

Your ref
Our ref
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Dear Mr Perigo

Planning Applications for Temporary Shale Gas Exploration at Roseacre Wood, Lancashire (LCC/2014/0101 & LCC/2014/0102)

We note that Friends of the Earth (FoE) has responded to the above planning applications, in its letter dated 19th September 2014.

In its letter, FoE raised a number of matters it suggests have not been addressed within the planning application and supporting documentation. With regard to those items we consider to be material to the planning application, the purpose of this letter is to clarify how these items are already addressed within the Environmental Statement (ES) and Planning Statement submitted with the planning applications.

This letter does not seek to comment on the general statements or opinions presented by FoE, or references to alleged experiences in the US which have no direct relevance to the particular proposals which are the subject of this application. Cuadrilla Elswick Ltd (**Cuadrilla**) reserves its rights to address any other matters raised by FoE at a later date.

In addition to obtaining planning permissions, a variety of consents and permits will also be required before commencement of development and 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. These include the requirements established by the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2010 which also requires the submission of environmental information as part of the consenting process. Some of FoE's comments fall outside the scope of the planning regime but relate to issues which are to be considered by other regulatory regimes. For completeness and in order to assist as far as possible with providing a broad understanding of the context, we have made reference to these other consenting processes where relevant, despite these issues not properly falling within the scope of the planning process.

The link to the Environment Agency web site for the consultation on the Roseacre Wood environmental permits is: https://consult.environment-agency.gov.uk/portal/npsapp/cuadrilla_1/cuadrilla_elswick_limited_1?pointId=ID-2988910-QUESTION-VIEWS-ON-THE-CUADRILLA-ELSWICK-LIMITED-ENVIRONMENTAL-PERMIT-APPLICATION&do=view

We address below the issues raised by FOE by reference to the paragraph numbering used in their letter dated 19th September 2014.

1. Precautionary Principle

1-4. The precautionary principle does not require applicants to demonstrate that there is zero risk associated with their proposed development. If this were correct it is likely that all forms of development would be curtailed.

The precautionary principle is incorporated into the requirements of applicable environmental legislation with which the project must comply and in relation to which the Environment Agency is the competent authority.

The 2005 UK Sustainable Development Strategy objectives were taken into account in *Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1* (December 2007). This policy document is now cancelled and has been replaced by the National Planning Policy Framework (NPPF). It is noted though that neither the historic PPS 1 Supplement document nor the NPPF refer to the “precautionary principle”.

The primary national planning policy relevant to the consideration of the planning application is that set out within the NPPF and the relevant policies have been referenced within the “Planning Statement” that supports the planning application.

We note that the NPPF makes reference to the five ‘guiding principles’ of sustainable development set out within the UK Sustainable Development Strategy *Securing the Future: living within the planet’s environmental limits. These relate to “ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly.” (Page 2 – NPPF – March 2012)*

The ES presents the results of the Environmental Impact Assessment conducted in full compliance with regulatory requirements for such an assessment and taking into account expert opinion from a number of specialists. That process has taken into account available scientific information and presents a full set of mitigation measures designed to reduce identified risks to an acceptable level. It fully accords with the UK Sustainable Development Strategies principle of “using science responsibly”.

The Planning Statement concludes, referring to the findings contained within the ES, that the impacts of the proposed development at Roseacre Wood would not outweigh the likely benefits. The proposals therefore fully accord with this and other policies of the NPPF.

5. Chapter 11 of the ES addresses the possible risks to groundwater and surface water as a result of the project, including as a result of:

- Well pad and transit activities;
- Well construction and possible well integrity issues;
- Induced hydraulic fractures in the underground shale rock.

Mitigation measures to address each of these risks are detailed in Chapter 11. For the reasons explained in Chapter 11, Arup has concluded that by implementing the proposed measures the project will not result in a significant effect on the quality of the water environment or other relevant water receptors.

6. Cuadrilla cannot reasonably comment on alleged contamination in unrelated projects in which it was not involved. In respect of this planning application, Arup has assessed groundwater contamination risks in Chapter 11 of the ES and has proposed appropriate detailed mitigation measures in Section 11.4.5, including:

- Wells will be drilled, constructed and integrity tested in accordance not only with regulatory requirements (DECC and HSE) but also with industry best practice guidance (Oil and Gas UK and UKOOG) and the requirements of Cuadrilla's Mining Waste Management Plan which is to be approved and enforced by the EA;
- The measures are designed to ensure that drilling, fracturing, produced fluids and the target shale zone are isolated from sensitive groundwater receptors. The design will comprise a minimum two-barrier, cement-sealed well design with surface casing set below the Sherwood Sandstone and additional intermediate casing set prior to entry into the target zone.

Details of proposed well construction will be provided to an Independent Well Examiner for review and comment and are the subject of regulation by the Health & Safety Executive.

7-9. See response to paragraph 6.

10. As stated in the ES hydraulic fracturing has been 'frequently carried out offshore and onshore in the UK on oil and gas wells in low-permeability reservoirs to increase well productivity'. We acknowledge hydraulic fracturing of **shale** has only been undertaken at one location in the UK, Preese Hall.

11. The regulatory framework for shale gas is comprehensive. The Department of Energy and Climate Change (DECC) publication *Onshore oil and gas exploration in the UK: regulation and best practice*¹ provides a roadmap and explains the permitting and permissions process for onshore hydrocarbon operations, from issuing of petroleum exploration and development licence (PEDL) to site operations.

12. As noted in ES Chapter 11 (Section 11.4.5 and Appendix K3.3) verification of well integrity will be performed during and following well installation (i.e. pressure testing, FIT, and wireline logging such as CBLs). During hydraulic fracturing and well testing operations, continuous pressure monitoring will be performed in uncemented annular space between production and intermediate casings to verify barrier integrity. Groundwater monitoring wells located around the well pad will enable identification of any variation in groundwater quality in the vicinity of the exploration wells.

The construction of multiple wells per pad and simultaneous activities on the well pad are considered in the ES Appendix K3.6 (potential for collision or interaction during drilling) and Appendix K4.2.3 (potential for interaction during fracturing).

The potential for collision of a new well with another well during drilling is routinely managed by the industry, where 5 to 6m separation at the surface is typical and can be as low as 3m. Multi-well pads for onshore hydrocarbon exploration and production have been developed across the UK, for several decades, including in Lincolnshire, Nottinghamshire, Hampshire and Dorset (Wytych Farm). Prior to any simultaneous

¹ Department of Energy and Climate Change (DECC), 2013d. Onshore oil and gas exploration in the UK: regulation and best practice. Ref. 13D/328. DECC, London, UK. 49pp.

operations, Cuadrilla will prepare a simultaneous well operations plan and risk assessment specific for the Project.

Each individual well on-site is designed to be capable of withstanding the maximum pressure that could be produced by well interaction, as all wells at the site are designed to sustain the same pressures. In addition, pressures will be closely monitored at each well during hydraulic fracturing activities. The Hydraulic Fracture Plan will also include a site specific risk assessment considering potential for interactions with offset wells or other Project wells, in accordance with industry good practice.

13. The statistics presented in the FoE letter reflect failure of a single well barrier (in what is a multiple barrier well design) rather than leakage of gas or liquid from a well. The ES Appendix K3 assesses well integrity in detail. In particular:

- The proposed exploration wells are designed with multiple barriers, providing several layers of protection that would all need to fail to result in a release of gas or liquids from the well to the environment (referred to as ‘well integrity failure’).
- Chapter 11 of the ES also assesses the environmental effects that could arise if the multiple barriers all failed and leakage from the wells occurred. It concludes that the potential of any impact is Very Low (groundwater receptors) or that there is no plausible pathway (ground gas receptors) due to local geological and hydrogeological conditions.

14. See responses to paragraphs 1 to 13 above.

2. Water Impacts

15. The ES describes how the overtopping of the bund to areas outside the well pad area would only occur in extreme situations and in any such extreme situation the well pad would also be inundated. This is because the bund is designed such that its exterior of the bund is 50mm higher than the pad surface. As described in the ES Chapter 4.5.4 the well pad will be underlain by an impermeable membrane such that any leakage or runoff is contained and can be recovered.

The Table 19.11 describes how under the isolation valve closed case (during hydraulic fracturing operations for example), runoff occurs only for storm durations where rainfall depth exceeds that of a 1 in 10 year return period event with a duration in excess of 48 hrs. Prior to that, runoff is contained. Calculations supporting this are given in Appendix S.

As described in Chapter 11 Section 11.7.7 paragraph 209, during operations the drainage is contained on site, and water collected in site drains will be used in drilling fluids and fracturing fluid and excess will be regularly pumped out and removed off site by a competent contractor. The storage capacity of the well pad could be exceeded in certain circumstances e.g. restriction of tanker movements preventing removal of water. Overflow onto the surrounding ground could occur by overtopping the perimeter drains; however the exterior bund is 50mm higher than pad surface so the pad would be inundated before this occurred. If overflow occurred it would probably be during heavy rainfall and any contaminants present would be highly diluted. The ES does not predict any significant adverse impact on surface water quality.

Industrial wastewater (rainwater captured by the pad during drilling, hydraulic fracturing and flow testing) will be treated at the local Wastewater Treatment Works (WwTW). There is sufficient treatment capacity at Davyhulme and Blackburn WwTWs to treat the

industrial wastewater. Therefore the impact is considered to be not significant.

16. Each project is design and location specific. The ES for Roseacre Wood can only assess impacts relating to this project.

17. As described in Chapter 19 (paragraph 27) of the ES, surface water collected in the drain would only be discharged to the watercourse in accordance with Environment Agency Environmental Quality Standards (EQS). The proposed scope and methodology for surface water monitoring has been submitted to the EA for assessment as part of the environment permit application. Cuadrilla has appointed a specialist contractor to undertake baseline, operational and post operational monitoring. Monitoring reports will be provided to the EA and made available on Cuadrilla's website.

18. Chapter 19 of the ES has assessed impacts for a range of return periods up to and including a 1 in 100 year return period and including allowances for climate change. If a very extreme event occurred where rainfall depths exceeded those of the containment capacity, there would also be additional dilution effects due to the large volume of rainwater present. Long duration events occurring over several hours or days (such as the 2013/14 events noted) would give longer timeframes to be able to tanker off excess volumes if required, in order to reduce the risk of the bund being overtopped.

Chapter 11 paragraph 58 correctly refers to Roseacre Wood, in reference to the Roseacre Wood ERA produced in parallel with the Roseacre Wood EIA and not the EIA produced for Preston New Road as indicated by FoE.

19. The possible pollution impacts above are extracted from, and have been assessed in, Chapter 11 (primarily section 11.7.7) and Appendix K of the ES. The probability, consequence, risk significance, mitigation measures embedded in the project design, and potential residual effects have been systematically assessed and are presented in the ES. The residual risk magnitudes are assessed as Low, in accordance with the criteria presented in the ES.

20. This paragraph simply provides a quote from the ES and no response is required.

21. This risk is discussed in Section 19.6.3 of the ES and the Flood Risk Assessment. Table 19.11 in the ES, supporting text and Appendix S describes how the project would not increase the runoff from the site as a result of the proposals, and in some cases, there would be a decrease in site runoff.

22. We note that this is for Lancashire County Council to address. The ES does not predict any significant adverse impact on surface water quality.

23. Cuadrilla has consulted United Utilities to ascertain any potential impacts of Cuadrilla's proposals on United Utilities' continued ability to fulfil its duty to its customers. Section 19.6.4 of the ES describes how United Utilities operate the potable water network as an integrated supply zone. Section 19.7.5.5 of the ES describes how hydraulic modelling has shown the demands sought are predicted to have no impact on local supplies (to supply volume or low mains pressure) and this is supported by a letter from United Utilities contained in Appendix S to the ES.

24. The 500 L/p/d figure is a national average and a statistic provided by the Environment Agency and is used to give context as a comparator. Since United Utilities operate the potable water network as an integrated supply zone, a comparison on a small local scale

such as the one made by FoE in item 24 is therefore not considered as relevant as the average figure used due to the way that water is supplied across the Northwest. Section 19.5.1 of the ES describes how the overall requirements for water have been reduced and measures embedded to help reduce these where practical.

25. The mitigation measures are stated in paragraphs 99,100 and 101 and the justification to assess the impacts post mitigation as 'minor adverse' acknowledges that it is likely that one or more of these measures will be feasible to implement. In addition, the embedded mitigation of United Utilities installing a pressure sustaining valve and pressure monitoring valve on the network would be a condition of it providing a supply of water to the site, and consequently would provide preservation of supplies for other uses of the network. We note also that mitigation to 'lengthen the intervals between fracturing' would not result in an extended period of operations on a daily basis, but could be achieved by not fracturing on some operational days.

Refer also to Appendix S where a letter from United Utilities states the solution does not satisfy the highest flow rate scenario [*i.e. supplying the full demand twice per day which is not sought by the project and hence not assessed*], but will provide sufficient daily flow to meet the most likely scenario of 765m³/day.

3. Climate Change

26. This paragraph conflates a number of issues, such as leakage, GWP etc, which are considered separately in numbered paragraphs below. The reference to statements on page 67 is not understood.

Climate change impacts arising from fossil fuel extraction are primarily a matter for national energy and climate change policy rather than decisions on individual planning consent applications. We note that the report by Sir David Mackay on the potential for greenhouse gas emissions from shale gas extraction, as well as its use, concluded that, with the right safeguards in place, the net effect on UK GHG emissions from shale gas production in the UK will be relatively small and considerably less than use of alternatives such as coal for electricity generation².

27. Mitigation measures are designed to be effective. In addition to the text quoted by FoE concerning maintenance of equipment, Chapter 8, paragraph 23 of the ES sets out five parallel examples of embedded mitigation, while section 8.9 sets out a further five means of mitigating effects on GHG emissions. To summarise the information included in chapter 8, para. 23, the three main sources of potential fugitive emission sources will be mitigated as follows:

- To prevent leaks from compromised well integrity:
 - A well integrity monitoring plan will be implemented throughout the project.
- To prevent leaks from pipes and connection components on-site:
 - Use and maintain all equipment and pipework in accordance with the manufacturers specifications;
 - Undertake hydrostatic pressure testing of all pipework and equipment used to process or move the gas around the Site;
 - Fugitive emissions monitoring will be undertaken across the Site at regular intervals.

² DECC; September 2013: *Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use*; Prof. D.J.C. MacKay, Dr. T.J. Stone: para.4a.

- To prevent fugitive emissions from flowback fluid containing CO₂ or CH₄:
 - The use of an enclosed completions system which separates gas, solids and liquids.

28. The paper by Caulton et al uses an unusual form of data acquisition and identifies the underlying geology and land uses as key determinants in the analysis of fugitive emissions. The target area of the study was the Marcellus shales which is not a comparable deposit to the Bowland shales due to depth, thickness and physical characteristics.

Section 8.7.3 addresses Green House Gas emissions from the drilling process as CO₂e, to provide a consistent approach to assessment of effects. Methane is an integral component of the CO₂e calculation and it is not considered appropriate to assess CH₄ as a separate component for this individual stage of the process.

29. The rationale for adopting the stated GWP is set out in our response to para. 30 below.

30. The GWP figures were selected to provide consistency with DEFRA conversion factors which are currently based on the IPCC's 2nd assessment report. DEFRA's aim is to provide a consistent comparison with the UK GHG Inventory and Kyoto Protocol. The GWP of 25, over a 100-year period, maintains this consistency of comparison and incorporates a safety margin in the estimation of effects.

31. The project's total predicted carbon footprint is the sum of the individual footprints attributable to each activity undertaken during the course of the project e.g. logistics, on-site machinery and flaring (see Appendix H; Table 1). Embedded and operational carbon footprints are also estimated (materials and waste), to provide a comprehensive assessment of GHG emissions. The primary contribution of CH₄ to the project's GHG emission profile is detailed in section 8.7.5 of the ES and Appendix H1.3.

32. Adoption of carbon budgets for alternative geographical areas would obviously provide a different figure, however there are no precedents for this type of assessment and the selection of Fylde as a baseline would be as valid as using the Northwest region or national figures. It is interesting to note that use of FoE's suggested comparator would still generate a relatively low percentage figure.

33. The climatic effects of GHG emissions operate at the global scale; it is not relevant to consider effects for a sub-set (industrial & commercial sector) of a sub-region (Fylde), as suggested in para. 33.

34 - 36. Significance of effects at the national (and higher) level is a more appropriate approach since climate necessarily takes effect over the wider context.

37. This paragraph in FoE's letter is factually incorrect, in that the target for GHG reduction set out in the Lancashire Climate Change Strategy 2009-2020 is 30%, not 34%. The statement in relation to Policy DM2³ omits the requirement for it to be implemented in accordance with Policy CS5 (*inter alia*), which sets out (in sub-para i-vii incl.) The criteria and requirements for sustainable mineral development in the County. In particular, sub-para (v) aims to ensure that:

“The amenity, health, economic well-being and safety of the population are protected by the introduction of high operating standards, sensitive working practices and

³ Joint Lancashire Minerals & Waste Local Plan; Site Allocation and Development Management Policies – Part One

environmental management systems that minimise harm and nuisance to the environment and local communities throughout the life of the development.”

The ES, and Appendix E in particular, set out in their entirety the means by which the project will comply with Policy CS5, including GHG emissions and their management.

38. It is agreed that planning decision makers need to consider climate change, however it is not appropriate to compare a permanent surface-mining process such as peat extraction with a temporary exploration activity that has been subject to rigorous environmental impact assessment. The scale of GHG emissions attributable to shale gas exploration activities at the site has been calculated, and is set out in chapter 8, section 8.11 of the ES. Section 8.10 states that these emissions are equivalent to 0.1% of the UK’s allocation for 2016 under the EU ETS; this is not considered to be a significant effect.

39. The calculation for MWth (Mega Watt Thermal) is based on the capacity of a combustion source as per European Commission Guidance (Guidance on Interpretation of Annex I of the EU ETS Directive (excl. aviation activities), March 2010

Utilising the manufacturers flow capacity and the net caloric value of the source stream (e.g. natural gas, diesel etc.), the Mega Watt Thermal capacity can be calculated.

4. Energy Policy

40- 53. This section of the FoE letter examines Government policy for “maximising recovery of UK’s indigenous supplies of oil and gas” and Government support for shale gas production.

The Planning Statement which accompanied Cuadrilla's planning application identifies the Government’s energy policy relevant to the determination of the planning application. Cuadrilla's obligation is to comply with the current regulatory environment and to identify policy relevant to determination of its planning application. It is not for Cuadrilla, or indeed the planning authority, to assess the adequacy of Government policy.

5. Environmental Impacts

54. The potential impacts of the project on waste, water quantity and quality, transport, air quality, visual, noise and ecological impacts have been thoroughly assessed in the ES. Arup has concluded that the project does not give rise to unacceptable adverse impacts for the reasons stated below:

Waste: The waste arisings from the project can be treated at a number of facilities with environmental permits in place for the treatment of the specific waste streams that will be produced. In the assessment of the potential waste arisings (Section 17.7 of the ES) the quantity of waste that the project may generate can be treated within the existing available regional treatment capacity. Waste flowback fluid generated during initial flow testing can also be treated within the available capacity (section 17.7.10.2 and Table 17.89 of the ES). Any variation in the quantities of flowback fluid generated will also be managed by the applicant using the measures stated in paragraphs 371 to 373 (section 17.8.5.3) of the ES.

Water Quantity: The water used by the project will be sourced from the United Utilities (UU) mains water supply. UU is required by the Water Act 2004 to produce a Water Resources Management Plan (WRMP). This identifies the current and future available water resources taking into account change in demand. This information was used in the

assessment of water resources in the ES (Chapter 19). The greatest quantities of water will be consumed by the project during Hydraulic fracturing, however these equate to only 1% of the daily available water resources across the UU water supply network (i.e. the spare capacity), and 0.03% of the total water resource across the UU water supply network (section 19.7.5.5, paragraph 76 of the ES). Furthermore, UU has provided the applicant with written confirmation that the quantities of water required to undertake hydraulic fracturing can be provided without resulting in an unacceptable adverse impact on other consumers (ES Appendix S7. –It is therefore concluded that the predicted effects are not significant.

Water Quality: The design of the well pad, well pad containment system, a pollution interceptor and an isolation valve provides a barrier between the works and waterbody receptors around the site (see ES section 4.5.4.2, paragraphs 38, 40, Figures 4.9 to 4.11). The wells will be designed to provide multiple barriers between the groundwater and deep underlying production zones. They will also comply with the guidelines and regulations stated in section 4.7.3 (paragraph 66 of the ES). Paragraphs 67 and 68 of Chapter 4 of the ES also describe casings and liners that will form the well. The applicant will implement a set of Environmental Operating Standards (a rationale document describing what these will cover is provided within Appendix E2 of the ES) to manage the environmental aspects of their operations and to provide a framework for the implementation of mitigation measures, planning and environmental permitting conditions. Chapter 11 makes an assessment of plausible pollutant pathways (section 11.7) which includes surface and groundwater considerations. It concludes that by implementing the proposed measures the proposals will not result in a significant effect on the quality of the water environment or other relevant potential receptors. It is therefore concluded that the predicted effects are not significant.

Transport: The transport impacts of the project are assessed in Chapter 18 of the ES. The project proposals have been developed to reduce the traffic impacts where possible, for example by re-using flow-back fluid during hydraulic fracturing to reduce the number of HGV movements required to remove waste water for treatment. With the implementation of these measures plus those set out in section 18.9 of the ES (and Appendix R) the effects of the project on other road users, pedestrians and cyclists are assessed as not significant because the magnitude of the predicted effects are small, and do not generate significant residual effects.

Air quality: The potential atmospheric emissions from the project have been assessed. This assessment has concluded (section 6.7 of the ES) that none of the planned activities will have a significant impact upon local human or ecological receptors. It is therefore concluded the predicted effects are not significant.

Visual impacts: The ES describes significant adverse visual impacts although these are only predicted during the drilling, hydraulic fracturing and initial flow testing phases. Such significant effects would be temporary and any worst case adverse effects would not occur continually over this three year phase of the development (see section 14.7.4.1 and Table 14.1 of the ES. These effects would also only be experienced by a limited number of visual receptors across a small area (the maximum extent of the impact on visual receptors being restricted to a distance of less than 1km from the well pad - see section 14.7.4.5 and Table 14.13 of the ES). Photomontages have been produced for viewpoints 3, 6 and 10 and included in the ES Appendix N4 showing worst case visualisations. These locations were agreed with Lancashire County Council. The mitigation measures set out in section 14.9 of the ES would contribute to minimising inter-visibility with the site fencing, site containers

and equipment along with lower sections of rigs, although the main significant but temporary visual effects would remain difficult to mitigate against in the wider landscape.

Noise impacts: The noise impacts from the project have been assessed (section 16.7 of the ES) and where necessary, mitigation measures identified (section 16.9 of the ES). With these mitigation measures the noise levels from the project are within the noise thresholds (described in section 16.4.3 of the ES). It is therefore concluded that the predicted effects are not significant.

Ecological impacts: The ecological impacts have been assessed (in section 10.7 of the ES). All of the effects identified in the assessment can be mitigated using the measures set out in section 10.9 of the ES. The residual effects with these measures in place have been assessed as not significant (section 10.10 of the ES). It is therefore concluded that the predicted effects are not significant.

55. The Landscape and Visual effects arising from the development have been comprehensively assessed in Chapter 14 of the ES. The Planning Statement, to which FoE's comment relates, summarises some of the principal findings from the LVIA chapter of the ES.

6. Waste

56. A suite of mitigation measures are set out in paragraphs 371, 372 and 373 (section 17.8.5.3) of the ES, including methods for dealing with variations in flowback production volumes and/or appropriate treatment capacities at individual facilities in the regional context.

57. This paragraph simply provides a quote from the ES and no response is required.

58. Section 17.8.5.3 (paragraph 373) of the ES describes the steps Cuadrilla would take if flowback were to exceed 40%, so that the quantity of flowback fluid requiring removal from the site for treatment will not exceed the available treatment capacity. These steps comprise:

- Provision of additional on-site tank capacity to temporarily accommodate stored flowback fluids to enable transport off-site to be controlled effectively;
- Consideration of temporary suspension of flowback production by closing in the well at surface, pending provision of capacity in treatment facilities or storage tank systems;
- Consideration of amendments to hydraulic fracturing operations to reduce volumes of flowback.

The ES assessed the peak volumes of flowback however the quantity of flowback fluid will reduce during initial flow testing to much lower levels by the extended flow testing stage (see table 17.53 and table 17.64 respectively).

59. The ES identifies 13 additional mitigation measures, of which discussing "any issue relating to insufficient capacity with the EA and other stakeholder" is just one. These are described in section 17.8.5.3 of the ES (paragraphs 371, 372 and 373).

There is a distinction to be drawn between re-using flowback fluid in the hydraulic fracturing process (which is proposed, as detailed in the planning application documents and ES) and recycling waste flowback fluid following it being stored as a waste, e.g. where there is no further planned re-use in fracturing operations at the site. No recycling of flowback fluid is currently planned as part of the activities.

Where the ES states that flowback fluid will be reused it is with reference to the hydraulic fracturing stage of the project (section 4.8.2, paragraph 80, 1st bullet point) where it would be used to form part of the hydraulic fracturing fluid and therefore reduce the total quantity of flowback fluid that has to be removed from site for treatment and also reducing the total quantity of mains water consumed by the project

Chapter 11 of the ES has assessed the plausible pollutant pathways associated with the project and concludes that no additional mitigation measures are required (see section 11.7 and 11.10 of the ES). Once exploration works are complete, the well will be plugged and abandoned in accordance with the relevant regulations in place at that time.

60. As set out above and in Chapter 17 of the ES flowback fluid will be reused rather than disposed of in accordance with the principles of the waste management hierarchy. When the flowback fluid is required to be disposed of this will be sent to an Environment Agency permitted waste disposal facility for disposal in accordance with the facilities permit conditions. No significant adverse effects are generated, particularly in the context of regional availability of waste water treatment capacity

As set out in section 17.6.2.3 of the ES, there are facilities in the north of England that are capable of treating flowback fluid and section 17.7.5.2 demonstrates that this can be achieved without exceeding the currently available treatment capacity.

In addition to the proposed mitigation measures:

- a comprehensive Environmental Operating Standard will be implemented as set out in Appendix E of the ES; and
- the detailed management of waste, including flowback fluids, will be set out in a Waste Management Plan, augmented by waste and materials management plans as summarised in Appendix E.

7. Drilling and Hydraulic fracturing Chemicals

61. Outlined in the Waste Management Plan HSE-Permit-INS-RW006, appendix A are the full disclosure of chemicals for drilling fluids. Drilling fluids are also discussed in response 71 and 72 below. Appendix K4.3 describes fracturing fluid. The hydraulic fracturing fluid contains non-hazardous to groundwater Polyacrylamide only. In accordance with Environment Agency technical guidance, the nature and quantities of proposed fracturing chemicals are identified in the ES and are identified in the environmental permit application, also discussed in response to 63. Full disclosure has been provided to the Environment Agency.

62. ‘Polymer mud’ is a widely used drilling term and is not used in the ES to imply any toxicity characteristics. Also see the response to point 71 below regarding drilling mud composition and hazardous/non-hazardous classification.

63. As noted in the ES K4.3 the friction reducer proposed for use is polyacrylamide. The Joint Agencies Groundwater Daughter Directive Advisory Group (JAGDAG), an

organisation that includes the EA, has assessed anionic polyacrylamide in accordance with the 'Methodology for the determination of hazardous substances for the purposes of the Groundwater Daughter Directive' (2006/118/EC). The conclusion of their assessment is that anionic polyacrylamide is non-hazardous under the definition of the Groundwater Daughter Directive.

64. As noted in the ES Appendix K, Section K4.3, while the EA has previously approved the use of gluteraldehyde previously, Cuadrilla has decided not to use gluteraldehyde or other chemical biocides other than the residual chlorine already present in the mains water. Cuadrilla may also use non-chemical methods such as the use of ultraviolet (UV) disinfection. The use of gelling agents, surfactants, and scale or corrosion inhibitors in fracturing fluid is not proposed.

65. The Low Toxicity Oil-based Mud (LTOBM) is not composed of diesel fuel, also see response to point 71 and 72.

66. The waste classification of flowback fluid is discussed in the ES Chapter 17 and is covered in further detail in the environmental permit application HSE-Permit-RW-PNR-006. As per Waste Management Plan a spacer fluid is injected to displace the mud both from the casing and the borehole, returning residual drilling muds to the surface before hydraulic fracturing. As result of using LTOBM, the spacer fluid has been classified with a EWC code 01 05 05* and will be stored pending its removal for offsite disposal within the surface hazardous waste facility area.

67. See responses to point 64 above and 71 below. As noted in ES Section 4.8.3, jetting fluid contains water, sand, and friction reducer. It contains no additional additives.

68. See response to paragraph 71 and 72 below. Material Safety Data Sheets are publically available from suppliers and can be downloaded from supplier's websites.

69. As noted in response 63 the friction reducer contains only non-hazardous substances under the Groundwater Directive definition.

70. As set out in the ES Appendix K as a contingency, dilute hydrochloric acid (<10% concentration) may be used to facilitate entry of the fracturing fluid from openings in the production casing to the target formation. Hydrochloric acid would be used to reduce fracturing pressure requirements. However, it has not been necessary to use it at other wells drilled in the licence area to date. Diluted hydrochloric acid will react with the shale (containing calcium carbonate materials) to produce salty water and carbon dioxide. Similar use of hydrochloric acid is commonly undertaken following drilling of drinking water wells in aquifers.

71. See response to paragraph 72 below.

72. The ES and environmental permit are consistent in their approach to drilling fluids. The ES notes at ES Chapter 11 (Section 11.7.3 para 173 and Appendix K3) that groundwater protection will be maintained as:

- No chemicals assessed by the EA as hazardous to groundwater (as defined by the Groundwater Daughter Directive) will be used when drilling above the Manchester Marls Formation.
- If contingency drilling fluids (or additives classed as hazardous) are necessary, such as Low Toxicity Oil-based Mud (LTOBM), the fluids will not be utilised in subsurface units above the Manchester Marls Formation, and will only be

employed for drilling where groundwater bearing units are very deep, of poor quality and isolated from nearer surface sensitive groundwater receptors and where isolating surface casing has been installed, cemented, and tested for integrity.

The ES notes (Section 11.7.3 para 173) only fluids approved for use by the EA under the environmental permitting regime will be used and the composition of drilling fluids is considered in additional detail in the environmental permit application (Appendix A), where the specific additives that may be used are identified.

The risks to groundwater associated with drilling fluids are described in detail in the ES Section 11.7.3 and Appendix K3.3. The residual risk is assessed as Low, in accordance with the criteria presented in the ES.

8. Water Quantity and Quality

73. Chapter 11 of the ES assesses in detail the potential impacts to the water environment associated with the proposed scheme. No significant adverse impact on surface water quality is predicted.

74. The possible impacts on water supply from the project are described in ES Chapter 19 - Water Resources.

9. Air Quality

75. Section 6.7.5 of the ES outlines the worst case impacts from traffic by comparing the maximum number of vehicles expected in one day and assuming that level of impact would continue on a daily basis. It is noted in the assessment that the maximum number is well below the screening criteria for assessment, therefore even with variations in planned activity the pollution from traffic is still expected to be not significant.

76. This paragraph is for Lancashire County Council to respond to.

77. All receptors have been assessed against the health based objectives. Worst case receptors have been selected in the assessment; these represent locations which are closer to the operation than those mentioned by FoE. The impacts at the worst case locations are not significant as set out in the ES section 6.7.5. With the nearest receptor being 350m from the site and the other receptors in the assessment all being within 2km of the site, receptors further away from the site such as those mentioned by FOE will experience even less of an impact. Therefore the impact upon the receptor locations mentioned will also not be significant.

78 This paragraph is a statement and does not require a response.

79. Fugitive emissions have been considered over all operational stages. In addition to the considerations provided during the extended flow testing section, fugitive gas release has been considered in Chapter 6 (Air Quality) section 6.7.5 as part of the Initial Flow Testing stage. In addition Section 8 (Greenhouse Gases) has assessed the impact of fugitive gas release during other stages of the project. Section 8.5.2 describes the measures that will be put in place to ensure the integrity of the system and to avoid release of fugitive emissions.

80. Cuadrilla will comply with the health and safety requirements for these types of operations, including the requirements of the *Health and Safety at Work etc Act 1974*, to provide suitable protection to the workforce.

81. This is a statement. The results of significance within chapter 6 indicate these increases are not significant.

82. The assessment has been based on worst case assumptions and been carried out using all relevant guidance and objectives as described in the ES. The concentrations at local receptors Roseacre Hall and Old Orchard Farm are well below the objective limits ($40\mu\text{g}/\text{m}^3$) and no harm to human or ecological health is expected as a result of air emissions. Please see section 6.7.5 of the ES for full details.

83. Following the Environmental Protection UK (EPUK) factors to judge significance as set out in Appendix F1 of the ES, the development resulted in a conclusion of ‘low priority’. The emission increases and resulting impacts at sensitive receptors are well below the air quality objective levels and were below the significance levels as outlined in the EA guidance.

84. The concentrations of pollutants predicted at human and ecological receptors were not found to be significant (ES section 6.7.5). Mitigation of the levels predicted is not required as there is no anticipated harm to human or ecological health. It should be noted that mitigation to minimise air quality emissions are already part of the design with regards to best practice measures being implemented.

85. This paragraph is a statement and does not require a response

10. Transport

86. This paragraph quotes from the NPPF and does not require a response.

87. This paragraph describes an FOE concern but does not require a response.

88. All traffic surveys undertaken on the local highway network included counts of the number of cyclists at each location. These are presented at Annex B of Appendix R1 of the Environmental Statement.

An independent road safety audit has been undertaken and is presented at Annex D of the Transport Assessment. The road safety audit did not raise any matters or concerns relating to pedestrians or cyclist movements in this or any other locations.

89. Policy DM2 of the Joint Lancashire Minerals and Waste Local Plan states that *“developments will be supported for minerals or waste developments where it can be demonstrated...that the proposals will, where appropriate, make a positive contribution to ...the reduction in the length and number of journeys made”*.

The policy then provides specific examples of how this can be achieved. In this respect, it refers to *“the control of the numbers, frequency, timing and routing of transport related to the development.”* These aspects of the traffic generated by the development will be controlled and monitored through the Traffic Management Plan agreed with Lancashire County Council as set out in Section 9.1 of the Transport Assessment in Appendix R1 of the ES.

The potential to reduce the number of journeys made to the site has also been explored in the methods of working and proposed exploration processes (e.g. the use of mains supply

of water, removing the need to bring water to site by tankers). The project will therefore fully comply with the transport criteria as well as all other criteria of Policy DM2.

90. The Transport Assessment in Appendix R1 of the ES does not present a total number of traffic movements over the life of the project as this is not a recognised means of assessing the transport impact of a development. Any assessment of traffic impacts must also consider the frequency and time period over which a given number of traffic movements occur. Hence, the Transport Assessment considers peak and average numbers of traffic movements on a ‘per day’ basis. This is an approved technical methodology used throughout the UK and has been agreed with the Local Highway Authority.

The project's impacts on greenhouse gas emissions and air quality have been considered within Chapters 8 and 6 of the ES respectively. This concluded as follows:

- Chapter 8 (relating to the cumulative effects of the Preston New Road site in combination with the Roseacre Wood site) that: *“Assuming both projects would take place within the same Carbon Budget period, the cumulative carbon footprint would still be relatively insignificant and accounts for less than 0.002% of the UK Carbon Budget and just under 0.1% of the projected EU ETS UK allocation at 2016 level (mid-point of EU ETS Phase 3).”*
- Chapter 6: *“With the mitigation measures”* as set out in the air quality chapter *“the residual effects are not significant.”*

91. As demonstrated by the TA, the daily volume of traffic generated by the development will be low both in terms of average and peak vehicle movements. The main source of potential impacts are the HGVs that will require access to/from the site and the ability of the local roads to accommodate this type of vehicle. It is considered that the TA recommends appropriate mitigation measures in order to reduce the potential impact of the increase in HGV traffic on the local area. The mitigation will include the implementation of, and adherence to, a Traffic Management Plan. The mitigation section (Table 18.126) mentions potential elements of the Traffic Management Plan, including that small convoys may be used for the short periods of peak activity on the site only. This is not in conflict to para 256 which states that vehicle movements will be spread throughout the working day depending upon the hours of operation of the development and the operational needs of the site. The detail of the Traffic Management Plan will be formally agreed with Lancashire County Council as the local highway authority. With these mitigation measures in place it will be demonstrated to the satisfaction of the highway authority that the Traffic Management Plan would function effectively, and that site traffic would not result in congestion.

92 - 93. A comprehensive Environmental Impact Assessment has been undertaken to assess all environmental issues that are considered to be relevant by the local planning authority. This assessment has considered the environmental impact of the development on potential receptors, including those impacts arising from traffic. The findings of this assessment are presented in the ES. The cumulative and in combination impacts of the Roseacre Wood and Preston New Road sites have been assessed in the Environmental Statement (Section 18.8). The Traffic Management Plan will be reviewed on a regular basis, including prior to each stage of the exploration works where significant changes to traffic movement are likely to occur. This will allow any potential issues arising from operational delay on either the Roseacre Wood or Preston New Road site to be planned for and managed.

Section 6 of the ES covers the potential impacts of vehicles, the maximum number of vehicles per day is well below the screening criteria and have been determined as being not significant.

11. Ecology

94 and 95. The location of National and International designated sites in relation to the Roseacre Wood site are identified in sections 10.6.2.1 and 10.6.3.1 of the ES. The assessment of impacts upon these designations is set out within section 10.7 (without mitigation) and in section 10.10 (residual effects with mitigation).

96. The effects of the array stations have been fully considered on these sites (section 4.1.2 of ES Appendix J7). It is not necessary to assess the effects of the operation of the array stations on these sites because they are not located within these sites and the frequency of visits (to change batteries) is low, i.e. approximately once a week (section 4.4.3, paragraph 30 of the ES). The ES also considers the potential for there to be effects on the BHS sites (Medlar Ditch, Medlar Meadows and Wesham Marsh) and concludes that the construction, operation and decommissioning of the Site will not have an adverse effect. This is justified in section 10.6.4.1 (paragraphs 189 to 191).

97. It is also noted in section 10.10.2.2 (paragraph 392 of the ES) that habitat type takes time to develop and consequently there will be a residual impact while the scrub/trees re/establishes. However, the habitat to be lost is not species rich and is arguably not representative of BAP compliant woodland. In any event the proposed mitigation, including management, will significantly enhance and improve on the existing baseline. This is why it is considered that the residual impact is not significant.

98. This is correct and has been documented (and fully assessed) in section 10.6 of the ES as well as the relevant technical reports in Appendix J of the ES.

99 and 100. The ES has considered the potential for functional links between the site and surrounding land and the SPA as demonstrated in sections 10.6.4.1 and 10.7.3.2 of the ES and Appendix J2.1 of the ES.

With regard to FOE's comment about the disturbance of birds, paragraph 161 of the ES (section 10.6.3.4) states:

"it has been observed during recent comprehensive observations from other sites in the wider landscape (including Lytham Moss BHS and Marsh Farm Fields BHS) that this is much more likely to amount to no more than 100-250 metres in the local area. The Site is located more than 130m from the field identified to have moderate potential for wintering birds." It should be noted, that in response to Natural England's comments the information presented within the ES is reviewed through the production of a shadow HRA. The purpose of the Shadow HRA is to aid the competent authority with their decision.

101. The location of each of the array stations has been reviewed to determine whether there were any within habitat which could be suitable for SPA bird species and whether, in combination, this could represent a loss of habitat. The majority of the array sites are close to hedgerows or linear features which are considered unsuitable habitat for SPA bird species. An assessment of the cumulative impacts in relation to the construction of the array sites for both Roseacre Wood and Preston New Road has been undertaken within the HRA. The cumulative loss of habitat when taking into account only those array sites situated away from a linear feature is 40m² for both developments. It is therefore not considered that this small loss of habitat is significant - refer to Section 5.2 of Roseacre Wood, Shadow Habitat Regulations Assessment- Screening.

The field to the south of the main development site was classed as having moderate potential for wintering birds; however, the overall assessment identified the small effective size of fields and limited sightlines as significant limiting factors for wintering birds (Ornithological Assessment -Appendix J2.1). In addition the boundary between the site and the southern field is delineated by a significant hedgerow which is a barrier in terms of visual disturbance, if SPA birds were present within this field (Section 3.2.3, paragraph 39, Roseacre Wood, Shadow Habitat Regulations Assessment- Screening). However a precautionary approach has been assumed in relation to mitigation for SPA wintering birds (Roseacre Wood, Shadow Habitat Regulations Assessment- Screening).

102-104. The baseline information regarding these species is described in section 10.6 of the ES and the relevant Appendices (namely J2.2, J3, J4, J5, J6, J7 and J8). The initial effects are assessed in section 10.7. Relevant mitigation measures are described in section 10.9 and the residual effects in section 10.10 of the ES.

105. In addition to paragraph 288 of chapter 10 of the ES it is also stated that this small flare would only be used in emergency conditions (section 4.10.1 and Table 4.3 of the ES). In this context, it is concluded that no further assessment is necessary.

106. The Ecology Chapter assessed all of the likely significant ecological effects. The site value factor is used to determine the magnitude of the potential impact and the level of significance. The mitigation measures (section 10.9 of the ES) have been defined by taking into account the specific details of the predicted effects (e.g. direct loss of habitat being replaced through planting). We believe that the proposed mitigation measures are proportional to effects that have been predicted.

To ensure that there is a robust framework for the implementation of mitigation measures, a Biodiversity Mitigation Strategy is proposed (section 10.9.1 of the ES). This will become part of the Environmental Operating Standards (**EOS**) for the site and will be included within the Ecology Control Plan. One of the objectives of the EOS is to give the planning authority and regulators confidence that the applicant will have environmental management systems and measures in place to implement the mitigation measures and any relevant planning conditions.

107. In its response to Lancashire County Council (**LCC**) on the planning applications (Letter from Natural England to LCC dated 4th August 2014), Natural England stated that it did not agree there is no evidence to suggest that the site and its surroundings are not functionally linked to the Morecambe Bay SPA. Natural England also went on to state

“The location of this development site and the proximity to Morecambe Bay SPA, Marton Mere SSSI and to some extent the Ribble and Alt Estuary SPA, means the likelihood is that the land is functionally linked.”

To address this, the applicant has produced a Shadow Habitats Regulations Assessment to document the information that LCC will require to inform a Habitats Regulations Assessment, (if required) as advised by Natural England (submitted on the 13th October 2014).

108. Based on the conclusions within the ES, the submitted Shadow Habitats Regulations Assessment Report and the information in responses 94 to 107 above, it is concluded that all of the potentially significant adverse effects [on ecology] can be mitigated so that no significant residual ecological effects remain.

12. Seismicity

109. It is for the reasons below that the ES contains sufficient information.

The ES discusses the recommendations of the various key references that provide guidance on the mitigation of induced seismicity (e.g. Green et al. 2012, The Royal Society and The Royal Academy of Engineering 2012, UKOOG 2013 and DECC 2014). In addition, the ES provides a summary of a thorough literature review on the mechanisms of induced

seismicity relating to hydraulic fracturing, in particular the causes of induced seismicity at Preese Hall (e.g. de Pater and Baisch 2011).

The steps involved in mitigating this risk are clearly described within the ES (Section 12.9) and more detail is provided in the ES Technical Appendix (Appendix L -Section L10).

As stated within the ES (Chapter 12, Para 58) all regional faults within the area of the proposed Roseacre Wood well site are considered to be ‘critically stressed’. Therefore, the assessment has followed the most conservative approach possible as a worst case scenario. This is not considered an uncertainty that will affect the outcome of the assessment.

The ES Technical Appendix (Appendix L, Para 264 to 272 and Para 278 to 286) discusses the ground motion prediction equations (**GMPEs**) that were considered and the sensitivity analysis that was carried out to assess the suitability of each GMPE. In conclusion, the Akkar et al (2013) GMPE best fit the locally measured ground motions from the Preese Hall induced seismic events. Therefore, local to the site, this is considered the best available technique. In addition, it is noted that the calculated 95th percentile PGV values were used to determine the potential effects (i.e. the probability of the PGV produced by a single induced seismic event exceeding the predicted 95th percentile value is 5%). This is a conservative approach.

The ES Technical Appendix L10.2.3 (Faults and hydraulic fracturing) discusses this issue. All rocks contain discontinuities to a greater or lesser degree depending on the geomechanical properties of the rock and the stress history that has affected the rock. The persistence of these discontinuities have a variety of scales, from ‘joints/fractures’ (millimetre to metre scale) to ‘small scale faults’ (metre to 100s metre scale) and ‘regional faults’ (kilometre scale). Joints/fractures and small scale faults are far more prevalent than larger regional scale faults.

It is noted that the potential release of seismic energy during fault slip is related to the degree of movement along that fault. Therefore, the potential movement along a small scale fault will be significantly less than that of a regional fault. Subsequently the seismic energy released during movement of a small scale fault will be limited to the small magnitudes typical of hydraulic fracturing activities. Therefore, hydraulic fracturing can take place within the vicinity of faults and potential induced seismicity will be mitigated by the extensive mitigation measures implemented as part of the project as discussed within the ES (Chapter 12, Para 138 to 181).

The ES contains sufficient information to enable Council to understand and evaluate the risks around induced seismicity, and contains sufficient information for an experienced geo-practitioner to make a thorough assessment of the risks associated with induced seismicity.

110. We recognise that the Fylde area contains a number of regional faults and the location of regional faults was considered during the site selection process. The work Arup has done for the ES has identified the location of these faults in 3D (Section 12.6 of the ES). More detail is provided within the ES Technical Appendix (Section L6) – in particular figure 4 of L6.2 and Figures 5 and 6 of L6.3. The ES also provides details on how the implementation of mitigation measures such as micro-seismic monitoring and the Traffic Light System will mitigate against potential induced seismicity associated with these faults.

We recognise that some faults that Arup have identified have not been mapped by the British Geological Survey (BGS). Arup have used the results of Cuadrilla's 3D seismic survey to identify faults and their location, which is the best available method for this objective. A 3D seismic survey far exceeds the level of detail of surface geological maps produced by the British Geological Survey.

As discussed in the ES, drilling through a fault does not provide a mechanism for inducing seismicity associated with the fault. We recognise that there will be small scale faults in the vicinity of the proposed hydraulic fracturing and these will be mitigated by the extensive mitigation measures implemented as part of the project as discussed within the ES (Chapter 12, Para 138 to 181).

111. Cuadrilla has carried out extensive work following the induced seismicity at Preese Hall. This work has been compiled into a synthesis report by de Pater and Baisch (2011)⁴. In addition a technical paper has been written by Eisner et al. (2013)⁵, which discusses the causes of seismicity at Preese Hall. All of this information is publically available and can be accessed online. The material has been reviewed by Arup and is summarised within the ES Technical Appendix (Section L3.4).

13. Material Considerations – economic and social

112. The scope of the ES was determined in the Scoping Opinion from LCC (Appendix D of the ES) and does not state that the ES should assess potential socio and economic effects on agricultural and tourism sectors. The ES has assessed environmental effects relating to:

Residents: The ES considers the impacts on local sensitive receptors, including the impacts of residential receptors in the context of likely significant environmental effects. The ES chapters on Air Quality (chapter 6), Hydrogeology and Ground Gas (chapter 11), Induced Seismicity (chapter 12), Landscape and Visual Amenity (chapter 14), Lighting (chapter 15), Noise (chapter 16) and Transport (chapter 18) all consider effects, either directly or indirectly on residents in the immediate vicinity.

Agriculture: The viability of the adjacent farm is dealt with in the Land Use chapter of the ES. Also see response to paragraph 113.

Loss of rural tranquillity, visual and noise impact, additional traffic and risks of local environmental pollution: These are covered throughout the ES. The assessments have shown there to be no significant effects in these areas with the exception of visual impacts, where although significant adverse visual impacts are predicted during the drilling, hydraulic fracturing and initial flow testing, these effects will be temporary and will only occur during the first three years of the project (see section 14.7.4.1 and Table 14.11 of the ES). The maximum extent of the impact on visual receptors is also restricted to a distance of less than 1km from the well pad (see section 14.7.3.1 and Table 14.13 of the ES). On the basis of the above factors, and the mitigation measure set out in section 14.8 of the ES, it is concluded that the adverse environmental effects are localised and temporary and, as such, no causal link can be drawn between likely environmental effects, and the sectors highlighted.

⁴ [1] De Pater, C.J., Baisch, S. (2011). Geomechanical study of Bowland Shale seismicity. Synthesis

⁵ [2] Eisner, L., Styles, P., Clarke, H. (2013). Felt induced seismicity associated with shale gas hydraulic stimulation in Lancashire, UK. 75th EAGE Conference and Exhibition incorporating SPE EUROPEC 2013. 11/23686841_1

113. The socio economic assessment has involved an assessment of employment impacts of the project – which have been thoroughly considered in Chapter 9 of the ES, and distinguish between likely local and non-local roles associated with the exploration works at one site over the proposed 6 year period of the planning permission. In addition the project's impacts on agriculture are considered in Chapter 13 of the ES.

The socio economic assessment is not an assessment of the shale gas industry. The assessment covers the temporary exploration works at one site over the short term period of the application. The assumptions are set out, and are appropriate for the works.

All the studies cited in this paragraph of the FoE letter consider scales which are not directly comparable to the Cuadrilla's applications in respect of temporary exploration activities at the Roseacre Wood site. In one case - the Bamberger study - a farmer has two active wells on his own property and 190 active gas wells within 5 miles.

With respect to FoE reference to media reports that strongly suggest that fracking could adversely affect house prices there is no evidence of onshore oil and gas activity in the UK adversely affecting house prices. (See Government response to Sunday Times article on value of homes in areas of shale extraction- 26th August 2014).

114. The assessment for Chapter 9 of the ES has used qualitative and quantitative techniques to assess the community and socio-economic effects of the development.

A number of different geographical comparator areas are examined throughout the Assessment as detailed in paragraph 9. Paragraph 38 details the population statistics for The Treales, Roseacre and Wharles parish and the settlements of Kirkham and Elswick that were analysed as part of the Assessment. In addition to the scoping stage of the EIA, Arup has been in public consultation for ERA and EIA and conducted a number of site visits that has informed understanding of issues for this assessment.

Paragraph 63 of Chapter 9 states: *Community infrastructure in the vicinity of the Site is scarce due to the immediate area being so dominated by agricultural land. No schools, community centres, places of worship or medical centres (including doctors, dentists etc.) were identified within 1km of the site. This decreases the sensitivity of the site in terms of any potential impact on community infrastructure.*

Chapter 9 details the wide ranging analysis undertaken for the whole geographic area. The comment from FoE is incorrect as all community facilities were reviewed as part of the Assessment.

115. The ES uses conservative assumptions to avoid overstating the benefits and to illustrate the job creation of a start-up industry.

As set out in the ES, the employment generation figure estimates the full time equivalent (FTE) employment generation figure for the short term exploration works. The metric used is 10-year full time equivalent jobs, however in reality, many different employees will be working on the site over its lifetime, for different time periods.

Cuadrilla has made commitments set out in the socio-economic assessment about use of local labour during construction (section 9.7.5, paragraph 86). Construction for example is an area where positions could be available in the immediate term (i.e. without the need for extensive specialist re-training). Clearly, if permission is granted, the site will represent one of the first steps for the industry in this area. The nature of this scenario is that specialist labour will be drawn in. The assessment sets out a clear and realistic context in

this respect itself. However, this is beyond the scope of the present assessment, which is concerned only with the proposed short term exploration activities associated with the site.

116. Total net employment is expected to be 11 full time equivalent averaged over a 10 year period jobs, including on site, indirect supply chain and the induced effects. The ES also states the number of full time equivalents employed over the six year lifetime of the project which gives a net employment number of 19 full time equivalent positions (section 9.7.2, paragraph 79, and footnote 106) Also see above response to 107.

117. The LCC scoping opinion for the project did not state that the ES should assess wider impacts on the economy (Appendix D of the ES). However, impacts on agriculture have been assessed in Chapter 13 (land use) which assesses both the impacts on the agricultural land resource (section 13.6.1.1) soil resources (section 13.6.1.2) and farm holding in which the well pad is located (section 12.6.1.3). The only mitigation that was required related impacts on soil resource which can be mitigated using the measures set out in section 13.8 to leave no residual effects.

Wider amenity effects from the project have been assessed indirectly. The visual impacts, particularly on features that the general public would use for amenity purposes and contribute towards the visitor economy (e.g. public footpaths and listed buildings), have been assessed in section 14.7 of the ES (Landscape and Visual Amenity)

118. Wider economic effects are identified in sections 9.7.3 to 9.7.9 of the ES and the ES provides a reasonable estimate of such effects. Also see above response to 112 and 113.

119. See response to 120 and response to 115.

120. The 17% figure is derived from the Regeneris Consulting report, *Economic Impact of Shale Gas Exploration & Production in Lancashire and the UK* (2011). The assumptions and methods used to arrive at this figure are presented in the report. The full report is available at:

http://www.cuadrillaresources.com/wpcontent/uploads/2012/02/Full_Report_Economic_Impact_of_Shale_Gas_14_Sept.pdf

With regard to the meaning of "Local expenditure": "Local" is considered to be Lancashire level. This is because of the nature of the area and the supply chain linkages, which are likely to include specialist contractors only available over a large distance.

121. See the detailed responses in paragraphs 26 to 39 of this letter.

122. The Leth v Austria case (C420/11) referred to was concerned with effects on the value of material assets. The issue with respect to this application is different. It is the issue of the direct and indirect effects on human beings, which are required to be assessed by Article 3 of the EIA Directive. Socio-economic effects on the well-being of the local population, either positive or negative, fall within that category and are therefore properly within the ambit of the EIA. Nothing in the Leth case precludes this. We also note that FoE themselves appear to acknowledge the need to take into account socio-economic impacts, but only where they are negative.

With regard to the reference to DECC's view on this issue in relation to the SEA for the 14th licensing round, it does not appear to us that the Government conceded that it could not lawfully take into account socio-economic effects. Rather, the Government simply took a pragmatic view "in the interests of removing any doubt as to the basis of the Licensing

Plan"⁶ given representations made by FoE and others. This does not require the Council to take the same view in relation to this application.

14. Public Health Impacts

123. The purpose of the Public Health chapter of the ES (Chapter 20) was to summarise the information relating to public health covered elsewhere in the ES rather than to review public health studies relating to shale gas exploration or the industry as a whole. This is not appropriate for an ES which is required to consider the likely significant effects of the proposed project in its specific location. Many of the public health studies referred to under paragraphs 124, 125 and 134 of the FOE letter are international and do not reflect the specific environmental baseline conditions or operational processes set out in the ES. Instead the ES assesses the likely significant effects of the Project based on the Project proposals at the time of assessment and potential receptors that could be affected.

This is in line with Public Health England's consultation response to LCC's request for a scoping opinion (Appendix D to the ES). In addition, Chapter 20 addresses the recommendations made by Public Health England in its report *Review of the Potential Public Health Impacts of Exposure to Chemical and Radioactive Pollutants as a Result of Shale Gas Extraction* (2013) relating to exploration and appraisal activities.

124. The quote is reference to a case study in Canada and its relevance for the UK is unclear.

125. This is a reference to Physicians, Scientists & Engineers for Healthy Energy (PSE), history of "health-damaging industrial activity" and its relevance to shale gas exploration is unclear.

126. The EIA process is based on Cuadrilla's specific proposal at Roseacre Wood within the UK regulatory context (as set out in in section 4.2 of the ES). The materials referred to by the FoE relate to different types of shale gas works in the US, Canada and elsewhere, where the operations undertaken and regulatory practices may differ substantially from those enforced in the UK.

127. Health impacts on workers have been considered in the ES. Potential Source-Pathway-Receptor linkages have been identified and assessed in section 11.7 of the ES. Section 11.7.8 of the ES reviews the potential impact to human beings. Sections 4.13 on environmental management and 11.4.5 of the ES also describe the procedures that the applicant will implement to protect both site workers and the general public by using their Health Safety, Security and Environment (**HSSE**) Risk Management Framework.

The design of the well (section 4.7.3. of the ES), the use of the enclosed four phase separator (instead of storing flowback fluid in open lagoons) and temporary flaring of methane have also removed potential pollutant pathways that would otherwise have impacted on site workers. Notwithstanding the above section 11.6.13 (paragraph 156 of the ES) states that '*Operational health and safety risks to Site*

⁶ Post-Adoption Statement for the SEA, published on 29 July 2014
11/23686841_1

workers and visitors outwith the scope of this assessment are nonetheless addressed by Cuadrilla's Health Safety Security and Environment (HSSE) Risk Management Framework (see Chapter 4) and other legislation (such as Borehole Sites and Operations Regulations 1995) and regulated by the HSE'.

128. Refer to response 61 in relation to disclosure of chemicals.

129. See response 103. The analysis of the data within section 20.3 of the ES (the community profile) includes the residents as illustrated by the map in Figure 20.2. Vehicles accessing the site will only use the A583 and M55 and the site is sufficiently distant from Blackpool for noise and air quality not to be significant issues. Therefore, the spatial extent of the community profile is appropriate to the scale and characteristics of the project.

130. The proposed access route to the site for HGVs already carries HGV traffic which may itself include potentially hazardous materials. The transport chapter of the ES (Chapter 18 and Appendix R) has assessed the impacts on other road users and modes of transport and concludes that the project does not present a significant effect to these road users (section 18.7 of the ES and summarises in Table 18.24). Section 11.7.7 (paragraphs 211 and 212) concludes that the risks associated with transporting potentially polluting materials to and from site are low. Taking the above into account, along with the measures included in the Traffic Management Plan that will be prepared before any works commence, it is concluded that the project should not be a deterrent to cyclists or pedestrians. This is also stated in section 20.4 (paragraph 18, 2nd bullet point).

131. See response to paragraph 80 above.

132. The documents referred to in the quote above assess the risks associated with the project and also identify the steps that the applicant will take to manage these risks. During the pre-application consultation events and, via newsletters and other forms of media, the applicant has sought to explain how the works will be undertaken and the safeguards that will be used to manage risk in an attempt to tackle the perception about the works.

The ASA said that because Cuadrilla has not yet received planning permission to implement all of the recommendations on hydraulic fracturing of the Royal Society and Royal Academy of Engineering joint-report they should not have used the word "proven". Crucially, however, the ASA upheld Cuadrilla's claim that Hydraulic fracturing can be done safely.

133. This material has not been specifically addressed in the planning or environmental permit applications for the following reasons:

- Health impact assessment was not requested within the Scoping Opinion (Appendix D of the ES)
- The studies are based on wells that have been, or are currently, operating in different locations, by different operators and under different regulatory regimes to those proposed by Cuadrilla;
- The wells in some studies do not share the same sources, pathways or receptors as the applicant's project. For example, in this application any gas from the well will be sent through a four-phase separator and then during the temporary flow testing period burnt via the flares whereas in many wells in the US and Canada natural gas is vented to the atmosphere from open tanks or lagoons; and

- Some of the studies above do not assess whether the health impacts that they identify are due to factors other than emissions associated with shale gas exploration or production.

134. As stated in section 4.13 of the ES, the applicant is developing an Environmental Operating Standard (**EOS**) and will use this to provide a framework to manage all of the environmental aspects of the project. The EOS will also be used to implement relevant planning or permit conditions (section 4.13.1 of the ES).

The enforcement powers of the appropriate authorities and the high profile of shale gas exploration projects, means that the applicant and its operations will be subject to close scrutiny by the regulators and other interested parties.

The applicant has also created two Community Liaison Groups (**CLGs**), one for each well pad, to provide open and independent scrutiny and challenge to the work being proposed by the applicant.

15. Consultation

135. No one was excluded from the pre-application consultation process. The public consultation events were widely advertised and newsletter (including details on the consultation events) were sent to over 10,000 residents in an extensive area surrounding the site.

The consultation events (where feedback forms were available for residents to set out their views on the proposals) were one of several methods used to seek views and issues on the emerging proposals for the exploration site. In addition:

- Information was available from the web site (such as details about the site, animations and views of the site). For the first site specific consultation the Cuadrilla website was visited 19,908 times, of which 16,183 were unique page views.
- Newsletters provided information on the proposed site, views of the site and the planning process.
- A community map was available online for residents to express their views.

The pre-application consultation process combined public consultation events with engagement events with specific stakeholders (parish council members and representatives of statutory bodies/ interest groups – such as the Environmental Agency and RSPB).

It is noted that FoE was invited to attend the consultation events. For example in an email to FoE (Helen Rimmer) on 23rd August 2013 we stated:

“We are committed to sharing information at the appropriate time and would welcome your attendance at the pre-application consultation event in early October to discuss your concerns. If you would like to discuss detailed technical issues, and could let me have a list of topics beforehand, the relevant experts will be made available at the exhibition to provide accurate and in-depth information.”

136. This paragraph is a statement and does not require a response

137. It is acknowledged that there was a lower level of interest on the Environmental Risk Assessment (**ERA**) process, which was undertaken before the exploration sites were announced. Much higher levels of interest were recorded for the two site specific consultation events. It is noted that the ERA was undertaken in consultation with DECC.

138. The ES has demonstrated that there will not be any significant impacts on designated wildlife sites, surrounding agriculture and tourism. Further, the ES and planning statement detail the engineering process and the parallel regimes for environmental protection.

15. Inconsistency with the Lancashire Waste and Minerals Plan and the Fylde Local Plan

139. We have reviewed the planning application proposals against all the relevant policies of the Core Strategy (as set out in the Planning Statement – section 6). With respect to Policy CS5, we conclude that the ES demonstrates that the considerations set out in Policy CS5 would be achieved with appropriate mitigation in place. It is for Lancashire County Council to conclude whether Cuadrilla's application conforms with this policy and other policies of the Core Strategy.

140. We have reviewed the planning application proposals against all the relevant policies of the Development Plan Document (**DPD**) (as set out in the Planning Statement – section 6). With respect to Policy DM2, we have concluded that the objectives of this policy 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.

It is ultimately for LCC to determine whether Cuadrilla's applications conform with this policy and other policies of the DPD.

141. We have reviewed the planning application proposals against all the relevant policies of the DPD (as set out in the Planning Statement – section 6). We have concluded that the proposals conform with these policies and ultimately it will be for Lancashire County Council to determine whether the Cuadrilla's applications are in accordance with, or conflict with, these policies.

16. Conclusions

The ES has identified the mitigation measures that are needed to address the assessed significant effects and other non-significant effects of the proposals which will be delivered in accordance with any conditions that LCC may impose.

We fundamentally disagree with FoE's conclusion that the adverse impacts of the application cannot be mitigated. Our conclusion and also the conclusion of key statutory consultees who have reviewed our findings, including the Environment Agency and the Health and Safety Executive, is that the conditions can be imposed to mitigate the adverse

impacts of the proposals. In this respect we draw to FoE's attention the conclusions of Public Health England⁷ who, in line with our own findings from the ES, have concluded

“no significant concerns in relation to the potential emissions from the site adversely impacting the health of the local population from this proposed activity, providing that the applicant takes all appropriate measures to prevent or control pollution, in accordance with the relevant sector technical guidance or industry best practice.”

We can confirm that Cuadrilla has committed to following all current industry guidelines and best practice and will work closely with the regulators in undertaking the works.

We address each of the areas where FoE considers that the adverse impacts of the activity cannot be mitigated:

1. **Climate Change:** As set out above (in response to point 25 of the FoE letter), Chapter 8 paragraph 23 of the ES sets out the areas of embedded mitigation, while section 8.9 sets out a further five means of mitigating effects on GHG emissions. Furthermore, the scale of GHG emissions attributable to temporary shale gas exploration activities at the site has been calculated, and is set out in Chapter 8, section 8.11 of the ES. Section 8.10 states that these emissions are equivalent to 0.1% of the UK's allocation for 2016 under the EU ETS and this is not considered to be a significant effect.
2. **Wastewater production:** It is anticipated that effects relating to flow back fluid during initial flow testing would be significant. This relates to the currently available capacity to treat the anticipated peak flow rate of the fluids over a relatively short period and is not associated with the impact of the waste fluids on the environment. Management measures will be implemented, for example providing storage on site and/or controlling the rate of waste fluid produced from the wells, so that peak flow back fluid production will not exceed the ability of the licenced water treatment works to treat it safely. Cuadrilla also commits to the following mitigation measures:
 - Identify opportunities for off-site re-use, recycling and recovery of inert waste and non-hazardous waste.
 - Regularly test the surface water of the pad to confirm whether it is possible to 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.
3. **Lighting:** Chapter 15 of the ES describes the assessment of potential night time light intrusion from the project. It concludes that through the incorporation of mitigation, as summarised in Appendix E2.10 of the ES the potential effects of light spill beyond the Site boundary and light source intensity are not significant. The assessment 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 Appendix E2.10 of the ES.

⁷ Public Health England. (2014) Letter to Mr Stuart Perigo, 11th July.
11/23686841_1

4. **Noise:** Chapter 16 of the ES details an assessment of potential noise impacts. It concludes that with the exception of night time fracturing operations, noise from the proposed development at Roseacre Wood would not be significant for all stages of the works. Cuadrilla commits to a number of mitigation measures, as set out in Appendix E2.11 of the ES, including only operating fracturing pumps during weekday daytime and Saturday mornings. With these mitigation measure in place, there will be no significant effects for all stages of work and the project will accord with policies of the NPPF and the Development Plan.

We hope that this letter will help you in clarifying the ES in relation to the points raised by FoE.

Should you have any questions or require any further clarification, please do not hesitate to contact me.

Yours sincerely

Mark Smith
Associate Director

cc Helen Rimmer, North West Campaigner, Friends of the Earth