing;
- Well drilling rig (for groundwater monitoring wells); and
- Site welfare facilities for construction staff

4.4 Groundwater monitoring wells (subject of a separate application)

Groundwater monitoring wells will be constructed within the Site fence line but outside of the impermeable liner and drainage ditches. The boreholes will allow groundwater quality and ground gas data to be collected prior to, during, and post-exploration.

The three pairs of monitoring wells would be installed around the well pad to a maximum depth of approximately 30m, using a small drilling rig, typically used for site investigation or water well drilling purposes. The first borehole would be drilled to prove the top of the Mercia Mudstone and to understand the superficial geological sequence. The monitoring installations will comprise, in each borehole, one standpipe in the deeper granular glacial deposits and a second in the shallower superficial deposits.

The detailed monitoring scope and reporting procedures would be agreed with the regulators in advance. It would comprise a period of baseline monitoring prior to drilling the shale gas exploratory wells, as well as monitoring throughout drilling, fracturing and flow testing and for an agreed period following abandonment. Continuous monitoring devices that record groundwater quality and gas concentrations in the monitoring wells regularly (e.g. hourly) are likely to be deployed, with periodic sampling and laboratory analysis. Monitoring would be undertaken by a specialist contractor for Cuadrilla.
4.5 **Well pad construction**

**Security**

The Exploration Site and access road will be secured by a 4m high welded mesh security fence. Additional fencing will be installed within the well pad area to help demarcate areas. Security lighting will be installed, and access to the Site will be controlled via a gated entrance onto Preston New Road. A small cabin will be provided on the well pad for security personnel who will actively patrol the Site. CCTV will also be installed at strategic points of the Site.

**Well pad construction**

The well pad will be constructed with a minimum depth of 300mm clean, compacted aggregate laid on an impermeable membrane and geotextile layer with protective felt inter-layers, or similar impervious profile.

Four drilling cellars will be constructed at between 5 and 25m spacings. These will comprise voids of about 3 metres in width and depth, with concrete walls and floor. Each exploration well will be drilled from the base of an individual drilling cellar.

Surface water run-off drainage and attenuation will be provided by a perimeter ditch system, a pollution interceptor and isolation valve so that the well pad can be isolated from the adjacent surface water ditches.

Figure 8 shows the layout of the prepared site before any operational activity commences and Figures 9-10 relate to sections showing boundary treatment.
Figure 8 Well pad design

Figure 9: Wellpad design (cross section A-A)
Utility connections

Mains water required by the Project will be drawn via a 150mm diameter pipe from a United Utilities mains located adjacent to the Site. All foul sewage will be collected and contained on the Site, in pre-fabricated toilet and mess room facilities. Foul sewage will be removed from the Site by tanker by registered waste contractors. Electricity requirements will be provided by on-site diesel-powered generators. Small power (mains electricity) and telecommunication connections may also be provided to the offices and welfare facilities at the Site.

Access

The Site will be accessed via the nearby A583 road and M55 motorway (see figure 11). The entrance to the Site will be located to the east of the existing lay-by approximately 2.2km along the A583 from Junction 4 of the M55. Provision is also made for access to a gas grid compound at the connection point to the gas grid.

The Site will be entered through a new opening in the hedgerow on the A583. A wide entrance will be created to allow for the passing of two heavy goods vehicles (HGVs) to avoid waiting and blocking of the main highway. A new track will be constructed to the site which will be surfaced appropriately to withstand HGV traffic. Potential mitigation measures, including traffic management proposals, to reduce the impact of additional HGVs traffic along the proposed HGV transport route are set out in Chapter 18 of the ES.
Figure 11 Proposed route from the Site to the M55

4.6 Drilling

Equipment

The equipment required to undertake drilling will be brought to the Site by HGVs, and will include:

- Plant and equipment specific to the drilling unit used, including a mast with an erected height of between 30m and up to 53m;
- 40ft ‘shipping containers’ for storage of equipment, workshops, and modules for office, welfare and onsite accommodation (single storey height; shipping containers not stacked double height);
- Cranes to assemble the drilling rig and other equipment;
- Drilling mud logging equipment;
- Well cementing equipment;
- Wireline logging equipment;
- Drilling materials and fluids; and
- Casings and tubulars.

The equipment mobilisation period for the drilling stage will typically last for two weeks. The approach to assessing traffic impacts from the equipment mobilisation is discussed in Chapter 18 of the ES. An illustration of the types of drilling rig that may be used during exploration works is provided in Figure 12. The proposed layout for these activities is illustrated on the Application Plan - Indicative Layout (PNR-EW-102) - Drilling, initial flow testing and extended flow testing.
Drilling

Up to four exploration wells will be drilled at the Site. The first well will be drilled vertically through the geological profile to a maximum depth of c. 3500m. The geological information from this first vertical well will provide data on the characteristics of the shale. From this data, the depths and orientation within the shale at which the horizontal wells will be drilled will be selected.

The lower section of the vertical well (Vertical Well 1) may be plugged with cement to the selected depth for initiating the drilling of the first horizontal (Horizontal Well 1), which would then be drilled to its anticipated lateral extent (see Figure 13).

Horizontal Wells 2, 3 and 4 will be drilled from the surface to depths determined by geological information derived from Vertical Well 1.

Once commenced, drilling works must take place 24-hours per day, 7 days per week.

Low intensity security lighting will be used as well as focussed task lighting around the base of the drilling rig to allow works to be undertaken during hours of darkness.

Drilling of the well includes the following elements: drilling mud engineering, casing running and cementing, data acquisition via coring and wireline logging, and directional drilling. Licensed, sealed radiological sources are commonly used for measurement purposes in wireline logging and logging while drilling.

The likely waste products from this stage of the Project are outlined in Chapter 17 of the ES.
Figure 13: Illustrative schematic showing the potential arrangement of vertical and horizontal wells below ground. (Not to scale).
Well design

The overall well construction will be designed to provide multiple barriers between the groundwater and deep underlying production zones and will be constructed in accordance with Oil & Gas UK Well Integrity Guidelines, UKOOG UK Onshore Shale Gas Well Guidelines (2013), Borehole Sites and Operations Regulations 1995 (BSOR) and Offshore Installations and Wells (Design and Construction Etc.) Regulations 1996 (DCR). The well design and installation will be submitted for review by an independent well-examiner, and notified to the Health and Safety Executive.

Three types of well have been designed for the Project: the vertical section of Well 1; the horizontal section of Well 1 and the subsequent three combined vertical and horizontal wells (Horizontal Wells 2, 3 and 4) (see Chapter 11 and Appendix K of the Environmental Statement for further details). Although the specific design of these wells may differ, they will all comprise a series of steel casings. The functions of these casings are summarised below; sizes and depths are indicative and are subject to modification according to final geological and operational conditions at and underneath the Site:

- **Shallow conductors** – a series of steel casings ranging from 42 inch (1067mm) to 30 inch (762mm) in diameter. These typically extend down to 60m below ground level depending on shallow soil and geological conditions. These steel casings are driven or fixed in place to provide a stable surface platform from which to drill subsequent sections of the well-bore. The conductor casings are designed to isolate any shallow groundwater, and isolate any shallow unstable sands. Shallow conductors are installed as part of civil site works;

- **Deep conductor**– Nominally 18 5/8 inch (473mm) to 20 inch (508mm) diameter steel casing extending from the surface to a depth of approximately 300m below ground level and terminating within the lower section of the Mercia Mudstone. This conductor may be installed either prior to mobilisation of the main drilling unit, using a smaller specialised conductor setting rig, or by the main drilling unit itself;

- **Surface casing** – Nominally 13 3/8 inch (340mm) diameter steel casing extending from surface to a depth of approximately 1,200m below ground level terminating within the upper section of the Manchester Marl;

- **Intermediate casing** - Nominally 9 5/8 inch (245mm) diameter steel casing extending from surface to a depth of approximately 2,000m below ground level, targeting the Upper Bowland Shale;

- **Drilling liner and tie back** – Nominally 7 inch (178mm) diameter steel casing extending from inside the 9 5/8 inch (245mm) casing to a depth ranging from 2,300m to 3,200m below ground level and depending on the departure depth from the vertical well. The 7 inch liner will be tied back to surface with 7 inch production casing; and

- **Production Liner** - Nominally 4 ½ inch (114mm) diameter steel casing extending from inside the 7 inch liner to the final depth of the well, which will be determined once data from Vertical Well 1 has been analysed.

Casings and liners will generally be cemented in place to seal off the various subsurface formations through which they extend. However for the 7 inch tie back and intermediate casing, the upper portion of the annulus will be left
uncemented to allow for pressure monitoring. It should however be noted that un cemented sections will only be present in sections of the well where there will always be at least one further layer of casing between well and adjacent rock. Each string (section of casing) will be pressure tested and subjected to quality assurance procedures to ensure its integrity. The depths, diameters and specifications of each casing will be dependent on the depth at which the different geological formations are encountered. For this reason all of the values described above are indicative.

A high-pressure wellhead will be installed onto the surface casing. A blow out preventer (BOP) will be installed onto the wellhead to provide secondary well control when drilling the remainder of each well. A BOP is not required for drilling to shallower depths because ground gas has not been encountered whilst drilling in these geological formations in other wells in the Fylde

**Drilling operations**

When drilling wells, drilling fluids or “muds” are used to:

- Facilitate the removal of drill cuttings (i.e. the fragments of rock created by the drill);
- Manage the hydrostatic pressure within the well as it is deepened for primary control of subsurface pressures to prevent the release of fluids or gas during drilling;
- Stabilise the borehole and the drilled cuttings;
- Lubricate the drill string when drilling the vertical and horizontal wells;
- Cool the drill bit; and
- Allow use of bridging agents in the drilling fluid to minimise any loss of drill cuttings or fluids to permeable formations, where these exist.

Two types of drilling mud are proposed, water based muds (primarily polymer drilling) or low toxicity oil-based emulsion mud (LTOBM). In all instances water based muds will be used when drilling through the shallow formations and the permeable Sherwood Sandstone formation. Where borehole stability is problematic and/or maximum lubrication is required during directional drilling and to reach the intended target distance, low toxicity oil-based muds (LTOBMs) offer improved performance over water-based fluids. LTOBM would not be used prior to casing and cementing off all potentially sensitive groundwater receptors in order to provide isolation from the base oil used in deeper sections. For this Project, this translated to use of LTOBM only after the surface casing has been set and cemented to isolate the Sherwood Sandstone.

In addition, LTOBM can be reconditioned for use at other locations, thus minimizing waste generation. Further details are provided in Appendix K of the ES.

The Environment Agency will review and assess all drilling fluids and components.

Further details about well design and drilling operations can be found in Appendix B and Appendix K of the ES.
4.7 Hydraulic Fracturing

Equipment

The hydraulic fracturing equipment, accommodation and ancillary equipment will be brought onto the Site in a pre-planned sequence, over a period of approximately two weeks. HGVs and other commercial vehicles will deliver the following (indicative description):

- Storage units (steel containers for additive storage);
- Steel water tanks (for freshwater and flowback storage);
- Sand storage/delivery units;
- Two enclosed gas flare stacks (up to 10m high)
- High volume separator;
- Work-over rig (up to 30m high)
- Up to 6 hydraulic fracture pumps;
- Blender unit;
- Manifold unit;
- Coiled tubing unit;
- Coiled tubing support tower (up to 30m high); and
- Monitoring cabin

The proposed layout for these activities is illustrated in application drawing - Indicative Layout (PNR-EW-103)- Hydraulic Fracturing, initial flow testing and extended flow testing. Figure 14 which provides an illustration of the equipment likely to be used during hydraulic fracturing.

Figure 14: Example of Hydraulic Fracturing equipment.

Overview of process

Hydraulic fracturing (commonly referred to as “frac’ing” or “fracking”) is a process which is undertaken to enable the flow of liquids and gases through relatively impermeable underground rocks (i.e. to increase permeability). It is used in situations where, under natural permeability conditions, fluids or gases will not flow freely, for example in shale or in rocks such as granite. It has been frequently carried out offshore and onshore in the UK on oil and gas wells in low-
permeability reservoirs to increase well productivity. Hydraulic fracturing is also used, in geothermal energy developments to create fractures for water to flow through crystalline rocks such as granite.

The Bowland Shale Formation was originally deposited as a mixture of organic-rich siliciclastic and carbonate mudrocks. These deposits accumulated in a deep marine environment, in an ocean basin in which the prevailing conditions were periodically oxygen deprived. This resulted in the accumulation of abundant organic material and therefore the deposits are characterised by relatively high total organic content (TOC). During subsequent shallow burial and compaction of the sediment to form shale, organic matter was converted to kerogen (an insoluble organic compound). During deeper burial (increasing temperature) and greater compaction, the kerogen generated liquid hydrocarbons and natural gas (primarily methane). At the present day this gas is adsorbed onto the remaining organic material and is trapped in the microscopic pore spaces in the Bowland Basin target formations. Because the gas-saturated shales are hard, fine grained, and with very low permeability, they need to be hydraulically fractured to produce the natural gas.

Pore spaces within the shales are very small (in the range of 5 to 100 nanometres) and have very limited connectivity. This means gas present in kerogen and pore spaces is trapped in the formation and cannot freely flow. In order to release the gas, and allow it to flow towards a well bore, the process of hydraulic fracturing must be undertaken. Hydraulic fracturing is the process of injecting fluids at high pressure to overcome rock strength and pressures acting on the rock at depth in order to develop a network of small fractures in the rock. As the overall goal is to maximise the surface area of the rock accessible by the well, the fracture sizes are designed to be root-like networks of minute fractures. Proppant (generally sand grains) that is part of the hydraulic fracturing fluid holds open the induced and pre-existing fractures so that pore spaces can be connected to the well.

The hydraulic fracturing fluid will consist of the following:

- Water is the predominant constituent in the fluid. It is intended that the water will be sourced from the mains water supply and by reusing the hydraulic fracturing fluid that returns to the surface between hydraulic fracturing stages as a closed loop system. This has the combined benefit of reducing both the consumption of mains water and the quantity of flowback fluid that has to be removed for treatment and disposal offsite. Clean rainwater collected in the perimeter ditches could also be used to make up the fracturing fluid. This would further reduce mains water consumption and the quantity of waste water transported from the Site;

- Proppant (Silica sand) is mixed in with the fracturing fluid at specific stages during a fracturing event to keep the fractures created in the shale wedged open after the hydraulic pressure has been released; and

- Friction reducer is added to the water to minimise the pressure losses incurred due to friction between the water and the well casings as the water travels several kilometres from surface through the well to the shale formation. The proposed friction reducer is polyacrylamide which is non-toxic and classified as non-hazardous to groundwater by the Environment Agency.

There is the potential that the flowback fluid which is re-used for subsequent hydraulic fracturing stages could contain bacteria. In some circumstances these
bacteria can restrict the flow of gas. To kill this bacteria UV treatment will be used. This would also be used to treat rainwater if it were also to be used to make up the hydraulic fracturing fluid.

As a contingency, dilute hydrochloric acid may be used to facilitate entry of the fracturing fluid from openings in the production casing to the body of shale. Hydrochloric acid would be used to reduce fracturing pressure requirements and improve treatment effectiveness. The hydrochloric acid will be stored at strength of no greater than 10% in solution. However, it has not been necessary to use it at other wells drilled in the licence area to date and it is thus included as a contingency.

Cuadrilla proposes to use a fracturing fluid with a composition comprising of at least 99.95% water and sand, and less than 0.05% friction reducer, by volume.

**Steps in the hydraulic fracturing process.**

**Consent for Hydraulic Fracturing**

A Hydraulic Fracturing Programme (HFP) will be submitted to DECC for review and approval after drilling is completed and before any fracturing starts. The HFP will identify how risks associated with hydraulic fracturing operations will be managed. Like all other activities prior to undertaking hydraulic fracturing activities, all other relevant consents will be obtained. DECC require the HFP to include:

- A map showing faults near the well and along the well path, with a summary assessment of faulting and formation stresses in the area and the risk that the operations could reactivate existing faults;
- Information on the local background seismicity and assessment of the risk of induced seismicity;
- Summary of the planned operations, including stages, pumping pressures and volumes;
- A comparison of proposed activity to any previous operations and relationship to historical seismicity;
- Proposed measures to mitigate the risk of inducing an earthquake and monitoring of local seismicity during the operations; and
- For shale gas fracturing, a description of proposed real-time traffic light scheme for seismicity, and proposed method for fracture height monitoring.

**Well preparation**

Prior to hydraulic fracturing, a “Frac Tree” will be installed on the wellhead. The purpose of the Frac Tree is to provide a seal and prevent release of gas and liquids at the surface. The valves within the tree have been specified to withstand the maximum hydraulic fracture pressure. Secondary valves in the tree are used as a contingency in the event that the primary valve (master valve) fails.

Following installation, the assembly will be tested to the maximum planned operational pressure. Once the test pressure has been set, operational activities cannot exceed the test pressure. The installation and testing is generally

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performed prior to mobilisation of hydraulic fracturing equipment to the site, as described above.

**Perforation of well-bore casing**

In order to control where fractures are created, the well casing must be perforated at target locations. These perforations will be pre-set into the well casing by installing sleeves (known as “frac sleeves”) during well construction, which can be later mechanically opened.

In the event that any of the frac-sleeves fail to open satisfactorily, the casing will be perforated using either an abrasive jetting technique or a small shaped explosive charge. If jetting is used, coiled tubing is placed into the well and a jetting fluid is injected through the tubing under pressure. The jetting fluid, similar to the hydraulic fracturing fluid, contains water, sand, and a friction reducer. Following perforation, the jetting fluid can be recovered as very little will have been released into the surrounding formation. During recovery, the sand will settle in the bottom of surface collection tanks and separated from the fluid. The recovered jetting liquid can be reused. However the sand generally cannot be reused as it returns in a damaged form unsuitable for reuse. Explosive charges have the benefit of providing calibration data for the buried array, and as such, may be used on initial perforations.

**Mini-fracture testing**

Before undertaking the main hydraulic fracturing stage, a pilot hydraulic fracturing stage or “mini-fracture” will be performed. This involves pumping small volumes of fracturing fluid (without any proppant) into the well. The purpose of the mini-fracture is both to evaluate the injection pressure required to generate fractures in the rock during the subsequent main hydraulic fracturing stage as well as to calibrate the micro-seismic monitoring network. The fracturing schedule may then be modified subject to the data gathered in the mini fracture. Mini-fracture testing may also be performed at various times during the hydraulic fracturing.

**Hydraulic fracturing**

Hydraulic fracturing will be performed over 30 to 45 stages per well at intervals of 30 to 50m per stage. The exact interval for each stage will depend on a variety of factors including extent of induced fracture networks on preceding stages. The initial stage will be at the end of the horizontal section of the well, furthest from the well pad, with successive stages working backwards along the well length towards the vertical section of the well. In order to induce fractures, pressure will be applied to the target interval. The applied pressure during each stage will be within the maximum operational pressure of the equipment. Within each stage several steps will be performed where the type and quantity of the sand proppant will be adjusted to optimise the fracturing process. Each stage is anticipated to last up to three hours. The entire hydraulic fracturing programme, per well, is anticipated to be less than two months per well.
Flowback fluid

Once a hydraulic fracturing stage is complete, the pressure at surface may be reduced, and a portion of the fluid which was injected into the well, allowed to return to the surface. This water is termed “flowback fluid” and will comprise a mixture of the injected hydraulic fracture fluids, sand, waters naturally occurring within the shale, dissolved minerals and any released hydrocarbons. Naturally occurring radioactive materials (NORM) are anticipated to be present in flowback fluid. This is because soluble NORM is naturally present in shale. In addition, if LTOBM is used during drilling, the flowback fluid may also contain small amounts of LTOBM constituents. Sampling and analysis will be performed on flowback fluid in order to ensure appropriate waste classification and adequate handling and disposal. It is anticipated that the flowback fluid will be classified as radioactive waste with non-hazardous composition.

On reaching the surface flowback fluid will be passed through a four phase separator that allows solids, water, condensate and gases to be separated for optimal waste recovery and management. This process will separate-out residual sand (by allowing it to settle out at the bottom of the collection tanks), a portion of the NORM (in solid form) and flowback fluid. These materials will be stored temporarily on site in enclosed tanks and then will be subsequently removed to an appropriate waste treatment facility permitted by the Environment Agency (including being licensed to receive NORM). The flowback fluid will then be reused, along with mains water, to create more hydraulic fracturing fluid for the next hydraulic fracturing stage.

Produced natural gas will be separated, measured and sent to two enclosed flare stacks where it will be combusted to form carbon dioxide and water vapour. More detailed information on flare stack emissions are contained in Chapter 6 of the ES.

Management of hydraulic fracturing operations

After hydraulic fracturing operations have been authorised by the relevant regulatory authorities, hydraulic fracturing will commence. It will generally comprise the stages illustrated in Figure 15.
Figure 15: Hydraulic fracturing process

1. Install frac-tree on to the wellhead
2. Mobilise injection and hydraulic fracturing equipment
3. Perforate casing
4. Perform mini-fracture test if required
5. Modify parameters based on monitored data.
6. Mix and pump fracturing fluid, monitor parameters and seismicity. Application of pressure to initiate fracture
7. Determine whether hydraulic fracture stage should be repeated.
8. Start new stage
9. If necessary release pressure and allow flowback
10. Start initial flow testing

Once all hydraulic fracturing activities are completed on a single or multiple wells, fracturing equipment will be removed from the Site and initial flow testing of the well will commence (see below). The duration of hydraulic fracturing activities for each well will vary according to the total number of hydraulic fracture stages undertaken in each well. However, it is not expected to last more than 2 months per well. Staff will be present on Site 24 hours a day, 7 days a week. However the pumps used to pressurise the well to create the fractures will only be operated during the daytime\(^4\).

Further details about hydraulic fracturing operations can be found in Appendix B of the ES.

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\(^4\) Day time is between the hours of 0700 and 1900 Monday to Friday and 0700 to 1300 Saturday (as defined by BS5228).
4.8 Initial flow testing

Although initial flow testing is described below as a standalone stage there is potential for some initial flow testing to be undertaken while hydraulic fracturing is also being implemented (i.e. in between fracturing stages).

Equipment

Following completion of hydraulic fracturing activities on a well, the equipment listed below will remain on Site for initial flow testing (see application plan Indicative Layout (PNR-EW-103)- Hydraulic Fracturing, initial flow testing and extended flow testing):

- Site staff offices, welfare facilities and storage containers;
- Coiled tubing rig (up to 30m high);
- Service rig to install/remove tubing up to 30m high);
- 2 enclosed gas flares (10m high) (an indicative illustration of the flare is included as figure 16).
- Flowback separator with line heater and associated equipment;
- Enclosed flow-back tanks; and
- Water storage tasks

Figure 16: Indicative enclosed flare stack to be used during initial flow testing (not to scale).

Initial flow testing operation

Following the hydraulic fracturing injection period, the well will be opened at the surface to reverse the flow of the fracturing fluid. The purpose of this operation is to remove a portion of the injected hydraulic fracturing fluid from the reservoir to enable natural gas to flow into the well.
To maintain full pressure control during the flowback process, and to prevent excessively high flowback velocities through the surface production equipment, the flow coming out of the well is passed through a device called a “choke manifold”, which reduces the pressure downstream of the frac head to a safe operating level as fluid is removed from the well. After the pressure reduction the flow stream enters a high-volume test separator, the purpose of which is to separate the water from the natural gas, and also to remove small amounts of sand, solids and condensate that may be produced during the flowback. The water and natural gas flow rates are measured and recorded. Samples of each are periodically taken so that a full compositional analysis of the water and hydrocarbons can be obtained.

At some point the well will start to produce mainly natural gas, and diminishing volumes of flowback fluid. It is at this point when the initial flow test begins. This test will run for up to 90 days by burning the gas in the flare system to establish an initial production rate or “IP”. If the findings are favourable, it may be followed by an extended flow test (as described below).

Natural gas produced during the initial flow test (but not the extended flow test) will be burned via the two on-site enclosed flare stacks.

Flaring of natural gas would only occur during this relatively short initial flow test period. Any further flowback fluid produced during this stage would be stored in tanks and periodically removed from Site for disposal at an Environment Agency approved permitted waste treatment facility.

**4.9 Extended Flow Testing (EFT)**

If flow rates indicate potentially viable flows and quantities of natural gas, a subsequent EFT period of between 18-24 months could be implemented.

The purpose of the extended flow test is to produce natural gas from the well for a longer period to gather data on the relationship between flow rates and well pressures, measure decline rates, and determine how much flowback fluid will be produced over time. This extended flow test data will contribute to an understanding of the reservoir and the predictability of the production performance. This data will also allow future well performance to be predicted, and this may be scaled up to estimate performance of a group of shale gas wells during any subsequent development phase.

In the event of EFT being undertaken, the resultant gas would be piped into the gas grid via a connection to the nearest main of appropriate size and pressure. This would eliminate the need for gas flaring. Additional equipment would be required to treat and regulate the pressure of the gas prior to connection to the gas grid, subject to the quality of gas produced.

**Equipment for the EFT**

At the Site the separation, dehydration and filtration plant and associated storage vessels will be located in the open areas of the well pad. The area required for this equipment will be approximately 25m x 17m. There will be a kiosk of size 6m x 3.5m which will house gas quality monitoring, pressure control and energy measurement equipment. The process required to treat the gas before it enters the high pressure gas grid is described in table 4.
Table 4. Treatment and monitoring processes required to connect to the gas grid.

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation</td>
<td>Volumes of sand and liquids will normally be produced from the well along with natural gas. Separation equipment will be used to separate out the gas, with sand, water and condensate being retained in separate vessels. These tanks will be emptied on a regular basis and the materials disposed of at an appropriately permitted facility via tanker transport.</td>
</tr>
<tr>
<td>Drying</td>
<td>After separation the gas will still be too wet for gas grid injection and, a dehydration process will be used to remove the remaining water from the gas.</td>
</tr>
<tr>
<td>Filtration</td>
<td>Subject to gas quality (determined in the initial flow test), the separated natural gas may need to be passed through an active carbon filter to remove impurities. The activated carbon material would be periodically replaced, typically twice a year dependent on the level of components being removed and size of activated carbon beds.</td>
</tr>
<tr>
<td>Gas Quality Monitoring</td>
<td>Measurements will be made to determine water and hydrocarbon dew points and other components (such as nitrogen) in order to comply with National Grid entry quality standards.</td>
</tr>
<tr>
<td>Energy Measurement and Adjustment</td>
<td>The natural gas will be continuously measured for flow rate and calorific value, together with gas quality monitoring, and pressure control. If necessary propane will be added to meet National Grid’s calorific requirements. A meter will be installed at the boundary of the well pad to measure the flow and quantity of gas produced at the Site.</td>
</tr>
<tr>
<td>Pressure Regulation</td>
<td>The pressure of the gas at the well head is estimated to be in excess of 75bar. Therefore a regulator will be installed to limit the pressure of the gas to 75bar prior to injection into the transmission network. After the pressure control there will be a Remotely Operable Valve (ROV) that will mark the boundary between the Cuadrilla system and the National Grid infrastructure.</td>
</tr>
<tr>
<td>Ancillary Equipment</td>
<td>A small flare will be fitted as part of the installation in order to enable safe operation of the facility in accordance with standard procedures. This flare would only be used in emergency conditions in order to avoid pressure build up above design conditions. It is noted that the gas well can be shut off at surface to control gas flow should this be required, therefore the flare is unlikely to be used.</td>
</tr>
</tbody>
</table>

Layout and connection to the gas grid

To allow connection to the gas grid two buried pipelines (depth of 1.2m and 6 inch diameter), will be laid. One will run parallel to the access track and connect to the gas grid pipeline running parallel to Preston New Road. The second pipeline will run west, parallel to Preston New Road to connect to a gas main to the west of the Site. At the connection points to the gas grid National Grid would require separate fenced off areas of approximately 8m x 9m. These will contain a small kiosk (approximately 4m x 2m) containing telemetry and gas quality monitoring equipment. (See Application Plan - Indicative Layout (PNR-EW-104)-Extended Flow Testing).
Well Servicing

During the initial flow testing and extended flow testing stages there may be need for occasional servicing of the well [well servicing]. A service rig, coil tubing unit and other equipment would be brought to the Exploration Site to undertake this procedure. The well servicing visits are unlikely to last more than a week and will only occur occasionally (see Appendix B of the ES for details).

4.10 Decommissioning and restoration

Once the exploration activities, described above have been completed, the well pad and associated surface works will either be taken on into production, subject to further consents and EIA, or decommissioned and restored to its current agricultural use.

Decommissioning and restoration would include the following activities:

- The well will be plugged and abandoned, the wellhead removed and the casing cut of at least 2.0 m below ground in accordance with regulatory requirements.
- Monitoring of the groundwater monitoring wells will continue following exploration well abandonment for a period agreed with the regulators, and subsequent decommissioning of the groundwater monitoring wells;
- Removal of remaining plant, equipment and temporary buildings;
- Removal of the surface array;
- Removal of the buried array surface features;
- The ditches would be emptied;
- All utilities would be disconnected and the layers of aggregate, high density poly ethylene membrane, geotextile and felt would be removed;
- If a connection to the gas grid has been constructed this would be removed up to the connection point to the gas grid and capped in accordance with any requirements from National Grid;
- Sub-soil stored on Site would be treated with selective herbicides, as appropriate, prior to placement on the site sub-grade;
- Topsoil stored on Site would be treated with selective herbicides, as appropriate, prior to placement on the replaced subsoils;
- Removal of Site boundary fencing; and
- Reinstatement of fences, gates and field drains.

4.11 Environmental management

Environmental Operating Standard

Cuadrilla has produced an Environmental Operating Standards (EOS) document which will establish a framework to enable environmental impacts, risks and compliance arrangements for operational activities to be effectively managed.

A ‘Structure and Rationale’ version of the EOS has been prepared as part of this ES accompanying the planning application for Preston New Road which sets out the purpose and structure of the EOS (see Appendix E of the ES). The EOS itself

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will be updated with specific measures required to meet the conditions of the various permits and the planning conditions, if these are granted.

Environmental Monitoring

During the Project Cuadrilla will undertake environmental monitoring to allow them to effectively manage their operations. Section 4.13 of the ES provides an indicative overview of the range of parameters and determinants to be potentially monitored. The specific parameters, frequency of sampling and dissemination of the data will be confirmed once the planning and environmental consents are in place and agreed with the appropriate authorities.

4.12 Timescales

The indicative timescales of the works are set out in table 5 below (italics represent activities that are the subject of a separate planning application).

The overall duration of the exploration activities from commencement of works up to the completion of restoration has been estimated to be up to five years and ten months. Building in a contingency of two months Cuadrilla are seeking a temporary planning permission for six years to complete all the exploration activities and restore the Site to its former use.

This is based on the assumption that the site is not taken forward for production. If the Site is found to be viable for production then the abandonment and restoration elements will not be progressed in the timescales shown in table 5 and an application will be prepared and permission sought for production.

Table 5: Indicative timescales of exploration activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Likely Commencement</th>
<th>Indicative Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Preparation/ mobilisation, establishment of monitoring boreholes</td>
<td>Year 0, month 0</td>
<td>2 month</td>
</tr>
<tr>
<td>Installation of Seismic Array and Monitoring Boreholes (subject of separate planning application)</td>
<td>Year 0, month 0</td>
<td>5 months</td>
</tr>
<tr>
<td>Drilling Well 1 – pilot hole and lateral (including set up and demobilisation)</td>
<td>Year 0, month 2</td>
<td>4-5 months</td>
</tr>
<tr>
<td>Hydraulic Fracturing Well 1 (including mobilisation and demobilisation of rig)</td>
<td>Year 0, month 7</td>
<td>3 months</td>
</tr>
<tr>
<td>Flow Testing Well 1 (90 days)</td>
<td>Year 0, month 10</td>
<td>3 months</td>
</tr>
<tr>
<td>Drilling Well 2 (including set up and demobilisation)</td>
<td>Year 0, month 10</td>
<td>4 months</td>
</tr>
<tr>
<td>Hydraulic Fracturing Well 2 (including mobilisation and demobilisation of rig)</td>
<td>Year 1, month 2</td>
<td>3 months</td>
</tr>
<tr>
<td>Flow Testing Well 2 (90 days)</td>
<td>Year 1, month 5</td>
<td>3 months</td>
</tr>
<tr>
<td>Drilling Well 3 (including set up and demobilisation)</td>
<td>Year 1, month 5</td>
<td>4 months</td>
</tr>
<tr>
<td>Hydraulic Fracturing Well 3 (including mobilisation and demobilisation of rig)</td>
<td>Year 1, month 9</td>
<td>3 months</td>
</tr>
<tr>
<td>Activity</td>
<td>Start Year, Month</td>
<td>Duration</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Flow Testing Well 3 (90 days)</td>
<td>Year 2, month 0</td>
<td>3 months</td>
</tr>
<tr>
<td>Drilling Well 4 (including set up and demobilisation)</td>
<td>Year 2, month 0</td>
<td>4 months</td>
</tr>
<tr>
<td>Hydraulic Fracturing Well 4 (including mobilisation and demobilisation of rig)</td>
<td>Year 2, month 4</td>
<td>3 months</td>
</tr>
<tr>
<td>Flow Testing Well 4 (90 days)</td>
<td>Year 2, month 7</td>
<td>3 months</td>
</tr>
<tr>
<td>Completion of initial exploration works and initial testing</td>
<td>Year 2, month 10</td>
<td></td>
</tr>
<tr>
<td><strong>Extended Flow Testing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Connection to Gas Mains</strong></td>
<td>Year 0, month 0</td>
<td>14 months</td>
</tr>
<tr>
<td><strong>Extended Well Test (all 4 wells)</strong></td>
<td>Year 1, month 2</td>
<td>3 years 8 months</td>
</tr>
<tr>
<td><strong>Completion of all extended flow tests</strong></td>
<td>Year 4, month 10</td>
<td></td>
</tr>
<tr>
<td><strong>Abandonment and Restoration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plug and Abandon Wells</strong></td>
<td>Year 4, month 10</td>
<td>3 months</td>
</tr>
<tr>
<td><strong>Restoration of Site (note: seasonally dependent – therefore contingency of 6 months built in to allows works to be undertaken during the spring/summer)</strong></td>
<td>Year 5, month 1 – Year 5, month 7 (May need to wait to following spring, summer window)</td>
<td>3 months</td>
</tr>
<tr>
<td><strong>Completion of Restoration (worse case timescale)</strong></td>
<td>Year 5, month 10</td>
<td></td>
</tr>
</tbody>
</table>
5 Key benefits and the justification for natural gas from shale

This section provides a clear justification for the proposed exploration works for shale gas with regard to key environmental, economic and technical considerations including:

- Energy security,
- Government support and national strategy,
- A comprehensive regulatory framework,
- Local and national economic benefits,
- Environmental impacts and mitigation, and
- Low environmental risk

5.1 Energy security

5.1.1 Demand for gas

Natural gas is one of the UK’s primary sources of energy and it is estimated that the number of gas consuming households in Great Britain, in 2011, was almost 23 million, approximately 90% of the households in the country. In 2012 80% of the energy used in the UK to heat homes, provide hot water and to cook came from natural gas. The government has indicated that the demand for gas in the UK will continue to exceed the amount that can be provided from existing UK sources over the next 15 years.

5.1.2 Supply of gas

The UK has been a net importer of gas since 2004 and is becoming more reliant on foreign supply, with the UK growing increasingly dependent on imports from countries such as Norway and Qatar. By 2025 the UK is forecast to be dependent on foreign imports for 68% of the gas needed to meet energy demand, and this could rise to approximately 77% by 2030. This dependency on foreign supplies of gas presents issues of security of supply for the UK.

There is the potential for renewable sources of energy (such as wind power) to meet some of the increased demand for energy and also to reduce reliance on fossil fuels. Nevertheless more efficient, reliable and cost effective renewable energy technologies need to be developed and the infrastructure will need to be

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6 Annual meter-point level data - DECC
9 Actual/projected UK oil and Gas Production and Actual/Projected UK oil and Gas Demand – DECC – 2013.
delivered to allow for renewables to provide a greater contribution to the energy mix.

Natural gas is likely to continue to be required during periods of interruptions of renewable supply (such as wind) and during the period when new renewable energy technologies are being developed. Gas (including gas from shale rock) is therefore likely to be a key source of energy whilst the technologies and capacity to exploit renewables sources are being developed over the longer term.

DECC published the UK’s Gas Generation Strategy on 5th December 2012. This document builds on many of the key points drawn out from the National Policy Statement (NPS) on energy (EN-1) and confirms the Government’s commitment to gas as a key part of the energy mix. The purpose of the Strategy is to reduce uncertainty relating to gas generation for investors.

The strategy notes the decline in domestic gas production, noting at paragraph 4.4 “UK gas production peaked in 2000 and since then has been steadily declining. By 2011, net UK gas production had fallen by 60% to 43 billion cubic metres (bcm) from the peak of 108 bcm in 2000”.

The Strategy reaffirms some of the concerns relating to the UK’s reliance on imports. Paragraph 4.7 states “the decline in UK gas production has increased the importance of imported gas for UK supply, and our integration with European and global markets. This increasing integration can bring greater resilience through a greater diversity of gas supply sources. However, it can also bring new risks associated with the influence of geopolitical events, different gas prices by regional markets and trade disputes.”

“Global gas demand is forecast to rise dramatically, by 55% to 2035” (paragraph 4.9). Given the UK’s reliance on imports and thus exposure to price fluctuations, therefore, the Strategy identifies that the UK is seeking opportunities to de-risk its gas supply, including through increased gas storage and exploring the potential for shale gas.

The Strategy concludes (paragraph 5.24) in respect of shale gas:

“If it can be shown to be economic and safe, domestic shale gas production could offer a significant economic opportunity for the UK, with the prospect of new sources of indigenous supply, new industrial activity and skilled jobs.”

The strategy underlines the importance of this potential by also confirming DECC’s decision to establish an Office for Unconventional Gas and Oil, to provide a single point of contact for investors, and ensure an efficient and effective regulatory process. The strategy also confirms the Government’s intention to establish a targeted tax regime to encourage investment in shale gas. The principles of this scheme were announced in the 2013 Budget Report.

5.1.3 Shale gas potential

Natural gas from shale has potential to boost the UK’s gas production significantly, reducing the UK’s dependence on foreign energy sources.
Shale Gas Industry in the United States

Within the United States over the last decade, there has been a significant expansion of shale gas production. Shale gas rose from only 2% of US gas production in 2000 to 34% in 2011, and is forecast to continue rising to almost 50% by 2020\(^{10}\).

Shale Gas Extraction in Europe

In 2011, European Union (EU) Heads of State concluded that Europe’s potential to extract and use unconventional fossil fuel resources, including shale gas, should be assessed (European Council 2011). In 2012, the European Commission (EC) judged that its existing legal framework was adequate to address shale gas extraction (Vopel 2012) and shale gas could reduce some European countries’ dependence on natural gas imports (European Parliament 2012b).

Shale gas extraction in Europe is at the exploration stage and commercial production of shale gas has not yet been undertaken. The EU in December 2013 issued recommendations on minimum principles for the exploration and production of hydrocarbons (such as shale gas) for Member States.

Shale Gas in the UK and Lancashire

In the UK shale gas extraction is also at the exploration and appraisal stage.

The volume of gas within the shale is known as the “gas resource”. “Gas reserves” are the estimates of the volume of gas that can be technically and economically produced. In the United States it was found that the ratio of reserves to resource varied widely between different shale formations. One estimate from the US Energy Information Administration has indicated that 22 per cent of shale resources are technically recoverable.

The latest report from British Geological Society\(^{11}\) give a central estimate of 1,329 tcf (38 000 bcm) “gas resource” in the Bowland Shale. The BGS work though does not comment on the potential “gas reserve” as there are no reliable estimates of this reserve.

Cuadrilla has estimated the “gas resource” within the scope of its licence in Lancashire to be 200 tcf (5660 bcm). However, more drilling and testing is needed before there is a reliable estimate of the “gas reserve” within Cuadrilla’s licence areas. The exploration at Preston New Road is needed in order to provide a better understanding of the “gas reserve”.

Lancashire Growth Plan

The Lancashire Enterprise Partnership (LEP) was established in April 2011. The Lancashire Growth Plan 2013/2014 sets out how the partnership intends to

\(^{10}\) [http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm](http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm)

achieve strong and sustainable economic growth in Lancashire. It outlines the priorities of the LEP and their agenda for change.

One of the key priorities of the LEP is to “Develop Sector Delivery Plans to unlock opportunities of national significance in emerging and established growth sectors, with the potential to create new investment, business growth and employment opportunities.” The Growth Plan identifies Lancashire as having major potential in making contributions towards low carbon strategies, emphasising that the rural economy of Lancashire offers strong growth characteristics. With specific regard to shale gas, the Growth Plan states that the LEP will “work with key business partners and investors to capture the economic benefit of local shale gas reserves, which are amongst the largest in Europe.” The delivery of a programme for Sector Delivery Plans for Lancashire’s key growth sectors, including shale gas, was programmed to begin by autumn 2013.

The Growth Plan explains that Lancashire can reclaim a position as a national economic leader by focusing on its economic strengths and competitive advantages. It asserts that the priorities “identified in the Growth Plan have the potential to create up to 50,000 new jobs over the next 10 years and generate additional economic activity... valued at over £3 billion.”

The Growth Plan articulates that “Lancashire has sectors with the capacity to become key drivers of growth in their own right” with expectations that the shale gas sector will “exceed national performance benchmarks.”

### 5.2 Government support and national strategy

A moratorium on hydraulic fracturing was imposed following two seismic tremors in the Blackpool area during 2011, associated with the Preese Hall site.

DECC confirmed in December 2012 that in the light of the robust controls in place to protect the environment and ensure safe operation, the moratorium on shale gas hydraulic fracturing could be lifted. The decision to lift the moratorium was informed by a wide ranging review of the scientific and technical evidence on the risks associated with hydraulic fracturing for shale gas, conducted by the Royal Academy of Engineering and the Royal Society. Their report was published in June 2012. Appendix B describes how the proposals for exploration at Preston New Road respond to the recommendations of the Royal Society and the principal conclusion is copied below.  

The Royal Society concluded that:

“*The health, safety and environmental risks associated with hydraulic fracturing (often termed ‘fracking’) as a means to extract shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation. Hydraulic fracturing is an established technology that has been used in the oil and gas industries for many decades. The UK has 60 years’ experience of regulating onshore and offshore oil and gas industries.*”

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12 Summary section, Shale gas extraction in the UK: a review of hydraulic fracturing, Royal Society and Royal Academy of Engineers, June 2012
There has also been extensive parliamentary discussion around the issues of shale gas extraction, including an inquiry into shale gas by the Energy and Climate Change Committee in 2011\(^\text{13}\), the conclusion of which is summarised below.

“On balance, we feel that there should not be a moratorium on the use of hydraulic fracturing in the exploitation of the UK’s hydrocarbon resources, including unconventional resources such as shale gas. However, DECC needs to monitor closely the current exploratory activity in the Bowland Shale in order to both assess the likely impact of large scale shale gas extraction in the UK and also to promote public confidence in the regulation of this activity”.

**The Secretary of State for Energy confirmed in a Statement (December 2012)\(^\text{14}\) that the Government had accepted the findings of the report of the Royal Society and the Royal Academy of Engineering concerned with the scientific and engineering evidence on the advances being made in shale gas extraction, and specifically the technology of hydraulic fracturing. The Statement by the Secretary of State provided an update on the progress the Government made in implementing the recommendations of the Royal Society and confirmed that with regard to:

**Seismic Risk and the Traffic Light System:** “So far as Cuadrilla’s current exploration programme in Lancashire is concerned, the remedial action level for the traffic light system (that is, the “red light”) will be set at magnitude 0.5 (far below a perceptible surface event, but larger than the expected level generated by the fracturing of the rock). I consider that this is an appropriately precautionary approach.”

**The Government established the Office of Unconventional Gas and Oil (OUGO) in December 2012** to help develop the shale gas industry. The office is working closely with regulators and industry to ensure that the regulatory regime is as clear and efficient as possible while safeguarding public safety and the environment.

The Government and agencies have recently introduced a number of important measures:

- DCLG has published planning guidance that clarifies the interaction of the planning process with the environmental and safety consenting regimes.
- In the Autumn 2013 Statement, the Chancellor announced support to encourage investment in onshore oil and gas, including shale gas by introducing tax allowances for early stage of development.

\(^{13}\) House of Commons Energy and Climate Change Committee, Shale Gas, 23\(^{rd}\) May 2011

\(^{14}\) Written Statement to Parliament by Edward Davey, Secretary of State for Energy, 13\(^{th}\) December 2013
• The Environment Agency has announced actions to improve the efficiency of the regulation of exploratory activity while maintaining environmental protection.

• Government has welcomed a package of community benefits that has been brought forward by the industry.

The Secretary of State for Energy (in a speech made on 9th September 2013 to the Royal Society) confirmed the case for the safe and responsible exploration of shale gas in the UK, in line with UK’s climate change targets. The Secretary of State stated in this speech that:

• “UK shale gas can be developed sensibly and safely, protecting the local environment, with the right regulation.”

• It is possible to meet “wider climate change targets at the same time, with the right policies in place.”

• “Gas, as the cleanest fossil fuel, is part of the answer to climate change, as a bridge in our transition to a green future, especially in our move away from coal”. Also the Secretary of State explained that for shale gas we will “control the production, so we control the carbon emissions created by production.” Given this control it will be important alongside shale gas extraction to “pursue vigorously the development and deployment of mitigation and abatement technologies like carbon capture and storage, to protect the planet.”

• “UK shale gas could increase our energy security by cutting” imports of gas.

• “Home-grown gas, just like home-grown renewables and new nuclear, also provides jobs for our people and tax revenues for our society.”

• “The reality is shale gas has a role to play in meeting all the objectives I have set out – keeping the lights on, tackling climate change and helping keep energy affordable and the economy moving. On all these fronts – especially energy security – shale represents an exciting prospect...It is a national opportunity. An opportunity it would be foolish to turn away from”.

The House of Lords Economic Affairs Committee reported on the “Economic Impact on UK Energy Policy of Shale Gas and Oil in May 2014. The House of Lords Committee fully supported the Government’s commitment to ‘go all out for shale’.

The Committee concluded that the UK is ‘exceptionally fortunate’ to have substantial shale gas and oil resources and that exploration and appraisal is urgently needed to establish their economic potential.

15 The Myths and Realities of Shale Gas Exploration– Speech by Ed Davey Secretary of State for Energy to the Royal Society – 9th September 2013
16 House of Lords Economic Affairs Committee Report - The Economic Impact on UK Energy Policy of Shale Gas and Oil– 8th May 2014
The Committee also expressed disappointment that the exploratory drilling with hydraulic fracturing needed for shale gas development has hardly begun. It found that since the lifting of a moratorium on hydraulic fracturing in 2012, the Environment Agency has not received or approved a single application for the permits necessary for exploratory drilling.

With respect to the Economic Impacts of shale gas the House of Lords Committee concluded that:

“Exploration and appraisal are urgently needed to establish the economic potential of the UK’s shale gas and oil resource. Shale gas is not the answer to all the energy policy challenges facing the UK. Substantial economic benefits would however flow from successful development. It would reduce imports and help maintain security of supply. This would be especially valuable given the continuing fall in output from the North Sea and Europe’s reliance on Russia, its biggest gas supplier, highlighted by the crisis in Ukraine.

Development of shale gas and oil in the UK would also generate direct employment, particularly in the North of England and be a significant benefit to the balance of payments and the Exchequer. UK produced shale gas is also likely to be cheaper than imported gas from the Middle East or elsewhere which carries the extra costs of transport and processing. If the UK does not develop its shale resources in a timely fashion, it runs a serious risk of losing the energy intensive and petrochemical industries which depend on competitively-priced energy and raw materials and which employ around 250,000 people.”

Shale gas exploration therefore has express national policy support by the Government.

5.3 Comprehensive regulatory framework

The UK has an established regulatory framework that encourages operators to make a continuous effort for improvement and reducing risk.

The Secretary of State, in his September 2013 speech explained how the UK has “the tightest safety and environmental regulations in the world” and given this context it would be important to ensure that “the same scientific rigour, methodical engineering, and stringent safeguards that have been applied elsewhere must be applied to shale”.

The regulatory regime in addition to the requirements for planning permission and exploration licences requires environmental permits from the Environment Agency. These cover:

- protecting water resources, including groundwater (aquifers) as well as assessing and approving the use of chemicals which form part of the hydraulic fracturing fluid
- appropriate treatment and disposal of mining waste produced during the borehole drilling and hydraulic fracturing process
- suitable treatment and management of any naturally occurring radioactive materials and
- disposal of waste gases through flaring.
In addition, the operator must notify the Health and Safety Executive of the well design and operation plans at least 21 days before drilling is due to start. Ultimately following the granting of planning consent and obtaining necessary permits, DECC grants consent to drill only once all permits are in place and all relevant consultees (including DECC, EA, HSE, BGS) have been notified.

The Secretary of State for Energy confirmed in his September 2013 speech that

- “So far as the UK is concerned, I believe that the industry has a good record, and that there are already in place robust regulatory controls on all oil and gas activities. On water contamination, first, all such operations are subject to scrutiny by the appropriate environment agency (the Environment Agency in respect of England and for the time being of Wales; and the Scottish Environment Protection Agency in respect of Scotland). It is an offence to cause or knowingly permit poisonous noxious or polluting matter to enter controlled waters, which include ground waters.”

- “So far as the use of chemicals is concerned, the environment agencies take a risk-based approach to the regulation of the use of chemicals in shale gas fracking activities. The hazard potential of all substances proposed to be injected into the ground will be assessed and the use of substances hazardous to groundwater will not be permitted. The identity of all substances proposed for injection, and the agency’s conclusions on their hazard potential, will be publicly available.”

- “Equally, disposal of waste water is subject to scrutiny by the agencies and will require a permit. The waste water from the operations in Lancashire has been found to contain low levels of radioactivity. A case-specific radiological assessment is required in support of any application for a permit for the disposal of radioactive waste. The agency will critically review any such assessment, and will only issue a permit if satisfied.”

In February 2013, the United Kingdom Onshore Operators Group (UKOOG), of which Cuadrilla is a member, published industry guidelines covering best practice for shale gas well operations in the UK17. The HSE, EA and DECC helped develop these guidelines. The guidelines demonstrate a commitment to responding to the regulatory framework with best practice.

### 5.4 Local and National Economic Benefit

#### 5.4.1 Local socio-economic impact at the exploration stage

**Economic Impact**

The economic benefits associated with exploration include local employment creation and supply chain opportunities associated with the site preparation, drilling and testing stages. In addition secondary beneficial effects would occur associated with the additional expenditure in the area.

Taking the project as a whole, the number of workers required will fluctuate in response to spikes of activity at different stages of work. Converting the employment data that is set out in the Environmental Statement (Chapter 9) into worker days shows the cumulative number of daily shifts, over the lifetime of the

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17 UKOOG, 2013. UK Onshore Shale Gas Well Guidelines.
exploration workers. This can then be converted to worker years and then full time equivalent jobs (FTE, assuming a full time job is 10 years). The ES has assessed that the estimated gross local jobs created by this temporary exploration activity is nineteen (FTEs).

Further details on the local economic impacts of the exploration works can be found at Chapter 9 of the Environmental Statement.

Community Benefit

The shale gas industry, including Cuadrilla, has set out their commitment to consulting with local communities in the Shale Gas Community Engagement Charter. It outlines the commitment to having an open dialogue with the public and the steps that will be taken to address concerns around safety, noise, dust, truck movements and other environmental issues. In response to the Charter Cuadrilla have committed to pay £100,000 in community benefits for each well that is hydraulically fractured. For Preston New Road this could result in a total payment of £400,000 to support local communities. Cuadrilla has entered into an agreement with the Community Foundation for Lancashire, under which this body will work with communities that are local to the well site to facilitate how the community benefit fund will be spent.

5.4.2 Production phase benefits

Local economic impact at production stage

It is not possible to predict whether production of shale gas would be viable from the Exploration Site until the exploration activities have taken place. If the Site is viable for production then a separate planning permission will be required, informed by an environmental impact assessment, for production to proceed. If production takes place there will be additional economic benefits associated with production. The scale and extent of benefits are difficult to estimate and have to be considered in the context of production from a number of potential sites within Cuadrilla’s licence area.

With regard to local economic impacts it is not possible at this point in time to accurately define the scale of production in terms of the number of wells required and the volumes of gas that could be produced within the wider licence area, or in the UK.

With regard to job creation, the Strategic Environmental Assessment (SEA) for Round 14 Onshore Oil and Gas Licensing (DECC, December 2013) concludes that whilst the number of jobs created would constitute a substantial boost to employment in the oil and gas sector nationally there is uncertainty on the extent to which the local labour markets associated with sites will benefit. The SEA states that:

“The potential for these jobs to directly benefit those local communities in which sites are located would depend on the balance between the skilled and unskilled construction, oil and gas posts required and the availability of individuals in the local labour market with the required skills and the relevant experience”.

Wider economic benefits from shale gas production have been set out within a report published by the Institute of Directors. This captures the range of benefits from jobs, monetary investment, energising homes and gas production, as summarised below.

Table 6: Potential economic characteristics of a 10-well pad of 10 laterals

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Production</td>
<td>31.6 billion cubic feet (bcf)</td>
<td>Total over lifespan</td>
</tr>
<tr>
<td>Investment</td>
<td>£142 million</td>
<td>Total capex plus opex over lifespan</td>
</tr>
<tr>
<td>Jobs</td>
<td>Peak of 406</td>
<td>Total of direct, indirect and induced</td>
</tr>
<tr>
<td>Energy to homes</td>
<td>Peak of 260,000 homes powered or 145,000 homes heated</td>
<td>Assuming losses in generation (for electricity) and transmission / distribution (for both electricity and gas)</td>
</tr>
</tbody>
</table>

Local community benefit at production stage

In the event that there are viable reserves suitable for production at Preston New Road and planning permission is secured for production then additional community payments will be made. The Community Engagement Charter for Oil and Gas from Unconventional Reservoirs states that the industry commits to:

“Provide a share of proceeds at production stage of 1% of revenues, allocated approximately 2/3rd to the local community and 1/3rd at the county level.”

National economic impact

The principal economic benefits at the national level are associated with the production stage and at this stage are indicative estimates. It is predicted that the beneficial economic impacts from the production in the Bowland Basin area of Lancashire in combination with other licence areas in the UK to the national economy would be significant. Economic benefits, at a national level, were assessed as part of the Strategic Environmental Assessment (SEA) for onshore oil and gas licensing, DECC – December 2013. The SEA concluded that:

“During all stages of the unconventional oil and gas exploration and production lifecycle there would be both direct and indirect (within the supply chain) job creation as well as jobs induced via expenditure of employed staff. During Stage 3 (production development) it is anticipated that the scale of job creation has the potential to be significant. Under the high activity scenario, it is estimated that at its peak, some 16,000-32,000 full time equivalent (FTE) positions (including direct, indirect and induced jobs) would be generated. This would represent an increase in the level of employment supported by the UK oil and gas industry sector. For the high activity scenario, assuming a 12 year phasing of development, the peak of job generation would last for a four year period, beginning 6 years after development started.”

19 Source: Table 35 Getting Shale Gas Working, Institute of Directors, June 2013.
20 UKOOG, June 2013. Shale Gas Engagement Charter
“There may also be the potential creation of training opportunities (for example, apprenticeship schemes) for the benefit of the local community”.

Economic benefits of shale gas extraction have also been set out within a report of the Institute of Directors (Getting Shale Gas Working, June 2013) as follows:

“1. Shale gas could replace a portion of gas imports. Whether UK shale gas production will be sufficient to reverse the rise in imports, or whether it will simply slow the rise in imports, is an open question. The prospect of either, however, should be welcomed, both for balance of payments and energy security reasons.

2. It could represent a new source of tax revenues to replace in part falling receipts from Fuel Duty and the North Sea. Shale production is unlikely to make a meaningful contribution to reducing the present budget deficit but, like the North Sea, it could help to support the public finances for many decades.

3. Shale gas production could create well-paid jobs in parts of the country that need them most, helping to rebalance the UK’s economy. Job creation is likely to spread beyond the industry itself and its supply chain, with the chemical sector in particular likely to benefit.”

5.5 Environmental impact and mitigation

The data and findings of the Environmental Impact Assessment contained in the Environmental Statement submitted with the planning application provide an assessment of the principal environmental effects which may be associated with the proposed development.

The EIA has concluded that the significant effects, following incorporation of mitigation, associated with the Preston New Road Site exploration works are limited to those associated with the visual impact of the proposals, lighting effects and waste fluid disposal. The visual effects would be temporary, of relatively short duration, for example each well would take approximately 3 months to drill. Also mitigation measures are proposed to help reduce and soften the view of site and equipment within the site.

The ES has concluded that there are no other significant environmental effects associated with the Preston New Road proposals. In order to ensure that the project follows best practices and seeks, wherever possible, to minimise the level of impact on the environment, the ES recommends mitigation measures for effects that are of minor or negligible nature. This includes the measures set out in the table below.
Table 7: Principal EIA findings and mitigation measures

<table>
<thead>
<tr>
<th>ES Topic</th>
<th>Effect</th>
<th>Mitigation</th>
<th>Residual effect</th>
</tr>
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</table>
| **Air Quality**                 | There would be potential for 14 effects on air quality and dust during the construction, operation and decommissioning and restoration stages. These effects are associated with vehicle emissions, emissions from plant and equipment and flare emissions. All effects would be **not significant**. | Other than embedded mitigation, further mitigation measures include best practice measures according to IAQM guidance:  
  - Monitor dust generation during the excavation of topsoil and subsoil and the construction of the earth bunds;  
  - Provide contact details for anybody being affected by dust generation from the Project to raise concerns; and  
  - If monitoring or community complaints identify a dust generation issue, implement best practicable means to control the source of emission or to mitigate the effect (e.g. carry out different construction works or damp down soils to prevent it being blown by the wind). | **Not significant** |
| **Water Resources and Flood Risk** | There would be potential for 18 effects on water resources and flood risk during the construction, operation, decommissioning and restoration stages.  
  Ten of these would be negligible effects associated with the risk to availability of water supplies in mains network resulting from demand requirements. Two would be negligible effects associated with increased runoff leaving the Site and entering the field drainage when compared to pre-developed condition. Four would be minor beneficial effects associated with increased runoff leaving the Site and entering the field drainage.  
  There would be one minor adverse effect during the hydraulic fracturing stage associated with the risk to availability of water supplies in mains network resulting from demand requirements. There would be one minor adverse effect associated with increased runoff leaving the Site.  
  All effects would be **not significant**. | Other than embedded mitigation, further mitigation measures include:  
  - Install PSV on network to reduce risk of bursts.  
  - More extensive reuse of flow-back water in the fracturing fluid to reduce water demand.  
  - Consider use of collected rainwater in the fracturing fluid to reduce water demand. | **Not significant** |
| Ecology | There would be potential for 13 ecological effects during the construction, operation, decommissioning and restoration stages. Effects are associated with:  
- The loss of habitat (e.g. sections of hedgerow, trees and grasslands);  
- Potential disturbance to bat activity and movement (from the activities and equipment present at the wellpad);  
- Loss of habitat for nesting birds (e.g. removal of trees and hedgerow) and increased disturbance from activities and noise.  
All effects would be **significant**. | Other than embedded mitigation, further mitigation measures include:  
- Use of measures to reduce the magnitude of lighting impacts on feeding bats (directing lights away from hedgerows and waterbodies that bats may use for feeding);  
- Replace any lost hedgerows and trees;  
- Vegetation clearance will either occur outside of bird breeding season or following confirmation that there are no breeding birds using the vegetation for nesting prior to its removal;  
- A qualified ecologist will undertake pre-start checks before vegetation and construction works commence; and  
- Implement noise attenuation measures (as set out in the assessment of noise impacts) to minimise disturbance to sensitive species of wildlife. | Not significant |
| Landscape | There would be potential for a total of two effects on landscape during the construction and the decommissioning and restoration stages. Effects are associated with the localised direct change in addition to indirect effects on landscape character setting and tranquillity.  
Both effects would be **not significant**. |  
- Removal and storage of site subsoil and topsoil into 2-3m high bunds to provide a degree of localised screening.  
- Undertake tree survey to B.S. 5837 and implement root protection plans.  
- Planting of native trees and shrubs.  
- Existing hedgerows allowed to grow taller.  
- Task lighting to comply with lighting guidance.  
- Targeted offsite hedgerow and hedgerow tree planting undertaken between PRoWs and Site.  
- Minimal working area, and works activity restricted to daylight. | Not significant |
| Visual Amenity | The main significant visual effects would occur during the drilling, hydraulic fracturing and flow testing stages. Of the 16 representative principal viewpoints that were assessed, seven are judged to be **significantly** adversely affected (major adverse visual effects on four visual receptors and moderate adverse visual effects on three visual receptors) |  
- Planting to fill gaps in existing hedgerows where they increase the visibility of the site.  
- Some planting of trees and shrubs around the periphery of the well pad to break up the views of the Site.  
- Design of the temporary lighting to comply with lighting guidance for rural areas. | **Significant but temporary (over a two year period)** |
| Land Use | There would be potential for three effects on land use during the construction and operational stages. Of these, there would be one moderate/major adverse effect associated with the displacement of soil resources. This effect would be **significant**. The following two effects would be **not significant**:  
- A negligible effect associated with the loss of productive agricultural land.  
- A minor adverse effect associated with the loss of farmable area to the holding affected. |
<table>
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<tbody>
<tr>
<td>Noise</td>
<td>There would be potential for 14 noise effects during the construction, operation, and decommissioning and restoration stages. These effects are associated with the operation of the plant and machinery within the Site and the movement of vehicles. Thirteen effects would be negligible adverse and <strong>not significant</strong>. However, if hydraulic fracturing occurs at night, the effect from the pumping operations would be adverse and <strong>significant</strong>.</td>
</tr>
<tr>
<td>Transport</td>
<td>During the construction, operation, and decommissioning and restoration stages there would be a combination of slight adverse or neutral effects on driver delay, pedestrian delay, pedestrian amenity, severance, accidents and safety, and dust and dirt. All effects would be <strong>not significant</strong>.</td>
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</table>

**Such significant effects would be temporary and the worst case would not occur continually over the twenty nine months for the drilling, hydraulic fracturing and flow testing of the four wells.**

It is considered that any mitigation, such as offsite screening for example, is not likely to reduce these effects particularly in the context of the short-term, temporary, reversible duration of the proposed development.

- Implementing Defra best practice measures for the excavation and handling of soils.  
- Follow Defra best practice for reinstatement.

**Noise**

- Other than embedded mitigation, further mitigation is to only operate fracturing pumps during weekday daytime and Saturday mornings.

**Transport**

- A Traffic Management Plan will be developed and formally agreed with the Local Highway Authority as part of the planning permission. The EIA has not identified any significant effects on transport and therefore there is no requirement under the EIA Regulations to specify mitigation measures. However the Traffic Management Plan may include the following:  
  - Vehicle and route restrictions.

Not significant
### Archaeology and Cultural Heritage

There would be potential for six effects on archaeological and cultural heritage assets during the construction, operation, decommissioning and restoration stages. These effects are associated with:

- the exposure or removal of hitherto unknown archaeological remains; and
- the effect on heritage assets through an increase in noise and vibration due to traffic movement.

During the construction stage and extended flow testing stages, the effects of exposure or removal of hitherto unknown archaeological remains would be **significant**. All other effects would be **not significant**.

Other than embedded mitigation, further mitigation measures include:

- Undertake an archaeological strip map and record exercise during the excavation of the topsoil.
- Programme of archaeological investigation (watching brief).

### Lighting

There would be potential for four lighting effects at each stage of the Project. These effects are associated with light spill beyond Site boundary (including light directed into windows), skyglow, light source intensity and building luminance.

During the construction, decommissioning and restoration light spill, skyglow and light source intensity are minor adverse and **not significant**. Building luminance is negligible and **not significant**.

During the drilling, hydraulic fracturing, initial flow testing and extended flow testing, all effects would be major adverse and **significant**.

- Following lighting industry best practice for the arrangement of lighting on Site,
- Using covers to prevent light spilling outside of the areas requiring illumination; and
- Using low powered lighting to illuminate other areas of the Site that require lighting.
- The use of low key security lighting- potentially movement sensor controlled or ‘part-night’ dimming.

**Significant** (effect of skyglow and building luminance- however magnitude of impact would be reduced by mitigation measures)  
**Not significant** (effect of light spill beyond Site boundary and light source intensity)
| Resources and Waste | There would be potential for 24 effects on resources and waste during the construction, operation and decommissioning and restoration stages. These effects are associated with inert waste, non-hazardous solid waste, hazardous waste, wastewater, industrial wastewater, low level waste and flow back fluid.

It is anticipated that effects relating to flow back fluid during initial flow testing and extended flow testing stages would be very substantial and significant. All other effects would be either negligible or slight and not significant. |
|---|---|
| | • Identify opportunities for off-site re-use, recycling and recovery of inert waste and non-hazardous waste.
| | • Investigate the opportunities to access Best Available Techniques to treat and recover the drill cuttings contaminated with LTOBM.
| | • Regularly test the surface water of the pad to identify whether it is possible to send the surface water to the local watercourse or use the surface water in the hydraulic fracturing process.
| | • Investigate the potential to recycle and treat the flow back fluid from the hydraulic fracturing process to reduce the waste generated.
| | • Identify appropriate treatment capacity with alternative treatment facilities.
| | • Discuss any issue relating to insufficient capacity with the EA and other stakeholders. |
| Greenhouse gas (GHG) emissions | There would be potential for GHG emissions during the Project. Effects are associated with GHG emissions to the atmosphere during all stages of the Project (from traffic movement generated from the project, waste minimisation and generation and disposal of waste) and GHG emissions from the flare. Although potential GHG emissions from the exploration works have been calculated, there is no recognised methodology to determine the significance of the emissions associated with the Project. Other than embedded mitigation, further mitigation measures include:
| | • Review opportunities to source stone from the well pad and access track from secondary aggregate sources (The measures listed above would generate fewer GHG emissions compared to treatment or landfill and have a positive effect on the Project’s GHG emissions.)
| | • Where practical, equipment used will remain on Site between uses. (This measure may reduce the number of traffic movements, hence reducing the associated GHG emissions.) |
| Induced Seismicity | There would be potential for nine effects on induced seismicity during the hydraulic fracturing stage of the Project. These effects are associated with ground motion hazard, well integrity, liquefaction, slope instability, and cumulative effects of settlement and fluid migration. All effects would be negligible or minor and not significant. Other than embedded mitigation, no further mitigation measures are required. |
| | Significant (effect of flow back fluid during initial flow testing and extended flow testing stages—magnitude of impact is very substantial, but could be lower if there are major increases in treatment capacity nationally) Not significant (for all other effects) | N/A  |
| Community and Socio-Economics | At each stage of the Project, there would be potential for four effects on the community and socio-economics. These effects are associated with employment; public access and recreational amenity; crime and public safety; and wider economic benefits.

Across all stages of the Project, the effects on employment would be low or medium beneficial and not significant.

The effects on public access and recreational amenity would be negligible and not significant.

During the construction stage, the effects on crime and public safety would be medium adverse and potentially significant. Across all other stages effects on crime and public safety would be negligible and not significant.

The magnitude of effects associated with wider economic benefits varies between each stage of the Project (either low beneficial, medium beneficial or negligible), however all effects are not significant. |
| Hydrogeology and Ground Gas | During all stages of the Project, potential hydrogeology and ground gas effects would be associated with leaks or spills entering the wider environment (the soil above the wells, groundwater, surface water or the atmosphere) leading to pollution or contamination.

All effects would be minor and not significant. |

| Other than embedded mitigation, further mitigation measures include:
- Consider approach to sourcing labour from local labour market to attempt to fairly maximise the local job creation.
- Use of local contractors and suppliers for the construction works.
- Ensure all best practice measures are employed to minimise disturbance to transport infrastructure which could result in congestion and delays on the local transport network. |

| Not significant | Not significant | Not significant |
In conclusion the Preston New Road EIA found that the environmental effects of the proposals are of a relatively low order through incorporation of measures and practices to protect, safeguard and in some cases enhance the environment.

5.6 Environmental Risk Assessment

An ERA has been prepared in order to provide assurance to the Department for Energy and Climate Change (DECC), that an appropriate risk management structure is in place, and that environmental risks have been identified and will be managed appropriately or controlled. DECC has requested the compilation of a pre-planning ERA which includes public stakeholder engagement input, for each proposed hydraulic fracturing site. The full report was submitted to DECC for comment on 24 April 2014.

The ERA addressed potentially significant environmental and human health risks associated with the lifecycle of the four wells. An advantage of undertaking an ERA is that it considers all potential risk events in a consistent manner which allows comparison and prioritisation of the key risks.

The high level ERA was used to inform the scope of the detailed assessment of risks and development of mitigation measures presented in the Environmental Statement. As is routine in operational permitting, environmental risk assessments will also form part of future operational permit applications. The assessment allows for embedded mitigation measures that will be in place as part of the design of the Project.

The ERA report presents a high level assessment of the key risks relating to the proposed exploration activities. A total of 15 high-level risks are presented. A high-level risk is one which encompasses a number of individual specific risks which all have similar pathways and receptors. Risks have been assessed using the risk matrix and definitions presented by the EA (2013).

All 15 risks are assessed to be low without further mitigation beyond the mitigation measures already embedded as required by the regulators and planning authorities and those intended to be incorporated into the Project and/or in place as part of Cuadrilla’s working practices. This assessment also takes into account the specific features of the site and the temporary nature of the proposed exploration works.
6  Accordance with planning policy

This section of the Statement examines the relevant national and local planning policies and guidance relevant to the proposed development. It demonstrates how the proposal has been informed by, and is in accordance with, the relevant framework of policy and guidance.

The review has been undertaken through a thematic approach focusing on the key relevant factors relating to this application and ensuring coverage of all relevant policy and guidance.

6.1  Relevant policy and guidance

6.1.1  Statutory development plan

Section 38 (6) of the Planning and Compulsory Purchase Act 2004 states that “If regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise”.

The Development plan comprises:

- Joint Lancashire Minerals and Waste Development Framework Core Strategy DPD, February 2009
- Joint Lancashire Site Allocations and Development Management Policies DPD, September 2013
- Saved policies of the Fylde Borough Local Plan, May 2003

6.1.2  Other policy and guidance material to the application

Emerging Fylde Local Plan

The emerging Fylde Local Plan will cover the period to 2030. A preferred options document for part 1 of the Local Plan was produced for consultation in June 2013, with an expected adoption date of December 2014. An adoption date has not been confirmed for the Fylde Local Plan Part 2: Site Allocations to 2030.

National policy and guidance

The following national planning policy documents and guidance are relevant and material to the proposal:

- National Planning Policy Framework (NPPF), March 2012
- National Planning Policy Guidance (an online resource), March 2014
- Overarching National Policy Statement for Energy (EN1), July 2011

Other material policy statements

- Gas Generation Strategy, DECC, December 2012
• “The Myths and Realities of Shale Gas Exploration”, speech by the Secretary of State of Energy and Climate Change, September 2012
• Annual Energy Statement, DECC. October 2013.

6.2 The NPPF and Sustainable Development

The NPPF is founded on the presumption in favour of sustainable development (paragraphs 11 - 14) “which should be seen as a golden thread running through both plan-making and decision taking” (paragraph 14).

Paragraph 14 of the NPPF clarifies that:

“For decision taking this means:

• approving development proposals that accord with the development plan without delay; and

• where the development plan is silent, or relevant policies are out-of-date, granting permission unless:

  - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework as a whole; or

  - specific policies in this Framework indicate development should be restricted.”

With respect to adverse impacts, the impacts of the proposed development at Preston New Road would not outweigh the likely benefits.

Indeed, the ES concludes that with appropriate mitigation measures in place there would only be only two areas of significant temporary adverse effects on local communities. These effects relate to views of the exploration activities from nearby areas and effect of sky glow and building luminance. In addition a significant effect is identified in relation to the treatment of waste flow back fluid from the initial flow testing and extended flow testing stages. Furthermore, the Sustainability Appraisal (SA) contained within Appendix D of this document seeks to demonstrate the balanced consideration of social, economic and environmental conditions and concludes that for the majority of the SA criteria the project either has no effect or the effects are negligible.

Paragraph 14 is translated to local planning policy by Policy NPPF1 of the Site Allocation and Development Management DPD. The policy confirms that the Council will take a positive approach to decision making in accordance with the presumption in favour of sustainable developments and confirms the approach to granting permission as set out in the NPPF.

6.3 Sustainable Use of Minerals

Section 13 of the NPPF (Facilitating the sustainable use of minerals) provides specific guidance in relation to the preparation of local policy and the determination of planning applications.

Paragraph 143 of the NPPF advises local authorities that local plans should “set out environmental criteria, in line with the policies of this Framework, against
which planning applications will be assessed so as to ensure that permitted operations do not have unacceptable adverse impacts … and take into account the cumulative effects of multiple impacts from individual sites and/or a number of sites in a locality.”

**Paragraph 144 of the NPPF** provides guidance to local authorities in regard to the determination of planning applications for minerals development. This includes a range of environmental, social and economic considerations. At the local level these are reflected by **Policy CS5 of the Joint Core Strategy, Achieving Sustainable Minerals Production**. This policy states that criteria will be developed for the consideration of minerals proposals outside of the plan making process to ensure that a range of environmental, social and economic considerations are taken into account

- the protection of water, air, soil and biodiversity;
- protecting features and landscapes of historic and cultural importance and their setting;
- preventing fluvial flood risks or surface water flooding;
- protecting the amenity, health, economic well-being and safety of the population;
- protection of infrastructure and services; and
- to ensure sensitive aftercare and restoration takes place.

This is echoed by **Policy DM2 (Development Management) of the Site Allocation and Development Management DPD**. The policy states that:

“Development for minerals or waste management operations will be supported where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that all material, social, economic or environmental impacts that would cause demonstrable harm can be eliminated or reduced to acceptable levels. In assessing proposals account will be taken of the proposal’s setting, baseline environmental conditions and neighbouring land uses, together with the extent to which its impacts can be controlled in accordance with best practice and recognised standards.”

Policy DM2 goes on to state that “In accordance with Policy CS5 and CS9 of the Core Strategy developments will be supported for minerals or waste development where it can be demonstrated to the satisfaction of the minerals and waste planning authority, by the provision of appropriate information, that the proposals will, where appropriate, make a positive contribution to the:

- **Local and wider economy**
- **Historic environment**
- **Biodiversity, geodiversity and landscape character**
- **Residential amenity of those living nearby**
- **Reduction of carbon emissions**
- **Reduction in the length and number of journeys made**”
For the shale gas exploration proposals at Preston New Road the objectives of these policies have been achieved, in accordance with the examples set out in policy DM2, in relation to the following key points.

- Economic benefits at the exploration stage and wider benefits to the local economy as well as the national economy that will follow if sites go into production.
- The control of emissions from the proposal including dust, noise, light and water.
- Restoration within agreed time limits, to a beneficial after use and the management of landscaping and tree planting.
- The control, through conditions, of the numbers, frequency, timing and routing of vehicles to and from the site.

The Environmental Statement demonstrates that the considerations set out in Policy CS5 would be achieved with appropriate mitigation in place. As per Policy DM2, the ES demonstrates that effects can be reduced, through the implementation of effective mitigation, to acceptable levels.

6.4 Energy

NPS EN-1 identifies the fundamental importance of energy to our way of life (paragraph 3.2.1). It refers to the need for energy “to heat and light our homes, to produce and transport food, to travel to work, around the country or the world. Our businesses and jobs rely on the use of energy…..”

Paragraph 3.3.4 articulates the benefits of adopting a diverse mix of sources of power generation. In respect of fossil fuel generation (including gas), the NPS confirms “fossil fuel generation can be brought on line quickly when there is high demand and shut down when demand is low, thus complementing generation from nuclear and the intermittent generation from renewables.”

The NPS establishes a planning horizon to 2025 given the “urgent need” for new energy infrastructure to be brought forward as soon as possible (paragraph 3.3.15.) The urgency is explained in part at paragraph 3.37 of the NPS, which confirms the planned closure of 22GW of electricity generating capacity by 2020 and “about 10GW of nuclear generating capacity is expected to close over the next 20 years.”

Whilst Government supports investment in low carbon energy (e.g. wind and nuclear) to meet the UK’s carbon reduction targets, the NPS places considerable emphasis on the continuing role of gas as part of the energy mix, in part to replace life expired coal and nuclear generating capacity. This is articulated at paragraphs 3.6.1 and 3.6.2.

NPS EN-1 also gives important context to the demand for natural gas in the UK. The text at paragraph 3.8.1 notes:

“The UK is highly dependent on natural gas, which is used in roughly equal quantities in domestic households (largely for space heating purposes), for electricity generation (generating just over two fifths of electricity in 2010) and across a range of businesses......... The share of natural gas in UK primary energy demand (including electricity generation) is expected to fall from 41% in
2010 to around 33% in 2020, and then could rise again to around 36% by 2025 as the use of coal for electricity generation declines.”

NPS EN-1 paragraph 3.8.4 also provides information relating to the UK’s reliance on imports, reporting that the UK became a net importer of gas in 2004 and in 2011 around 40% of the UK’s net demand for gas was expected to be met by net imports. Future demand is estimated to be circa 70 billion cubic metres (bcm) in 2020. Net import demand is forecast at 38 bcm in 2020 and 53 bcm 2025 (compared to 30 bcm in 2010). Current and forecast gas production and import figures are presented in Figure 3.1 of NPS EN-1, which illustrates the increasing reliance on imports and explains the concern expressed in the NPS for the UK’s security of supply.

Given potential risks associated with global political instability and volatile energy markets, the figure confirms a forecast for continued UK reliance on gas imports. To address this, the NPS confirms the need for new gas infrastructure to minimise future supply risks. The NPS relies on DECC’s analysis of risks and reports at paragraph 3.8.8, that “whilst the gas market is largely robust to a range of adverse events, the risk of shortfalls in supply cannot be ruled out, nor the risk that there may need to be significant increases in wholesale gas prices in order to balance the market.”

The NPS therefore identifies new gas infrastructure requirements, including the increasingly important role for shale gas at paragraph 3.8.18:

“A competitive gas market across the European Union, which may include potential gas sources such as shale gas or gas from coal gasification, will have an increasingly important part to play in meeting the needs of UK and other European gas consumers.”

Paragraph 3.8.19, therefore, confirms the continuing importance of gas as part of the UK’s energy mix:

“Gas is the cleanest and most reliable fossil fuel. It is likely to continue to be a central part of GB’s energy mix during the transition to a low carbon economy:

- In the domestic (household) sector, where it remains the fuel of choice for cooking and heating;
- In the industrial sector, as a source of energy and as a feedstock;
- In the power generation sector, as a reliable source of flexible power generating capacity, to back-up intermittent renewables, so underpinning security of supply and price stability in the electricity market;
- gas demand for power generation could increase substantially due to the greater use of electricity for heat and transport.”

EN1 sets out a clear objective to decarbonise the UK’s energy supply but also an urgent need to increase the security of that supply in order to avoid the economic and social risks of an energy shortage. The proposed solution is to deliver a diverse range of energy infrastructure with an important and potentially increasing role for gas generation, which is identified as being the cleanest and most reliable fossil fuel. Shale gas is also recognised as having the potential to have an increasingly important role to play as part of the UK’s energy mix. The proposals at Preston New Road are supported by the objectives and policies of EN1.
The ethos of NPS EN1 is reflected by the more recent National Planning Policy Guidance (NPPG) (Planning for Hydrocarbon extraction), which states that “mineral planning authorities should take account of Government energy policy, which makes it clear that energy supplies should come from a variety of sources. This includes onshore oil and gas, as set out in the Government’s Annual Energy Statement.”

The Annual Energy Statement, 2013 states that:

“in managing the transition to a low carbon energy mix, gas (as the cleanest fossil fuel) is expected to continue to play a major role. So continuing to ensure diversity of gas supplies remains important. Growth of unconventional oil and gas, for example, may help to ensure this.”

“The Government is committed to ensuring that the regulatory, planning and fiscal regimes enable the onshore industry to establish what the commercial prospects in the UK may be for unconventional oil and gas. The Government will make sure that the exploration and extraction can be carried out safely and with full regard for the protection of the environment”

“The Government welcomes the recent investment in the industry by Centrica, which demonstrates the attractiveness of Bowland shale as an investment proposition”.

DECC published the UK’s Gas Generation Strategy on 5th December 2012. The document builds on many of the key points drawn out from NPS EN-1 above and confirms Government’s commitment to gas as a key part of the energy mix. The purpose of the Strategy is to reduce uncertainty relating to gas generation for investors. The Strategy concludes (at paragraph 5.24) in respect of shale gas:

“If it can be shown to be economic and safe, domestic shale gas production could offer a significant economic opportunity for the UK, with the prospect of new sources of indigenous supply, new industrial activity and skilled jobs.”

6.5 Transport and Access

The NPPF, at paragraph 38, encourages solutions which support reductions in greenhouse gas emissions and reduce congestion.

Paragraph 32 requires decisions on planning applications to take account of whether:

- opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;

- safe and suitable access to the site can be achieved for all people; and

- improvements can be undertaken within the transport network that effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

Policy DM2 of the Site Allocation and Development Management Plan states that:
“Development for minerals or waste management operations will be supported where it can be demonstrated to the satisfaction of the mineral and waste planning authority, by the provision of appropriate information, that all material, social, economic or environmental impacts that would cause demonstrable harm can be eliminated or reduced to acceptable levels.”

Policy DM2 goes on to state that “reduction in the length and number of journeys made” is one of the considerations and an applicant can demonstrate compliance with this aspect of the policy through “controls of the numbers, frequency, timing and routing of transport related to the development”

The supporting information to policy DM2 states that “if the adverse impacts of operations cannot be reduced to acceptable levels through careful working practices, planning conditions or legal agreements, then the operation will not be permitted.”

The supporting information then goes on to describe the sorts of controls and measures that should be considered:

“Hours of operation can also be imposed on planning permissions as a means of minimising disturbance to neighbours. Even if site operations do not commence until the permitted hour, HGVs may arrive at the site entrance before this time, thus negating the benefits of controlling hours of operation. The control of these early morning HGV movements should be undertaken. There is also scope to restrict hours of working in order to control vehicle movements at peak times, and thus reduce the development’s impact on the road network.”

The Transport Assessment, which forms part of the EIA, has concluded that the traffic generated by the proposed development is at levels that are acceptable and that there are measures and controls that can be used to ensure that these levels are achieved. These measures are summarised in table 7 of section 5.5 of this Statement.

6.6 Land use and Agriculture

Land use allocations

Policy CS1 of the Joint Core Strategy seeks to safeguard Lancashire’s Mineral Resources. It confirms that “minerals will only be extracted where they meet a proven need for materials with those particular specifications.” It explains that “mineral resources with the potential for extraction will be identified as Mineral Safeguarding Areas and protected from permanent sterilisation by other development.” Policy CS4 of the Joint Core Strategy goes on to explain the process for the identification and allocation of areas for minerals extraction. The policy asserts that in the plan period, sites will be identified for sand and gravel but no other sites will be identified for the extraction of other minerals.

These policies predate the current proposals for shale gas exploration or extraction in Lancashire. As such the Site is not within a minerals safeguarding area nor are there any sites identified within any of Lancashire’s DPDs for shale gas exploration of extraction. It is not considered that the proposals present a departure from the Development Plan in this respect; rather it is the case the Development Plan is silent and out of date with regard to the specific issue of land use and shale gas exploration and extraction. A report to Lancashire’s Joint
Advisory Committee (1st May 2014) confirmed that the absence of policy on unconventional oil and gas within the Local Development will be addressed through a review of the Joint Lancashire Mineral Local Plan to commence later in 2014.

**Countryside**

**Policy SP2 of the Fylde Borough Local Plan** sets out the policy approach in regard to the proposed use of land within Countryside Areas. The policy states that development will not be permitted within Countryside Areas unless within the following categories:

1. That essentially required for the purposes of agriculture, horticulture or forestry; or other uses appropriate to a rural area, including those provided for in other policies of the plan which would help to diversify the rural economy and which accord with Policy SP9;

2. The rehabilitation and re-use of permanent and substantial buildings which are structurally sound, in line with policies SP5 and SP6;

3. The re-use, refurbishment or redevelopment of large developed sites in line with Policy SP7;

4. Minor extensions to existing residential and other buildings;

5. Development essentially needed for the continuation of an existing enterprise, facility or operation, of a type and scale which would not harm the character of the surrounding countryside.

The Site is within the Countryside Area as designated within the Local Plan Proposals Map. Shale gas related development is not one of the uses listed as appropriate within the countryside and would therefore present a departure from this policy. However, it is considered that material considerations suggest that an exception should be made to this policy in respect of the temporary nature of exploration operations and the need to explore and ultimately recover mineral resources where they occur. Government policy, need and the particular locational demands of mineral resources are important material considerations (as described in the Government’s NPPF and associated guidance) that justify a departure from Policy SP2. This was the case with the applications for shale gas exploration and other applications for mineral extraction that have already been permitted in Lancashire.

More recently, the emerging Fylde Local Plan includes Policy GD1 which states that “development will be directed towards existing settlements, and within settlement boundaries ... developments outside settlement boundaries will be assessed against national policy and any relevant Local Plan policies.”

Shale gas exploration is proposed to take place outside of settlement boundaries given the need to explore and ultimately recover mineral resources where they occur, primarily within countryside locations.

**Agricultural land**

**Paragraph 112 of the NPPF** is concerned with taking account of the benefits of the best and most versatile agricultural land. It states that “where significant development of agricultural land is demonstrated to be necessary local planning
authorities should seek to use areas of poorer quality land in preference to higher quality”.

**Policy EP 22 of the Fylde Local Plan** protects the permanent loss of the best and most versatile agricultural land (Grades 1, 2 and 3a) by preventing development where it could reasonably take place on previously developed sites, on land within the boundaries of existing developed areas or on poorer quality agricultural land. This policy is soon to be replaced by **Policy EC3 of the emerging Fylde Local Plan**, which similarly prevents the “loss of the best and most versatile agricultural land outside settlement boundaries... unless it is necessary to deliver development allocated in the Local Plan, or for strategic infrastructure.”

The Exploration Site and access covers an area of approximately 2.65ha and is located within a parcel of agricultural land of around 7.2 ha. The complete parcel of land is bounded to the north and east by other agricultural land and to the south by Preston New Road. A detailed survey of soil characteristics at the Site and surrounding areas show the agricultural land quality to be limited by soil wetness. As such, 1.1 ha of the land at the Site is limited to Subgrade 3b (moderate quality), and the remainder of the area (1.55ha) to Subgrade 3a (good quality). The land is therefore a resource of medium to low sensitivity.

Chapter 13 of the ES reports impacts on land use. It concludes that the loss of agricultural land from production and as a soil resource is not significant; ensuring that recommended mitigation takes place.

### 6.7 Economic development

**The NPPF** emphasises the role of the planning system in supporting sustainable economic growth. “Planning should operate to encourage and not act as an impediment to sustainable growth. Therefore significant weight should be placed on the need to support economic growth through the planning system” (**Paragraph 19**). The NPPF confirms that “The Government is committed to securing economic growth in order to create jobs and prosperity, building on the country’s inherent strengths, and to meeting the twin challenges of global competition and of a low carbon future” (**Paragraph 18**).

More specifically **paragraph 144 of the NPPF** states that when determining planning applications, LPAs should “give great weight to the benefits of mineral extraction, including to the economy.”

Locally, **Policy DM2 of the Site Allocations and Development Management DPD** confirms that developments for minerals will be supported where appropriate information is provided to demonstrate that the proposal will make a positive contribution to the local and wider economy in addition to other factors.

Shale gas extraction will make a positive contribution to economic growth at a local and national scale.

Locally, positive economic impacts would occur from expenditure at the exploration stage. It has been estimated that around 17% of all expenditure from the exploration phase is expected to occur at the sub-regional (Lancashire) level, for a single well this would amount to approximately £1.7m, which equates to £5.3m at the UK level. Expenditure benefits would also come in the form of an endowment community benefit payment of £100,000 per hydraulically fractured well. Direct employment benefits created during this temporary exploration
activity would include nineteen full time equivalent local gross jobs in total. These effects are detailed in Chapter 9 of the Environmental Statement.

The Project would mark a positive step to the production of shale gas in the UK, which would decrease UK gas imports, contribute to national energy security and generate higher tax revenues.

**6.8 Flood risk**

The NPPF provides policy concerning the need to respond to the challenge of climate change, flooding and coastal change. In particular, there is a focus on flood risk and **Paragraph 100** articulates that “inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at high risk, but where development is necessary, making it safe without increasing flood risk elsewhere.” **Paragraph 103** states that when determining planning applications, Local Planning Authorities should only consider development in areas at risk of flooding where they have been appropriately informed by a site-specific flood risk assessments and if applicable, the exception test.

This is reflected by **Policy CL1 of the Fylde Local Plan Preferred Option, Flood Alleviation and Water Efficiency**. The policy states that “planning decisions should follow the sequential approach to the location of development, as required under Paragraph 100 of the NPPF.” The policy requires that development minimises flood risk impacts on the environment and mitigates against the likely effects of climate change. This should include the use of sustainable drainage systems and steering development away from areas of high flood risk.

More specifically, **Policy CS5 of the Joint Core Strategy** states that criteria will be used to consider minerals proposals including ensuring that proposals do not adversely contribute to fluvial flood risk or surface water flooding.

The proposed site is located within the Environment Agency’s designated flood zone 1 and is therefore at a low risk of fluvial flooding. A Flood Risk Assessment has been submitted with this planning application. It concludes that “the development will not increase the risk either on or off-site as a result of the development proposals.” Various mitigation measures are summarised in table 7 of section 5.5 of this Statement, such as containment measures to ensure no detrimental effects on areas downstream of the site.

**6.9 Biodiversity**

**Paragraph 118 of the NPPF** provides specific guidance with regard to biodiversity when determining planning applications. It states that “When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity” and sets out several principles to be followed, which are paraphrased below:

- If significant harm resulting from a development cannot be avoided (through locating on an alternative site), adequately mitigated, or compensated for, then planning permission should be refused;
- Proposed development likely to have an adverse effect on a Site of Special Scientific Interest should not normally be permitted;
- Development proposals where the primary objective is to conserve or enhance biodiversity should be permitted;
- Opportunities to incorporate biodiversity in and around developments should be encouraged;
- Planning permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland, unless the need for, and benefits of, the development in that location clearly outweigh the loss; and
- Special Protection Areas, possible Special Areas of Conservation, listed or proposed Ramsar sites and sites identified for compensation measures on these sites or European sites should all be given the same protection as European sites.

These principles are reflected at the local level in the Fylde Local Plan. Specifically, **Policy EP15** offers the highest level of protection to European Sites and Policy **EP16** affords protection to SSSI.

More generally, **Policy EP18 of the Local Plan** states that “existing natural features should be retained where possible, within development schemes where appropriate, additional features should be created as part of the development scheme.”

**Policy EP19 of the Fylde Local Plan** protects species and their habitats specifically protected under schedules 1, 5 or 8 of The Wildlife and Countryside Act 1981 (As amended) by preventing development which would have an adverse impact upon them. It articulates that “where development is permitted which would affect these species, or their places of shelter and breeding, the use of planning conditions and/or obligations will be used to:-

1. Facilitate the survival of individual members of the species.
2. Reduce disturbance to a minimum.
3. Provide adequate alternative habitats to sustain the current levels of the population.”

The emerging **Fylde Local Plan (Preferred Option)** goes further, with regard to natural features, stating that “the loss of landscape and biodiversity features will be minimised or, where loss is unavoidable, their like for like replacements will be provided. Where such features including trees, woodlands, hedgerows and field ponds, are lost and replaced, measures will be put in place to manage these features” (**Policy ENV1 Landscape and Biodiversity**).

A comprehensive site selection process was undertaken to identify a suitable site for the proposed exploration works. This included a consideration of designated sites, protected species and their habitats and natural features. None of these features are located within the boundaries of the application. Furthermore there are no statutory designations, including those referenced above, within 3km of the Exploration Site. There is one statutory designation within 5km of the Site: Marton Mere, Blackpool SSSI and LNR, located 3.2 km north-west of the Site and it has been assessed (in chapter 10 of the ES) that there will be no impact from the project on this area.
With regard to non-statutory designated sites, there are five Biological Heritage Sites (BHS) located within a 3km radius surrounding the Exploration Site. In relation to UK BAP habitat, all woodland copse surrounding the Site have been identified as having potential to qualify as ‘lowland deciduous woodland’ UK BAP habitat / NERC Act (2006) Section 41 Habitats of Principal Importance. This includes the wooded triangle of land which is located 400m to the north of the Site.

Chapter 10 of the ES reports an assessment of predicted impacts on ecology and nature conservation. The assessment concludes:

“It is judged that there will be no residual significant effects once the mitigation measures have been implemented. It is envisaged that the results of the compliance checks and inbuilt monitoring, which will be undertaken as part of all phases of the Project, will provide further evidence that there are no residual effects, once all the mitigation measures have been adopted. Should any adverse impacts on sensitive ecological receptors be identified following the compliance checks and inbuilt monitoring, then additional measures will be put in place, as recommended by the appointed Ecological Clerk of Works, to minimise any identified adverse impacts identified.”

This mitigation approach to ecological effects, as summarised in table 7 of section 5.5, accords with Policy E18 of the Fylde Local Plan, through the provision of replacement and enhanced habitats and natural features.

6.10 Landscape character

Policy EP11 of the Fylde Local Plan requires new development in rural areas to be sited in keeping with the distinct landscape character types identified in the Landscape Strategy for Lancashire and the characteristic landscape features defined in Policy EP10.

Policy ENV1 Landscape and Biodiversity of the emerging Fylde Local Plan (Preferred Option) requires that development has regard to its landscape type. In addition:

- “it will be appropriate to the landscape character type within which it is situated, as identified in the Lancashire Landscape Character Assessment (2000);

- An appropriate landscaped buffer will be provided for development that impacts upon land outside settlement boundaries, in order to limit the impact of development;

- Suitable landscape planting should be incorporated within or, where appropriate, close to new development. Measures should be in place for the management of such landscaping.”

Specific to minerals development the Site Allocation and Development Management DPD refers to the requirement for appropriate information on landscape character (Policy DM2). The narrative to this policy explains that “careful consideration of the siting of the development, the method of working and the layout and design of the site will be required to mitigate any visual impact.”
Chapter 14 of the ES reports an assessment of potential landscape and visual impacts arising from the Project. As required by Policy ENV1, the assessment explains how the constituent elements and character of the landscape, its condition, the way it is experienced and the value attached to it have been considered in relation to the Project. It reports impacts on landscape character and viewpoints.

The Site benefits from not being visually intrusive from the surrounding area. In addition there are no sensitive national designations within 5kms of the Site (National Parks, Areas of Outstanding Natural Beauty, Registered and Historic Gardens, National and Trails). Several residential properties are visible in the wider landscape from the Site, and these are within 1km from the Site.

The Site is within the local Landscape Sub Character area 15d The Fylde. The Landscape chapter of the ES (Chapter 14) concludes that there would be no significant effects on the landscape resource for any phase of the development.

Significant visual effects would occur during the drilling, hydraulic fracturing and flow testing phases and arise as a result of the drilling (53m high rig) and hydraulic fracturing (36m high rig) which would be in use for approximately 24 months. The Site is located within 1km of six residential properties that are significantly adversely affected which include properties at Plumpton Hall Farm, Preston New Road, Staining Wood Farm, Moss House Lane and Moss House Farm. A fishing pond at Moss House lane would also be significantly adversely affected.

It is considered that any mitigation in the form of offsite screening for example would not markedly reduce these effects although there are a number of mitigation measures proposed to assist in reducing the extent of the visual effects, as set out in table 7 of section 5.5. Considering the temporary duration of the visual effects, extensive visual screening is also considered unnecessary.

In the longer term, following exploration and testing, (or following production if the site is taken forward having secured the necessary permissions) the Site would be restored and would return to an agricultural use in keeping with the landscape character of the area.

6.11 Pollution

Paragraph 120 of the NPPF seeks to prevent unacceptable risks from pollution and land instability. It states that decisions should ensure that “the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area of proposed development to adverse effects from pollution, should be taken into account.”

Paragraph 122 of the NPPF advises that local planning authorities focus on “whether the development itself is an acceptable use of the land and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes. Local planning authorities should assume that these regimes will operate effectively.”
Surface water

At the local level, **Policy EP23 of the Fylde Local Plan** is concerned specifically with surface water pollution. It seeks to prevent development that would adversely affect the quality of coastal waters, rivers, canals, lakes, ponds and other bodies of water. It asserts that “development which would be likely to give rise to pollution on inland surface water or coastal waters will not be permitted.” “Where development is permitted surface water resources will be protected by the imposition of appropriate planning conditions.”

Chapter 19 of the ES includes an assessment of surface water and drainage impacts, and assesses how the well pad containment and drainage system would function and how this may affect the site and local surroundings. The general area surrounding the Site includes a network of open agricultural drainage ditches that ultimately discharge into the River Ribble to the south of the Site, at Lytham.

The proposed site drainage design and well pad containment system comprises a welded High-density polyethylene HDPE membrane overlain by 300mm drainage stone, draining to perimeter ditches. The drainage system has been designed to retain any fluid or water that is split within the Site and therefore helps to manage any risks to water quality in the area. In addition to the drainage design there are a number of measures proposed to mitigate effects on water resources as described in table 7 of section 5.5.

With these measures in place, the ES concludes that there will be only minor adverse effects on surface water resources.

Ground water

**Policy EP24 of the Fylde Local Plan** is concerned with ground water and seeks to prevent development which would adversely affect the quality of ground water and the ability to utilise existing or potential resources within the Borough.

Chapter 11 of the ES reports an assessment of the impacts relating to hydrogeology, including potential contamination and ground gas migration that may result from the Project.

Cuadrilla is committed to following the mitigation measures as set out within the ES and as summarised in table 7, section 5.5 of this Statement.

By implementing these measures the ES concludes that both the probability of pollutants affecting the ground water and the consequence of pollution to be low or very low. The risk of pollution of ground water has consequentially been assessed to be of a minor or negligible and not significant effect on hydrogeological features.

Light pollution

**Paragraph 125 of the NPPF** encourages the use of good design to “limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”

**Policy EP28 of the Fylde Local Plan** states that regard should be had to the issue of light pollution in relation to development proposal with external lighting facilities.
Chapter 15 of the ES describes the assessment of potential night time light obtrusion from the project. It concludes that through the incorporation of mitigation, as summarised in table 7, section 5.5, the potential effects of light spill beyond the Site boundary and light source intensity are not significant. The assessment though concluded that there will be some significant effects with respect to skyglow and building luminance - however magnitude of impact would be reduced by the mitigation measures outline in section 5.5.

**Air quality**

**Policy EP26 of the Fylde Local Plan** asserts that development will not be permitted which is likely to give rise to unacceptable levels of air pollution. Where potentially polluting development is allowed, planning permission will be granted subject to appropriate conditions designed to minimise airborne emissions.

Chapter 6 of the ES reports an assessment of the impacts of the Project on air quality as a result of emissions of pollutants into the atmosphere. This considers impacts associated with vehicles, equipment and flaring of natural gas. It also takes into account the potential effects from the Project that could result in the generation of dust. This assessment also assessed the potential quantities of naturally occurring radioactive material, specifically radon that would be emitted during flaring. It concludes that none of the impacts identified would have a residual significant effect on human or ecological receptors and legal safety levels are not exceeded. A number of best practice measures according to IAQM guidance are recommended, as summarised in table 7, section 5.5.

### 6.12 Noise

**The NPPF** details the policy approach with regard to public health, quality of life and general amenity. This addresses issues of noise. **Paragraph 123 of the NPPF** states that planning decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise including through the use of conditions; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The NPPF promotes an ‘avoid, reduce and mitigate’ approach to potential noise impacts on health, quality of life and amenity value.

**Paragraph 143 of the NPPF** states that “when considering noise limits, local plans should take into account “that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.”

**Paragraph 144 of the NPPF** provides guidance on determining applications for minerals development. In particular, it states that local planning authorities should ensure that any unavoidable noise and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties.
The NPPG provides specific guidance to address noise emissions from minerals development. It confirms that a noise impact assessment is required and that this should identify all sources of noise and take account of the noise emission, its characteristics and likely impacts on the surrounding neighbourhood. It advises that mineral planning authorities should take account of the prevailing acoustic environment and in doing so consider whether or not noise from the proposed operations would give rise to significant and/or adverse effects and enable a good standard of amenity to be achieved. “In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure would be above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation” It goes on to quote specific noise standards for mineral operations.

Locally, Policy EP27 of the Fylde Local Plan prevents development which would unnecessarily and unacceptably result in harm by way of noise pollution. Developments which otherwise may not have been compatible in terms of noise pollution, can be made so with the appropriate use of planning conditions to minimise or prevent pollution.

Specific to minerals developments, Policy DM2 of the Site Allocations and Development Management DPD notes that information should be provided in regard to the residential amenity of those living nearby.

Chapter 16 of the Environmental Statement details an assessment of potential noise impacts. It concludes that with the exception of night time fracturing operations, noise from the proposed development at Preston New Road would not be significant for all stages of the works. Cuadrilla commit to a number of mitigation measures, as set out in table 7 of section 5.5, including only operating fracturing pumps during weekday daytime and Saturday mornings. With these mitigation measures in place there will be no significant effects for all stages of work and will accord with policies of the NPPF and the Development Plan.

6.13 Cultural heritage

One of the core planning principles of the NPPF, at paragraph 17, is to “conserve heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations.”

Paragraph 128 states that “In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets’ importance and no more than is sufficient to understand the potential impact of the proposal on their significance.”

Policy EP21 of the Fylde Local Plan states that “in considering development proposals, particular regard will be given to the archaeological significance of the area. Where there is an identified archaeological interest on a site, developers may be required to provide an archaeological assessment or, if necessary, a field evaluation.”

It goes on to state that
“in relation to proposals affecting remains of local importance, consideration will be given to the merits of the case taking into account the importance of the remains and the need for the proposed development.”

The ES has concluded that there are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Registered Battlefields, Listed Buildings or Conservation Areas within proximity (within 1km) of the Site. There are no environmental effects on any known features designated for their heritage or historic value.

There is a slight possibility that hitherto unknown prehistoric assets, most probably of Bronze Age date, might be encountered within the footprint of the site. Remains, if encountered, are likely to take the form of artefact scatters. Assets of this type would be of local interest, likely to survive in a partially fragmented state and be overall of low heritage value. In accordance with the NPPF and Policy EP21 if these types of remains are encountered the appropriate measures will be taken, reflecting their importance. With these measures in place and other measures as summarised in table 7, section 5.5, the ES Reports no significant effects on cultural heritage.
7 Conclusion

The use of the Site for the exploration of shale gas would mark a positive step to achieving the national agenda for energy security, with minimal adverse environmental effects and in compliance with local and national planning policy. The development has the potential to create a new local industry in this part of Lancashire with associated positive economic and job creation effects. This final chapter of this Planning Statement concludes the key points made in relation to:

- Compliance with the statutory development plan, national and emerging policy, and
- Other material considerations.

7.1 Accordance with the statutory development plan, national and emerging policy

Table 8 provides a summary of the national and local planning policies and guidance relevant to the proposed development. It demonstrates how the proposal has been informed by, and is in accordance with, the relevant framework of policy and guidance.
### Table 8: Summary of planning policy review

<table>
<thead>
<tr>
<th>Issue</th>
<th>Policy</th>
<th>Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable development</td>
<td>• NPPF, Para 14</td>
<td>Preston New Road exploration proposals are in accordance with development plan policies that are relevant and up-to-date. Where there are no relevant policies, in particular where there is a silence in local policy in specific regard to shale gas exploration, the proposals accord with the NPPF.</td>
</tr>
<tr>
<td></td>
<td>• Site Allocation and Development Management DPD, Policy NPPF1</td>
<td>With appropriate mitigation measures in place significant effects on nearby local communities would be limited to temporary adverse effects, relating to views of the exploration activities from nearby areas and skyglow and building luminance.</td>
</tr>
<tr>
<td>Sustainable use of minerals</td>
<td>• NPPF, Para 143 -144</td>
<td>Economic benefits would be achieved at the exploration stage. Wider benefits to the local and national economy would follow if the findings from the exploration at the Preston New Road site and other sites are encouraging.</td>
</tr>
<tr>
<td></td>
<td>• Joint Core Strategy, Policy CS5</td>
<td>Environmental impacts would be minimised. In particular pollution from the proposal would be controlled, including dust, light, noise and water emissions.</td>
</tr>
<tr>
<td></td>
<td>• Site Allocation and Development Management DPD, Policy DM2</td>
<td>The Site would be restored within agreed time limits, to a beneficial after-use and landscaping and tree planting would be managed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicles would be controlled to and from the Site in terms of numbers, frequency, timing and routing. Various options have been considered in order to determine an appropriate route that would not significantly impact on the amenity of nearby residents.</td>
</tr>
<tr>
<td>Energy</td>
<td>• NPS EN-1</td>
<td>Shale gas has the potential to have an increasingly important role to play as part of the UK’s energy mix and is part of the Government’s national strategy concerning energy security.</td>
</tr>
<tr>
<td></td>
<td>• NPPG</td>
<td></td>
</tr>
<tr>
<td>Transport and access</td>
<td>• NPPF, Para 32</td>
<td>The Transport Assessment (Chapter 18 of the ES) reports an assessment of:</td>
</tr>
<tr>
<td></td>
<td>• Site Allocations and Development Management Plan DPD, Policy DM2</td>
<td>• the capacity of the roads that form part of the proposed HGV route to the site;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• the safety of the road with the additional traffic generated from the site for other users of these roads and those living in the vicinity of the HGV route; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• amenity related impacts associated with the additional traffic on local residents.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The assessment concludes that traffic generated by the proposed development is at levels that would be acceptable and that measures and controls could be used to ensure that these levels are achieved.</td>
</tr>
<tr>
<td>Land use</td>
<td>• Joint Core Strategy, Policies CS1, CS4</td>
<td>The policies predate the current proposals for shale gas exploration or extraction in Lancashire. As such, the Site is not within a minerals safeguarding area, nor are there any sites identified within any of</td>
</tr>
</tbody>
</table>
Fylde Borough Local Plan, Policies SP2, EP 22
Fylde Local Plan Preferred Option, Policies GD1, EC3

Lancashire’s DPDs for shale gas exploration of extraction. The proposals are not considered to present a departure from the Development Plan; rather it is the case the Development Plan is silent and out of date in regard to the specific issue of land use and shale gas exploration and extraction. Shale gas related development is not one of the uses listed as appropriate within the countryside. Also, shale gas exploration is proposed to take place outside of settlement boundaries, which is a departure from the Local Plan. However the temporary nature of exploration operations and the need to explore and ultimately recover mineral resources where they occur are material considerations that outweigh the need to comply with this policy.

Economic development
NPPF, Paras 18 and 144
Site Allocations and Development Management DPD, Policy DM2

Shale gas extraction would make a positive contribution to economic growth at a local and national scale. The Project would mark a positive step to the production of shale gas in the UK, which would decrease UK gas imports, contribute to national energy security and generate higher tax revenues.

Flood risk
NPPF, Paras 100, 103
Fylde Local Plan Preferred Option, Policy CL1
Joint Core Strategy, Policy CS5

The proposed site is located within the Environment Agency’s designated flood zone 1 and is at a low risk of fluvial flooding. The Flood Risk Assessment concluded that the development would not increase the risk either on or off-site as a result of development proposal.

Biodiversity
NPPF, Para 118
Fylde Local Plan, Policies EP19, EP19
Fylde Local Plan Preferred Option, Policy ENV1

A comprehensive site selection process was undertaken to identify a suitable site for the proposed exploration works. This included a consideration of designated sites, protected species and their habitats and natural features. In addition there are no statutory designations within 3km of the site. There would be no residual effects once mitigation measures are implemented. Should any adverse impacts on sensitive ecological receptors be identified following compliance checks and inbuilt monitoring, then additional measures would be put in place, as recommended by the appointed Ecological Clerk of Works, to minimise any identified adverse impacts identified.

Landscape character
Fylde Local Plan, Policy EP11
Fylde Local Plan Preferred Option, Policy ENV1
Site Allocation and Development Management DPD, Policy DM2

There are no sensitive national designations within 3km of the Site and there would be no significant effects on the landscape resource for any phase of the development. However, significant visual effects would occur during the drilling, hydraulic fracturing and flow testing phases. However, such effects would occur for a relatively short duration of 24 months. Considering the temporary duration of the visual effects, extensive visual screening would be unnecessary. However, mitigation has been proposed to assist in minimising visibility of the Site.

Pollution
NPPF, Paras 120, 122, 125
Fylde Local Plan, Policies

The proposed site drainage system has been designed to retain any fluid or water that is spilt within the Site and therefore helps to manage any risks to water quality in the area. In addition to the drainage...
design, mitigation is proposed to reduce the effects on water resources.

Embedded mitigation, including specific design measures would be implemented to prevent potential contamination and ground gas migration. The effect of pollution of ground water would not be significant on hydrogeological features.

The potential effects of light spill beyond the Site boundary and light source intensity would be significant although can be lowered through the incorporation of mitigation.

With regards to air quality, none of the impacts identified in the ES would have a residual effect on human or ecological receptors and legal safety levels would not exceeded.

### Noise

<table>
<thead>
<tr>
<th>Noise</th>
<th>NPPF, Paras 123, 143, 144</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fylde Local Plan, Policy EP27</td>
</tr>
<tr>
<td></td>
<td>Site Allocations and Development Management DPD, Policy DM2</td>
</tr>
</tbody>
</table>

Noise associated with the proposed works, with the exception of the operation of fracturing pumps at night, has been assessed not to be significant. Cuadrilla have committed not to operate the pumps outside of day time hours so that drilling is the only operational activity during the night-time. Nevertheless noise would be minimised by best practicable means of working and as far as is practicable, fixed items of plant such as generators would be placed in screened positions to minimise noise emission in the direction of the dwellings.

### Cultural heritage

<table>
<thead>
<tr>
<th>Cultural heritage</th>
<th>NPPF, Paras 17, 128</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fylde Local Plan, Policy EP21</td>
</tr>
</tbody>
</table>

There are no World Heritage Sites, Scheduled Monuments, Registered Parks and Gardens, Registered Battlefields, Listed Buildings or Conservation Areas within proximity (within 1km) of the Site. There would be no environmental effects on any of features designated for their heritage or historic value.

Hitherto unknown prehistoric assets might be encountered. If remains are encountered, they would be of local interest, likely to survive in a partially fragmented state, and be overall of low heritage value. Appropriate measures would be taken, reflecting the importance of any such remains that are encountered. With these measures in place and other measures as summarised in table 7, section 5.5, the ES Reports no significant effects on cultural heritage.
As parts of the Development Plan are out of date (e.g. the Fylde Local Plan 2003) and there are no policies specific to shale gas extraction, other material considerations are relevant to the determination of this application. These other important material considerations (as summarised below) indicate the application should be permitted.

An assessment has also been undertaken of the adverse impacts and the means to minimise and mitigate impacts of the development (as summarised within section 5.5 of this Statement). The principal conclusion of this assessment is that any adverse impacts of the development can be appropriately mitigated and controlled through conditions and other regulatory processes. With these mitigations and controls the benefits of the development (as reported in section 7.2 below) are shown to outweigh any significant adverse effects when assessed against the policies of the NPPF. The proposals therefore meet one of the key tests of the NPPF for determining planning applications.

7.2 Other Material Considerations

The principal material considerations for the determination of this planning application are the key benefits and justification for the exploration of shale gas, as reported at section 5 of this Statement. In summary these are:

1. **Energy Security.** It is widely accepted that natural gas from shale has potential to boost the UK’s gas production significantly, reducing the UK’s dependence on expensive foreign energy sources. This is evident from the experience of the shale gas industry in the United States. DECC’s Gas Generation Strategy, 2012 concluded that “If it can be shown to be economic and safe, domestic shale gas production could offer a significant economic opportunity for the UK, with the prospect of new sources of indigenous supply, new industrial activity and skilled jobs.”

2. **A comprehensive Regulatory Framework.** Government ministers and respected independent bodies such as the Royal Society and the Royal Academy of Engineers have confirmed that “UK shale gas can be developed sensibly and safely, protecting the local environment, with the right regulation.” The Government has made a commitment to make sure that the regulations to protect and minimise any impacts on the environment are followed to the letter. This Statement has described the regulations currently in place, enforced through bodies such as the Environment Agency, the Health and Safety Executive and DECC, to ensure that the processes involved in the exploration of shale gas are safe and that the safeguards are in place to protect the environment. The UK has 60 years’ experience of regulating onshore and offshore oil and gas industries.

3. **A robust evidence base.** This evidence base has been established principally through the findings and recommendations of the Royal Society and the Royal Academy of Engineers. The principal conclusion of these bodies were that “The health, safety and environmental risks associated with hydraulic fracturing ... as a means to extract shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation.” An important part of the evidence base relates to “hydraulic fracturing being an established technology that has been used in the oil and gas industries for many decades”.

4. **National Strategy.** Energy National Policy Statement EN1 recognises that “Gas will continue to play an important role in the electricity sector – providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply.” Government support is also apparent from the shale gas tax allowance designed to incentivise early investment and support development in the shale gas industry and from guidance and regulations recently put in place to help facilitate the
delivery of shale gas development. National planning guidance supports the efficient
determination of planning applications with guidance to both applicant and the local
authorities at the pre-application and determination stages.

5. **Local and National Economic Benefit** It is recognised that the benefits at both a
local and national level at the exploration stage are likely to be modest although
benefits of production could be significant. This is acknowledged in the Strategic
Environmental Assessment (SEA) for onshore oil and gas licensing, DECC –
December 2013. “During all stages of the unconventional oil and gas exploration
and production lifecycle there would be both direct and indirect (within the supply
chain) job creation as well as jobs induced via expenditure of employed staff. During
Stage 3 (production development) it is anticipated that the scale of job creation has
the potential to be significant.”

6. **Environmental Assessment and Mitigation.** The detailed EIA has concluded that
with appropriate mitigation measures in place significant effects on nearby local
communities would be limited to temporary adverse effects, relating to views of the
exploration activities from nearby areas, skylow and building luminance. These
effects would be temporary and visual effects of relatively short duration, for
example each well would take approximately 3 months to drill and mitigation
measures are proposed to help reduce and soften the view of Site and equipment
within the Site. The ES has concluded that there are no other significant
environmental effects on local communities near to the Preston New Road proposals.
Nevertheless in order to ensure that the project follows best practices and seeks,
wherever possible, to minimise the level of impact on the environment the ES
recommends additional mitigation measures for effects that are of a minor or
negligible nature.

7. **Environmental Risk** The ERA report presents a qualitative assessment of the key
risks and has been reviewed by DECC. A total of 15 high-level risks are presented.
All 15 risks are assessed to be low and would therefore not require further mitigation
above measures required by the regulators and planning authorities and those
intended to be in place as part of Cuadrilla’s working practices.

In conclusion of the considerations set out in this Planning Statement, the proposed
development is commended to Lancashire County Council for approval.
Appendix A

Site Search
A1 Site Search

In selecting sites for this phase of exploration a staged process has been followed involving firstly identifying suitable areas, and then identifying suitable sites within these areas, based on an assessment of a range of environmental and geological criteria.

Stage 1 - Identifying Areas of Suitable Geology

The aim for this stage of exploration is to undertake drilling and hydraulic fracturing operations in areas of relatively consistent geology – areas of relatively flat lying (horizontally bedded), continuous and thick sections of Bowland Shale. By targeting these areas horizontal drilling can be performed through a consistent shale “zone”, and, by using the buried array to monitor fracture growth, the performance of the hydraulic fracturing process can be accurately assessed and optimised.

With the data gathered from the 3D seismic survey and from other geological data sources two areas were identified with relatively shallow, flat-lying shale – one to the south of Roseacre, the other to the west of Little Plumpton.

Stage 2 – Applying Tier 1 Environmental Constraints

Within the two areas of search defined by the geology, two sets of environmental constraints were analysed to guide the selection of appropriate sites. The first (tier 1) consisted of features or receptors, set out in Table A1, that would be avoided for this stage of the exploration programme.

<table>
<thead>
<tr>
<th>Sensitive feature or receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing and proposed European and national designations</td>
</tr>
<tr>
<td>(for example Special Protection Areas, Sites of Special Scientific</td>
</tr>
<tr>
<td>Interest).</td>
</tr>
<tr>
<td>Nationally designated heritage assets including: listed buildings,</td>
</tr>
<tr>
<td>Scheduled Monuments, Registered Parks and Gardens, Registered</td>
</tr>
<tr>
<td>Battlefields and World Heritage Sites.</td>
</tr>
<tr>
<td>Groundwater Source Protection Zone 1</td>
</tr>
<tr>
<td>Flood Risk – avoiding flood risk zone 3b.</td>
</tr>
</tbody>
</table>

Stage 3 – Applying Tier 2 Environmental Constraints

Following the assessment described above for Tier 1 technical specialists undertook desk based studies and site visits to collect further information to assess the factors in Table A2. The Tier 2 criteria have been used to select locations less likely to result in significant environmental effects.

<table>
<thead>
<tr>
<th>Site Selection Criteria</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connections</td>
<td>A review of the existing road network and access arrangements was</td>
</tr>
<tr>
<td></td>
<td>undertaken to identify locations where it would be suitable to use an</td>
</tr>
<tr>
<td></td>
<td>existing access or create a new access to an exploration site.</td>
</tr>
</tbody>
</table>
### Utilities
- Areas were identified where there is potential to connect to existing utilities networks (principally potable water supply and gas).

### Environmental Constraints

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural heritage</td>
<td>All heritage assets identified via the historic environmental record were mapped and reviewed.</td>
</tr>
<tr>
<td>Landscape character</td>
<td>Landscape character areas were mapped and considered in regard to the location of exploration well sites and the County’s Landscape Strategy.</td>
</tr>
<tr>
<td>Visual impact</td>
<td>A broad zone was used to establish the area in which the exploration well sites may be visible.</td>
</tr>
<tr>
<td>Protected species</td>
<td>Data was collected from site walkovers, surveys and existing ecological records were reviewed.</td>
</tr>
<tr>
<td>Non-designated sites/valuable habitat</td>
<td>Non-designated sites and valuable habitats were defined and reviewed for each site.</td>
</tr>
<tr>
<td>Agricultural land quality</td>
<td>Information was collected on agricultural land classifications (i.e. 1, 2, 3a and 3b).</td>
</tr>
<tr>
<td>Proximity to housing and other sensitive uses</td>
<td>Residential properties and other sensitive uses were considered and the distance from these uses was taken into account.</td>
</tr>
<tr>
<td>Light pollution</td>
<td>The potential for light pollution was considered for each zone taking into account the topography of the site, existing barriers and sensitive receptors.</td>
</tr>
<tr>
<td>Noise</td>
<td>A more detailed consideration of noise was undertaken for each zone, taking into account existing noise levels, potential noise barriers and distance from residential properties and sensitive receptors.</td>
</tr>
<tr>
<td>Air quality</td>
<td>The potential for air quality impacts was considered taking into account air quality management designations and sensitive receptors.</td>
</tr>
<tr>
<td>Water resources, flood risk and drainage</td>
<td>Proximity to watercourses, wetlands and ponds, and the potential for future development of groundwater resources was considered. Flood risk issues and drainage requirements were also considered</td>
</tr>
</tbody>
</table>

### Planning Constraints

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local planning policy</td>
<td>The Development Plan allocations and planning designations were identified</td>
</tr>
</tbody>
</table>

### Land Ownership Issues

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential to secure a lease from the landowner</td>
<td>The likelihood of using the land for the purpose of an exploratory well was determined based on discussions between Cuadrilla and the land owners.</td>
</tr>
</tbody>
</table>

In summary the findings from the staged site search approach was the identification of two suitable exploration sites at Roseacre Wood and Preston New Road. These sites were selected for this phase of the exploration as they performed well with respect to the environmental criteria that were used and are suitable in terms of geology and land ownership.
### Alternative Sites Not Selected

Cuadrilla currently has four sites related to exploration of shale gas in the Fylde study area, developed and drilled prior to suspension of activities in early 2011. These sites – Grange Hill (near Singleton) Preese Hall (Weeton), Becconsall (near Banks) and Anna’s Road all comprise a fenced area containing a consolidated aggregate surface, earth bund, drainage channels, and drilling cellar(s).

#### Grange Hill

Following analysis of the 3D seismic survey information, the Grange Hill site near Singleton does not have the geological characteristics preferred for this phase of the exploration. Local faulting and folding structures limit the volume of continuous, horizontally bedded shale. Furthermore, the existing well pad would require extending to allow up to four wells to be drilled and hydraulically fractured.

Cuadrilla is currently seeking temporary planning permission, for three years, to retain the existing site compound and access track, to monitor reservoir pressure and seismicity, prior to plugging and abandoning the existing exploratory well and fully restoring the site.

#### Preese Hall

The Preese Hall site was drilled and hydraulically fractured in 2010, following which two tremors occurred. This triggered the suspension of operations, and the site was cleared of all superstructures, operational equipment and ancillary accommodation.

Due to the geological characteristics at the site it has been decided that further exploration works will not be undertaken at this location. Instead the well will be plugged and cut off below ground level and the well pad removed so that the land can be restored and returned to agricultural uses.

#### Anna’s Road

Anna’s Road is located in a Biological Heritage Site, and is close to internationally designated conservation areas of Morecambe Bay. The presence of winter resting areas for important species of birds, would restrict drilling and hydraulic fracturing activities to a relatively narrow period. For these reasons, this site is not proposed for this phase of exploration and will be restored during the summer of 2014.

#### Becconsall

The Becconsall site is located outside of the 3D seismic survey area. For this reason there is insufficient geological data to progress exploration on this site at this time.

A planning application was submitted to LCC on the 25th March 2014 to allow perforations to be made in the well casing and pressure monitoring equipment to be installed for 12 months in the existing well. At the end of this period the equipment will be removed. The well will then be plugged and abandoned and the site restored.
Appendix B

How the Proposals Respond to the Recommendations of the Royal Society
The Government asked the Royal Society and the Royal Academy of Engineering to carry out an independent review of the scientific and engineering evidence relating to the technical aspects of the risks associated with hydraulic fracturing to inform government policymaking about shale gas extraction in the UK. Several recommendations were made relating to the management of the extraction process, best practice techniques and regulations. The key recommendations in relation to shale gas exploration are set out in the table below which also provides an explanation of how the Preston New Road proposals have responded to the recommendations.

**Table B1: How the Royal Society Recommendations have been Addressed**

<table>
<thead>
<tr>
<th>Royal Society Recommendation of Relevance to Operators</th>
<th>How the Preston New Road proposals have addressed the Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation 1: To detect groundwater contamination</td>
<td>Operators should carry out site-specific monitoring of methane and other contaminants in groundwater before, during and after shale gas operations. Environmental monitoring boreholes will be installed before operations commence, ensuring an adequate baseline dataset of groundwater is collected. An environmental monitoring plan will be prepared and agreed with the regulators for operation and decommissioning phases ensuring adequate site specific monitoring during and after operations. The data collected by operators should be submitted to the appropriate regulator. The environmental monitoring plan will include the locations, frequency and methods of monitoring and will identify how the data will be shared with the regulators.</td>
</tr>
<tr>
<td>Recommendation 2: To ensure well integrity</td>
<td>Well designs should be reviewed by the well examiner from both a health and safety perspective and an environmental perspective. The well design will be submitted to the well examiner for review. A final report will be prepared by the well examiner which will describe the well design and its construction in relation to health and safety and environmental protection. The well examiner should carry out onsite inspections as appropriate to ensure that wells are constructed according to the agreed design. The well examiner can undertake site visits. Data will be provided to the well examiner on a regular basis for review and comment. Operators should ensure that well integrity tests are carried out as appropriate, such as pressure tests and cement bond logs. Well integrity testing consisting of pressure tests and formation integrity tests will be performed during well construction. Cement bond logs (CBLs) will be collected during construction and will be interpreted by an experienced and competent professional. In addition, additional pressure testing will be performed prior to hydraulic fracturing. The results of well tests and the reports of well examinations should be submitted to the Department of Energy and Climate Change (DECC). All collected data on the well construction will be compiled into an End of Well Report (EOWR). The EOWR will be submitted to DECC.</td>
</tr>
<tr>
<td>Recommendation 3: To mitigate induced seismicity</td>
<td>Operators should carry out site-specific Desk study review and 3D seismic survey have</td>
</tr>
</tbody>
</table>
**Recommendation 4: To detect potential leakages of gas**

Operators should monitor potential leakages of methane or other emissions to the atmosphere before, during and after shale gas operations.  

The data collected by operators should be submitted to the appropriate regulator. These data could inform wider assessments, such as the carbon footprint of shale gas extraction.

**Recommendation 5: Water should be managed in an integrated way**

Techniques and operational practices should be implemented to minimise water use and avoid abstracting water from supplies that may be under stress.  

Wastewater should be recycled and reused where possible.  

Options for treating and disposing of wastes should be planned from the outset. The construction, regulation and siting of any future onshore disposal wells need further investigation.

**Recommendation 6: To manage environmental risks**

An Environmental Risk Assessment (ERA) should be mandatory for all shale gas operations, involving the participation of local communities at the earliest possible opportunity.  

The ERA should assess risks across the entire lifecycle of shale gas extraction, including the disposal of wastes and well abandonment. Seismic risks should also feature as part of the ERA.

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| surveys to characterise and identify local stresses and faults. | been undertaken to identify faults. The first well will provide additional geological and stress information to characterise the rock mass. |
| Seismicity should be monitored before, during and after hydraulic fracturing. | Comprehensive multi-instrument seismic monitoring package before, during and after hydraulic fracturing |
| Traffic light monitoring systems should be implemented and data fed back to well injection operations so that action can be taken to mitigate any induced seismicity. | Real time multi-instrument seismic monitoring with seismic expert in attendance |
| Operators should share data with DECC and BGS to establish a national database of shale stress and fault properties so that suitable well locations can be identified. | Cuadrilla have committed to dissemination of information through DECC. |

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| Operators should monitor potential leakages of methane or other emissions to the atmosphere before, during and after shale gas operations. | Air quality monitoring will be undertaken before, during and after operations. |
| The data collected by operators should be submitted to the appropriate regulator. These data could inform wider assessments, such as the carbon footprint of shale gas extraction. | Monitoring data will be shared with the Environment Agency. |
| Techniques and operational practices should be implemented to minimise water use and avoid abstracting water from supplies that may be under stress. | UU have undertaken hydraulic modelling and their water supply network can deliver the demands without affecting other (wider) users of their network. (see ES Water Resource Chapter 19). |
| Wastewater should be recycled and reused where possible. | Part of the fracturing fluid to be made up using re-used flow back fluid which reduces the demand for new water supplies. |
| Options for treating and disposing of wastes should be planned from the outset. The construction, regulation and siting of any future onshore disposal wells need further investigation. | In depth discussions have taken place with operators of potential treatment facilities and commercial negotiations are well progressed. No disposal wells are proposed. |
| An Environmental Risk Assessment (ERA) should be mandatory for all shale gas operations, involving the participation of local communities at the earliest possible opportunity. | An ERA has been completed and submitted to DECC in Draft in April 2014. Engagement with local communities has been undertaken to inform the ERA, as described within the ERA report. |
| The ERA should assess risks across the entire lifecycle of shale gas extraction, including the disposal of wastes and well abandonment. Seismic risks should also feature as part of the ERA. | All high level risk areas associated with the proposed exploratory works are assessed, including waste disposal, well abandonment and seismic risks. It is a live document which regularly updated. |
**Recommendation 7: Best practice for risk management should be implemented**

<table>
<thead>
<tr>
<th>Operators should carry out goal based risk assessments according to the principle of reducing risks to As Low As Reasonably Practicable (ALARP). The UK’s health and safety regulators and environmental regulators should work together to develop guidelines specific to shale gas extraction to help operators do so.</th>
<th>DECC have published their guideline for ERA (April 2014). The ERA has been submitted to DECC for review and they are content. The EIA has assessed environmental risks and has identified appropriate mitigation measures / operational procedures. The environmental permit applications identify additional measures. The above will be brought together in the environmental operating standards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operators should ensure mechanisms are put in place to audit their risk management processes.</td>
<td>Cuadrilla will produce an Environmental Operating Standards (EOS) outlining the detailed mechanisms to be implemented to manage environmental, health and safety management risks. Performance against this standard will be managed through regular quality audits.</td>
</tr>
<tr>
<td>Risk assessments should be submitted to the regulators for scrutiny and then enforced through monitoring activities and inspections.</td>
<td>The ERA that has been submitted to DECC is supplemented by information in the ES and will be enforced through the EOS.</td>
</tr>
<tr>
<td>Mechanisms should be put in place to allow the reporting of well failures, as well as other accidents and incidents, between operators. The information collected should then be shared to improve risk assessments and promote best practices across the industry.</td>
<td>Cuadrilla are committed to work with UKOOG to develop such a mechanism.</td>
</tr>
</tbody>
</table>
Appendix C

Site Restoration Plan
Reinstatement Operations to Former Usage

When the decision is made to restore the site to its former usage the well(s) will be plugged, hydrostatically tested, and abandoned with an agreed programme or method approved by the Health & Safety Executive and the Department of Energy and Climate Change.

Pre-Restoration Site Clearance

The wellhead and Xmas-tree will be removed and the well casing cut off not less than 2 metres below the finished ground level, a metal plate welded on top, and a concrete slab placed on top of the plate.

All plant, equipment, buildings, security fencing, and surface installations, will be dismantled and removed from the site, either to a re-location or to storage.

The site ditches, sump(s), cellar(s), and cess tank(s), will be drained and any contaminated materials removed from the site, such wastes will be disposed of at approved locations, in accordance with the prevailing legislation of the time.

All pipes, cables, ducting, and items above the impermeable lining will be disconnected, excavated, and removed from the site for disposal.

All uncontaminated hardcore and stone will be removed, with a flat bladed grader or bucket, for re-use or disposal. Concrete installations will be broken up and removed, the geotextile membrane (Terram), sand, and impermeable linings will then be removed, with disposal to an approved location.

Any installations, cables, and pipes, below the linings level will then be excavated and removed from the site.

The buried gas pipeline connecting to the gas grid shall be terminated at the grid connection point as agreed with National Grid. The gas pipeline shall be abandoned by purging out residual gas, inerting by filling with Nitrogen and capping/sealing at either end. Some National Grid infrastructure will be restored or remain in place in accordance with National Grid policy.

The cellar, sump and ditching voids will be infilled with any sub-soil stored on site, in layers of not more than 200 mm thickness, ready for the site area to be then re-graded to the original contour levels.

Any header drains installed will be rodded to check their integrity prior to their retention as part of the reinstatement scheme.

Sub-Soil Cultivation

Any weed growth on any subsoil stockpiles will be eliminated by non-persistent, contact weedkiller such as "Roundup", prior to the re-grading of the sub-soil to reform the falls and gradients which existed prior to occupation of the site and to the original site contours, the sub-soil will be deep tine cultivated, using a crawler or four wheel driven tractor, drawing a winged, deep tine cultivator to a depth of 600 mm at 1000 mm centres, so as to achieve a good heave across the full width of the site.
Work will be carried out in dry conditions, and as far as practical at right angles to the field drainage system. Any extraneous material brought to the surface will be removed to a tip with stones picked to approximately 75mm. Works for the replacement and spreading of the topsoil to an even depth, will be carried out following the fine grading of subsoil.

**Replacement and Cultivation of Topsoil**

Any weed growth on the topsoil stockpiles will be eliminated by non-persistent, contact weedkiller such as "Roundup". Topsoil will then be spread from the stockpile, using agricultural machinery, crawler or four-wheel driven tractors. Topsoil will be spread to give a uniform depth over the whole site, to avoid the formation of depressions which could hold water, and to grade to the original levels.

All operations will be carried out when both the ground and topsoil are dry and crumbly as far as practicable.

All topsoil areas within the site, including areas not affected by construction operation will be ploughed and cultivated to ensure that all stones, rubble, vegetation and other extraneous material larger than 75mm in any direction are removed from site to a suitable tip.

The topsoil will be worked to a fine tilth by rotovator or harrowing to not less than 100 mm depth.

If it should prove necessary to import topsoil into the site, disease and pest free material as near as practicable to that on site will be used.

**Removal of Site Boundary Fencing**

The boundary fencing will only be dismantled and removed if it is not required to protect the restoration area from stock animals.

**Reinstatement of Fences & Gates**

Any fences and gates removed during the use of the site will be replaced with new materials which match as closely as practicable those previously existing on site.

Any hawthorn hedge removed will be replanted with container grown "quick's" spaced in a double row of plants 9 inches apart. A pressure treated timber post and four rail fence with livestock and rabbit proof netting will be constructed on either side of the newly planted hedge.

Any fence to protect a hedgerow planting will be maintained for a period of two years.

**New Field Drainage**

If necessary, a scheme of field drainage in the site area will be prepared and agreed with the Landowner and for works to be carried out by a specialist land drainage contractor in year two, or earlier if appropriate.

Any construction header drains installed to intercept the field drains will be retained, these will be rodded to check their integrity prior to their incorporation as part of the drainage reinstatement scheme.
Perforated plastic pipe of minimum diameter, 110 mm, will be laid at the bottom of the trench surrounded by and backfilled with clean washed 10 to 20 mm pea-gravel and will be backfilled to within 225 mm of surface allowing for settlement for the gravel. Drains will be laid to the maximum available falls and, at depths not less than 600 mm cover.

Any outfall of the drainage system will consist of 2m lengths of frost resistant plastic pipe set into a suitable headwall (concrete or gabion) with a splash plate, discharging at water level into the ditches.

**Management and After Care**

The whole former operation site will be returned to agriculture after completion of the works, subject to the Landowner's agreement. Annual inspections will be made in August/September of each year, for a period of three years, with the Landowner or his Agent, to review the progress and crop productivity of the restoration area.

**Subsequent Management**

A. If, subject to Grass Planting.

**Year 1**

1. Initial treatment will be carried out as described above.
2. The site will be rolled with a light, grassland roller and spread with a compound fertiliser as recommended by soil sample analysis.
3. The grass will be cut for Silage or hay in May/June and subsequently grazed.
4. Any weeds will be sprayed with an appropriate weedkiller.
5. All stock/cattle will be removed in adverse weather conditions to prevent poaching.

**Year 2**

1. Annual inspection (if required)
2. Carry out additional restoration and compensate the owner or the land user for any loss.

**Year 3**

Repeat steps 1 and 2 above (if required)

B. If subject to Arable Planting

**Year 1**

1. Initial treatment will be carried out as described above
2. The crop will be assessed prior to harvest with regard to production levels and compared to production levels from adjoining undisturbed land,
Year 2

1. If required, further subsoiling or comprehensive field drainage scheme will be considered at the annual inspection.

2. Compensate the owner or land user for any loss or disturbance if required.

Year 3

1. Compensate the owner or land user for any loss or disturbance if required.
Appendix D

Sustainability Appraisal
This appendix documents the results from a Sustainability Appraisal (SA) of the exploration proposals at the Preston New Road site. It has been undertaken by using the SA criteria developed for the Joint Lancashire Minerals and Waste Development Framework. It was concluded that this was an appropriate SA framework to use for this assessment because of the spatial nature of the assessment criteria.

The following sections of this chapter describe the potential effects of the Project against these SA criteria including whether or not there is a potential effect and where there is effect the nature of the impact (e.g. negligible or adverse). The assessment does not assess the significance of any potential effects because this already covered by the Environmental Impact Assessment and documented in the Environmental Statement.

**SA of the temporary shale gas exploration Project**

**Table D1 Sustainability appraisal of temporary shale gas exploration.**

<table>
<thead>
<tr>
<th>Sustainability Topic</th>
<th>Assessment Criteria</th>
<th>Indicator</th>
<th>Potential effect</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Resources</td>
<td>Groundwater Source Protection Zones</td>
<td>SPZ1 (for all landfill and waste management activities) SPZ2 (unless for non-hazardous) SPZ3</td>
<td>None</td>
<td>The Site is not within any groundwater source protection zones.</td>
</tr>
<tr>
<td></td>
<td>Mineral Safeguarding and Consultation Areas</td>
<td>Located within a Mineral Consultation or Safeguarding Area or located near to either of the above (typically within 250m).</td>
<td>None</td>
<td>The Project is not within a safeguarded area and does not sterilise or extract any mineral resources other than the hydrocarbons present in the Bowland Shale.</td>
</tr>
<tr>
<td>Soil and Agricultural Land Quality</td>
<td>ALC Grade 1 &amp; 2 (or Grade 3a, where information exists) Located within an area of environmentally significant soils</td>
<td>Yes Negligible</td>
<td>Temporary loss of 1.55ha good quality agricultural land (3a). Although an area of good quality land will be taken out of production the facts that the area is small and temporary. The excavated top-soil and sub-soil will be stored (during the works) and restored (during decommissioning and restoration in line with industry best practice.</td>
<td></td>
</tr>
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<tr>
<td>Natural Heritage</td>
<td>Internationally protected areas</td>
<td>SACs, SPAs and Ramsar sites</td>
<td>None</td>
<td>The site is located 6km from the Morecambe Bay SPA and Ramsar sites. No effects on their status are predicted. The Ecology assessment for the Project has considered the potential</td>
</tr>
<tr>
<td>Nationally/statutory protected areas</td>
<td>Limestone Pavement Order areas SSSI Ancient Woodland</td>
<td>None</td>
<td>The Site is not within or close to a Site of Special Scientific Interest (SSSI) or ancient woodlands. Furthermore, there are no Limestone Pavement Order areas in this area of Lancashire.</td>
<td></td>
</tr>
<tr>
<td>Locally significant wildlife sites</td>
<td>Biological or Geological Heritage Sites Located within area of known wildlife significance (e.g. BAP habitats, wildlife corridors)</td>
<td>None</td>
<td>The Site is not within or close to a Biological or Geological Heritage Sites. Furthermore, there are no Limestone Pavement Order areas in this area of Lancashire. However, the Project will involve the removal of sections of hedgerow.</td>
<td></td>
</tr>
<tr>
<td>Landscape</td>
<td>Area of Outstanding Natural Beauty</td>
<td>Located within an AONB or located near to its (typically within the immediate landscape setting of the AONB)</td>
<td>None</td>
<td>The Project is not located within or near to an AONB. Therefore this is not applicable.</td>
</tr>
<tr>
<td>Landscape Character</td>
<td>Would result in loss of features important to landscape character (e.g. hedgerow density, vistas, etc)</td>
<td>Yes Negligible</td>
<td>The potential effects of the Project on landscape character have been assessed within the ES. It is concluded that the impact on landscape character will be very localised and temporary. Therefore no significant effect is predicted.</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Would lead to loss of visual amenity (e.g. affecting local viewpoint)</td>
<td>Yes Adverse</td>
<td>The height of the equipment that will be used during the exploration works will be visible from a number of viewpoints around the Site (e.g. public rights of way and roads). The visual effects will last for up to 2.5 years after which point all that will remain on site will be the infrastructure required for the Extended Flow Test. This equipment is typically no taller than a single storey building and would be screened by the earth bund and existing vegetation within the landscape (e.g. hedgerows).</td>
</tr>
<tr>
<td>Greenbelt</td>
<td>Within greenbelt</td>
<td>None</td>
<td></td>
<td>The Site is not within an area designated for planning as greenbelt.</td>
</tr>
<tr>
<td>Conservation area</td>
<td>Conservation Area (or within the setting of a conservation area)</td>
<td>None</td>
<td></td>
<td>Site is not within Conservation Area or the setting of a Conservation Area. The potential effects of the Site on more distant Conservation Areas and heritage features have also been assessed and also concludes that the Project will not be visible from these locations and will not have a detrimental effect on these features.</td>
</tr>
<tr>
<td>Past land use</td>
<td>Will utilise brownfield or derelict land</td>
<td>Yes Adverse</td>
<td></td>
<td>The Site is located on greenfield land and has not been previously developed.</td>
</tr>
<tr>
<td>Sustainability Topic</td>
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<tr>
<td>Cultural Heritage</td>
<td>Listed buildings and Parks and Gardens</td>
<td>Grade 1 &amp; 2* and Grade 2 listed buildings and structures. Located within or close to park or other formal space of local historic importance or locally significant buildings</td>
<td>Yes Negligible</td>
<td>No direct effects from the Project on listed buildings or other designated sites and features. The potential effects of the Site on more distant heritage features have also been assessed and concludes that the Project will not be visible from these locations and will not have a detrimental effect on these features.</td>
</tr>
<tr>
<td>Archaeological or Historic Monuments</td>
<td>Scheduled Monument Structures or remains listed on the Sites and Monuments Record</td>
<td>Yes Negligible</td>
<td>No direct effects from the Project on schedule monuments. The potential effects of the Site on more distant schedule monuments have also been assessed and concludes that the Project will not be visible from these locations and will not have a detrimental effect on these features.</td>
<td></td>
</tr>
<tr>
<td>Health and Well-being</td>
<td>Public Rights of Way (PRoW)</td>
<td>PRoW Would necessitate temporary diversion of rights of way</td>
<td>None</td>
<td>There is no requirement for the temporary or permanent closure / diversion of a PRoW (public footpath or bridleway).</td>
</tr>
<tr>
<td>Flood Risk</td>
<td>Is the site within Flood Zones 2 &amp; 3</td>
<td>None</td>
<td>The site is within Flood Zone 1 (areas with a likelihood of flooding from watercourses of 1 in 1000 years or greater) so no further assessment is required.</td>
<td></td>
</tr>
<tr>
<td>Non-Complementary Land-Uses</td>
<td>Near to non-complementary land-use such as residential areas and public spaces (e.g. places of worship, schools, hospitals, and other premises attracted</td>
<td>None</td>
<td>The site is not near large and built up areas that include residential properties, schools, churches, hospitals or other premises that attract significant numbers of people).</td>
<td></td>
</tr>
<tr>
<td>Sustainability Topic</td>
<td>Assessment Criteria</td>
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<tr>
<td></td>
<td></td>
<td>significant numbers of people)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Airfield Exclusion Zones</td>
<td>Within 3km of Airfield Exclusion Zones Within 13km of AEZ</td>
<td>Negligible</td>
<td>The flare is enclosed so will not present a risk to aircraft.</td>
</tr>
<tr>
<td>Infrastructure and Accessibility</td>
<td>Ability to connect to railway network Located within 5km of primary road network Suitability of access roads to carry HGVs rate of Road Traffic Accidents on local routes</td>
<td>Yes Negligible</td>
<td>The Site is within 5km of the primary road network (A585). The suitability of all potential access routes for HGVs have been assessed and where necessary mitigation measures are being put in place (e.g. passing places on Dagger Road).</td>
<td></td>
</tr>
<tr>
<td>Planning Status</td>
<td>Resulting in re-use of buildings within B2 Industrial Allocation Resulting in re-use of Brownfield Sites (with or without B2 Industrial Allocations status) Greenfield (with existing plan allocation status)</td>
<td>Yes Adverse</td>
<td>The Site is located on greenfield land and does not have any specific planning allocation. This is because of the need to undertake the exploration works in areas with suitable geology. A rural and less densely populated area was also chosen for this exploration project to avoid potential significant environmental effects (under the EIA Regulations).</td>
<td></td>
</tr>
<tr>
<td>Market Location</td>
<td>Sited within 15km of principle sources of waste arisings.</td>
<td>None</td>
<td>The Project does not involve the treatment of waste therefore this is criteria is not relevant</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

For the majority of the SA criteria the project either has no effect or there is the effects are negligible (17 in total). Of the remaining effects the following conclusions have been made:

- Although there will be a visual impact this impact will be short-lived and temporary;
- The site does not re-use previously developed land because it is an active decision to choose site locations away from large population centres. This is so that Project only effects a small number of people and minimise the extent of any potential disturbance; and
- The re-use of buildings have been avoided because it is not practicable to undertake exploration works from within existing buildings.

None of the adverse sustainability effects can be mitigated or avoided by the Project. However, it is noted that because the Project is temporary it will be returned to its greenfield state following the exploration works if it is decided that the Site is not suitable as a location for shale gas production. If it is determined that the Site is suitable for shale gas production in the future it would be subject to its own planning application and EIA.