

Appendix 17

Public Health

Proposal

The applicant has provided an overview of potential public health impacts relevant to the proposal. The overview is set out as a separate chapter in the Environmental Statement (ES). The applicant also sets out an assessment of any potential public health impacts in each of the various chapters of the ES (e.g., noise, air quality, water, etc.).

In February 2014, Public Health England (PHE) identified a range of public health concerns that should be addressed in the preparation of the applicant's ES. This was in response to the scoping opinion request by the applicant. PHE raised the following points:

- Identification of where within the ES receptors that could be affected by health impacts are identified;
- Highlighting where, within the ES, the impacts from construction decommissioning have been assessed;
- How potential health impacts relating to emissions to air and water have been assessed and where in the ES these are documented;
- Specific issues concerning emissions to air;
- Specific issues concerning emissions to water;
- How potential health issues relating to land quality and contamination have been assessed;
- How potential health issues relating to waste management have been assessed;
- Other health related issues such as the management of pollution incidents, the regulation of the site and how potential public stress and anxiety have been taken into account by the Project; and
- The organisations that have been consulted regarding health related issues during the EIA process.

The following issues have been explored in detail by the applicant in separate chapters of the ES, and have also been summarised in an overview section of the ES on public health (chapter 20).

- Noise;
- Air quality;
- Water (surface and groundwater);
- Perception effects

This report and its appendices similarly makes an assessment of the applicant's proposal in separate sections (e.g. noise, air, water, etc.) and provides an overview in this appendix on public health.

Noise

The site is located away from residential properties. The noise impact of the project has been assessed in the Noise Chapter (Chapter 16 of the ES).

Baseline noise levels have been established by a measurement survey by the applicant. This data is used to assess the potential significance of any effects. The site is in a rural location. However the proximity of the M55 to the north and A583 to the south means that during the day time road noise is a feature of the current environment.

Different stages of the project will have different noise levels. The noisiest activities are most likely to occur within the first two to three years of the project. However, the noise levels for all stages of the project have been assessed by the applicant.

The applicant concludes that only stage with the potential to result in a significant noise effect is where hydraulic fracturing occurs during night time (2300-0700) where noise limits are at their most stringent. This will be mitigated by only operating the pumps used (only for up to 3 hours at a time during hydraulic fracturing) during weekday daytime and Saturday mornings. Vibration impacts have been ruled out by the applicant because of the nature of the project, method of construction for the well pad, arrays and pipeline connection for the extended flow testing.

The Roseacre Wood and Preston New Road sites are sufficiently distant from one another that there will not be combined or cumulative lighting impacts on receptors from both sites.

The applicant has concluded that the Project will not have significant noise effects on the nearest residential properties or businesses.

Air Quality

The applicant has assessed air quality impacts in Chapter 6 and Appendix E of the ES.

The predicted air quality emissions from the Project have been compared to Air Quality Objectives and Limit Values for the different pollutants likely to be emitted by the Project activities (Section 6.7 of the ES). These objectives and limit values are based on minimizing health effects as a result of acute or chronic exposure to potentially sensitive individuals. It is noted that the PM10 levels have been screened out by the applicant as being insignificant.

Dust

The applicant concludes that given that the site is located within an area of agricultural land and has not been subject to historical development there is a negligible risk of contaminated dust being generated during the construction of the well pad, access track, extended flow testing infrastructure, gas pipeline and the seismometer arrays.

The risk to nearby receptors has been assessed by the applicant. This assessment has concluded that there is a negligible to low risk of dust being created by the Project and it will not result in a significant effect. This is because there is sufficient distance between the Site and potentially sensitive receptors. Furthermore, the scale and duration of the Project activities (construction of the access track and well pad and decommissioning) will not be carried out over a long period of time (less than 2 months for each activity).

Emissions from generators

The applicant has provided details of equipment that will be used at the site, i.e. pumps, fracturing water transfer pumps, generators, blender units and service rigs. The equipment will be used during the drill phases for the duration of the drilling. During the hydraulic fracturing the engines will be run for only a few hours at a time. Given the size of the generators and engines and the relatively short period of operation, these sources have been scoped out of the assessment by the applicant. A table summarising the generators used on site is provided in Appendix F of the ES. Further information was requested from the applicant to justify the decision to remove the generators from the scope of the assessment. This has been provided.

Emissions from road traffic

To assess the impacts from road traffic an initial screening exercise was undertaken by the applicant that examined the likely changes in vehicle numbers on the road and compares these with criteria from the Design Manual for Roads and Bridges (DMRB) to determine whether a more detailed assessment was required. The criteria are not exceeded so no significant air quality impacts are likely, according to the applicant's assessment. Again, further information was requested to justify this decision and this has been provided.

Emissions from the Flare

The Air Quality chapter of the ES (Chapter 6) includes a forecast and assessment of the potential quantity and effects of NORM in the form of gas (specifically radon) that may be present in the gas that is burnt in the flare stacks. These predictions have been compared to an annual dose limit of 300 microSv/yr for a single source. The predicted emissions from the combustion of gas in the flares is 0.3 microSy/yr. This is one thousand times lower than the International Commission on Radiological Protection (ICRP) limit. Therefore, the applicant concludes, the levels of NORM emitted to the atmosphere by the Project do not present a significant risk to health.

The flares that will be used to burn gas generated during initial flow testing are the main source of emissions to air associated with the Project. The concentrations and distribution of pollutants (specifically NO₂ and benzene) have been modelled by the applicant so that the effect on air quality, and indirectly health, can be predicted at potentially sensitive receptor locations around the site (residential properties). The ES air quality assessment concludes that the levels of NO₂ and benzene are well within the regulatory limits and therefore do not present significant risk to health.

In summary the air quality effects from the project have been assessed for dust, NO₂, PM₁₀, PM_{2.5}, benzene and NORM. The assessment by the applicant for all of these parameters has concluded that the emissions from the project will not be significant.

Surface and groundwater

As part of the analysis reported in Chapter 11 of the ES, a review of potable water abstractions was undertaken by the applicant. There are no surface or groundwater abstractions in the vicinity of the surface or below ground works that are used for potable water. This is based on a review of abstraction points registered with the EA and local authorities.

Potable water within the vicinity of the site is provided by United Utilities by their mains potable water supply.

The applicant states the design of the wells, including multiple layers of containment through the shallow sections of the wells, and the characteristics of the geology below the site means that there are no plausible pollutant pathways between the well and drinking water supplies.

The well pad has also been designed to provide the level of containment required by the Environment Agency's Pollution Prevention Guidelines. This, it is reasoned, in combination with the implementation of the Environmental Operating Standards (See Appendix E of the ES), will minimise the risk of surface spills of potentially polluting materials affecting surface watercourses, soils, crops and animals.

For these reasons the applicant concludes that the risk of a pollutant linkage being created that could then impact on human health is negligible.

Perception Effects

The applicant states that the key health effects raised by residents during the various consultation events prior to submission of the various planning applications are:

- Risk from radioactive materials;
- Risk from flammable gases;
- Risks from the presence of potentially hazardous materials at the site;
- Risk from emissions to air (including flaring);
- Risk from induced seismicity;
- Risk of pollution to ground and surface water
- Road safety and traffic concerns; and
- Concerns regarding potential sensitive groups or individuals (e.g. children or people with pre-existing health conditions).

In order to respond to these issues, the applicant has undertaken or will undertake the following:

- Provided information about shale gas exploration and the processes of drilling, hydraulically fracturing and flow testing wells;

- Undertaken early engagement with the wider community to allow them to communicate their concerns, to feed into the development of an Environmental Risk Assessment (ERA) and then the development of the planning applications for Roseacre Wood and Preston New Road;
- Provided evidence on known risks either as part of the ERA, the ES, other documentation supporting the planning applications and applications for Environmental Permits;
- Develop a programme of environmental monitoring during the exploration works and mechanism to publicise the results and provide affected parties with a means to raise concerns and communicate with the applicant throughout the life of the Project; and
- Development of a framework for environmental management of the site, through implementation of a comprehensive Environmental Operating Standards (see Appendix E of this ES).

Summary of consultee comments and representations

A number of statutory consultees and other bodies have referenced potential health impacts in their responses to the consultation. The responses and representations that specifically reference potential health impacts are summarised as follows:

LCC Director of Public Health

On 6 November 2014 the County Council's Cabinet endorsed a Health Impact Assessment (HIA) of the Potential Health Impacts of the Proposed Shale Gas Exploration sites in Lancashire.

The HIA was prepared by the County Council's Director of Public Health (DPH) to inform the planning, environmental permitting and consenting process by the County Council and the regulatory roles of Environment Agency(EA), Department of Energy and Climate Change (DECC) and the Health and Safety Executive (HSE) respectively.

The HIA concluded that shale gas exploration, like any other industrial activity, has its risks to the health and wellbeing of the population. Having completed the HIA for each of the two sites the DPH has concluded that the key risks to the health and wellbeing of the residents who live near the two proposed sites in Lancashire include:

- Lack of public trust and confidence, stress and anxiety from uncertainty that could lead to poor mental wellbeing
- Noise related health effects due to continuous drilling, and
- Issues related to capacity for flowback waste water treatment and disposal.

The DPH advises that these risks and other issues highlighted in this report can be mitigated by LCC, EA, DECC, and the HSE to protect the health and wellbeing of local residents. In particular:

- There is also a need to be vigilant during the operations, and in emergency preparedness.

- A robust baseline and long term monitoring of environmental and health conditions is required in order to reassure communities and to understand the cumulative and long term effects.
- Local communities should be actively involved and the risks should be communicated in a transparent and reliable manner that is proportionate to the exploratory phase of the industry. This needs a closer working relationship between the industry, national and local agencies as well organisations with an interest in local shale gas exploration.
- If this industry is to develop further, there is a need for shale gas specific spatial strategy at a local level and an onshore oil and gas industry specific integrated regulatory framework at a national level. Further research on effects of shale gas development on health and wellbeing will help to improve the policy and regulatory framework as the industry moves into production phase.

The HIA contains 45 recommendations aimed at range of organisations (e.g., the County Council, the EA, DECC, the HSE, the LGA, the applicant, etc.). Some of the recommendations are relevant to the determination of this planning application, while others relate to the development of the industry more generally. Indeed, Appendix J of the HIA contains 16 recommendations for the County Council in its role as mineral planning authority.

The 16 recommendations are set out below:

1. Consider the need for further noise assessment, particularly on the proposed Roseacre Wood site and if necessary, require additional mitigation measures to reduce noise associated with the development of the sites and more particularly the drilling and hydraulic fracturing phases of the development and which could be controlled by conditions attached to any planning permission.
2. Establish with the Applicant that liability and compensation arrangements are in place to cover any structural damages to properties that can be attributed to an unlikely event of induced seismicity.
3. Undertake an independent verification of the assessment of air quality, transport, waste management and induced seismicity prior to determining the planning applications.
4. Seek agreement with the Applicant to establish an independent comprehensive baseline and on-going long term monitoring of environmental and health conditions prior to any activity on the sites. An indicative framework is described at the end of this document.
5. The Director of Public Health should be informed of the results of the measurements and any breaches to the planning condition or environmental permit.
6. Consider the need to seek further clarification from the Applicant that the cumulative impacts of the operations from the flare, generators, vehicles and drilling will not exceed the national air quality objective thresholds, particularly for PM 10, 24 hour mean levels.
7. As part of either the planning or permitting process, the Applicant should be required to submit regular data on the ambient air quality on site measuring all the common air pollutants relevant to the activity and report them regularly.

- PM10 and PM2.5 should be reported separately (PM10 stands for particulate matter less than 10 microns in diameter).
8. The Roseacre Wood site is within 55m of a National Grid gas transmission pipeline. Interconnections into national transmission pipelines are proposed at both sites. Advice should be sought and an assessment undertaken as to whether the nearby gas transmission pipelines are considered to be a major hazard.
 9. Any extended flow testing provided for by any planning permissions should be aligned with the permits to be issued by the Environment Agency.
 10. An assessment of light pollution as part of the site operations should be carried out, and if there are likely to be significant impacts associated with light pollution from the sites that cannot be mitigated or controlled, the Applicant should be requested to consider the opportunity to offer to fit blackout blinds to those homes most likely to be affected.
 11. Further clarification or new information on the occurrence and magnitude of equipment likely to be contaminated with radioactive waste and how such waste would be managed on the site and disposed of should be sought.
 12. Should planning permission be granted, it should be a pre requisite that no activity can start until the onsite and offsite waste treatment capacity is defined.
 13. Further clarification should be sought that any specific risks due to using the MoD site for accessing the Roseacre Wood site have been addressed before any planning permission is granted.
 14. A full assessment of the impacts of additional traffic associated with the proposals on road safety should be carried out and appropriate traffic management options considered to address the public concerns, particularly in respect of the Roseacre Wood site.
 15. Should planning permission be granted, provision should be made with the Applicant to maintain road safety, particularly on the access routes to Roseacre Wood site and road safety and any related incidents on the access to both the sites should be monitored.
 16. In the event planning permissions are granted, any breach of planning conditions should be reported to the Director of Public Health so that necessary steps can be taken in protecting and improving the health of local communities from issues arising due to the alleged or identified breaches of planning control.

The Director of Public Health has also set out indicative proposals for long term monitoring associated with the project. The aim is to establish baseline and on-going monitoring through a shale gas observatory to:

- monitor environmental and health conditions
- Support risk communication and reassurance to local communities on the safety and impacts of shale gas activities in Lancashire.
- Govern and manage the observatory in consultation with various stakeholders including the local communities, the industry, and the regulatory agencies.

The DPH believes that establishing a shale gas monitoring unit in Lancashire as an independent source of reliable information will help with the understanding of any environment and health impacts and the communication of risks to the local

communities. It will also support the development of future policy and practice of shale gas extraction.

Public Health England: has sought a number of clarifications regarding the planning application in two separate consultation responses. In turn, the clarifications and questions contained in both PHE responses have been satisfactorily addressed as a result of further information or clarification provided by the applicant.

In nearly all cases, the applicant has clarified how and where the PHE comments are addressed in the Environment Statement submitted with the planning application. Many of the clarifications requested by PHE are already addressed in the ES, or are controlled by the Environment Agency through the permit process.

PHE conclude that although onshore oil and gas extraction and related activities have the potential to cause pollution to air, land and water, the currently available evidence indicates that the potential risks to public health from exposure to the emissions associated with such extraction are low if the operations are properly run and regulated.

Based solely on the information contained within the application provided, PHE has 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.

PHE agrees with the proposals to undertake baseline monitoring of ground waters, surface waters and local air quality to better assess the impact on the environment from any development.

However, it says the details of the baseline monitoring prior to operations need to be provided to ensure it will allow assessment of the impact of operations on the local environment. Baseline monitoring, and on-going monitoring, is a requirement of the Environment Agency permit as set out in the Waste Management Plan (which is part of the permit). In addition, a pre-operational condition of the permit requires the applicant to obtain written approval from the Agency for an Environmental Management and Monitoring Plan (EMMP) at least 4 weeks before commencement of the gas flaring activity. This will include details of the baseline air quality study undertaken before activities commence, together with details of the ambient air monitoring programme proposed during and after the period of gas flaring.

PHE say the levels of radon are very small and there are no grounds for concern about the potential radiological impact of radon arising from the proposed activities. Similarly, on naturally occurring radioactive material (NORM) PHE confirm the dose is significantly below PHE's recommended level and is not a concern.

Fylde Borough Council: objects to the proposal. The Borough Council believes operations would be in relatively close proximity to residential properties and the noise and general disturbance from 24 hour drilling operations and associated activity would be significant. The Borough Council says the proposal is contrary to

the provisions of Policy DM2 of the Minerals and Waste Local Plan and Policies EP26, EP27 and EP28 of the Fylde Borough Local Plan which are considered to be in conformity with the provisions of the National Planning Policy Framework.

The Borough Council questions the validity of the locations used by the applicant to measure existing levels of background noise. The Council also expresses concern about the increase in noise levels from a quiet rural background. Continuous noise monitoring is requested, as is the absence of HGVs overnight in order to prevent disturbance to residents.

In terms of air quality, the Borough Council states the increase in road traffic is unlikely to approach the "action" level of 40µg/m³ but the area will see a rise in air pollution albeit not very significant but due to low current levels there will be a significant percentage increase. It is the Borough Council's intention to relocate one of the NOx tubes that is used to monitor road traffic pollution in another area to this location.

In addition, the Borough Council requests that the applicant shall ensure that there is continuous monitoring of air quality as a result of increase road traffic to demonstrate that air quality guidelines are being met.

Dust – the site has been categorised as "medium" with reference to likelihood of dust creation and dispersal. Due to the sensitivity of the environment and the residents the Borough Council advise that the site is categorised as "large".

Lighting – the Borough Council makes a number of suggestions about the practical orientation and positioning of lights, together with guidance that should be used.

Westby-with- Plumptons Parish Council: Recommends the application be refused for the following summarised reasons and which also relate to application LCC/2014/0096:

- The proposed development would introduce an industrial form of development into a rural setting which will be of detriment to resident's quality of life.
- The value and saleability of properties will drastically diminish
- The proposed development is located too close to some resident's properties.
- Noise pollution day and night from the 24hour operation.
- Air pollution to any degree is unacceptable
- Evidence of earth tremors from Cuadrilla's activities elsewhere
- Residents' concerns over structural damage to properties, including Carr Bridge Residential Park, from vibrations from heavy plant and machinery.
- Concern regarding the visual aesthetic of the site, which requires screening.
- Major concerns over the highway access to the site, which is a renowned blackspot. Traffic lights should be installed.
- Concern regarding the suitability of A and B roads for additional traffic and the Kingfisher pub roundabout for larger vehicles.
- No evidence is given regarding compensation availability for damage occurring due to the fracking process, including structural damage, long-term land side effects and flooding.

- Impacts on the natural drainage system and potential damage to any asbestos in the underground system.
- Concerns regarding water contamination and the disposal of contaminated water.
- Inconvenience of anti-fracking protestors, affecting resident's quality of life and in turn the need for and cost liability of extra policing.
- Parishioners feel they are 'guinea pigs' in a fracking trial that is being rushed through without guarantees regarding environmental effects, safety precautions and compensation for affected people, properties and the environment.
- Concern regarding control and enforcement of the rules and regulations.

The Parish Council has requested that if the proposal is granted permission that the site and process is policed at all times; the residents are kept informed of all processes; emergency contingency plans are made public; compensation guarantees are put in place; access to land is pre-approved by landowners and a liaison committee is established to with representatives from the applicant, neighbouring properties, police, planning and environment officers from Lancashire and Fylde councils.

Kirkham Town Council: Object to the proposed exploration activities as a whole and are of the view that the benefits are outweighed by the potential major problems relating to seismicity; air, land and aquifer pollution risk; light pollution; flow back water; vehicle movements; noise; water supplies; visual impact, property values and insurance; potential future expansion and impact on local wildlife.

Medlar-with-Wesham Parish Council: Object to the proposed exploration activities as a whole and are of the view that the benefits are outweighed by the potential major problems relating to seismicity; air, land and aquifer pollution risk; light pollution; flow back water; vehicle movements; noise; water supplies; visual impact, property values and insurance; potential future expansion and impact on local wildlife.

Friends of the Earth: object to the proposal. They argue the public health section of the ES does not review the evidence on the adverse public health impacts of unconventional gas, nor acknowledge that the development of the industry has outpaced the knowledge about health impacts. Friends of the Earth cite a number of health studies as a growing body of the negative impacts of shale gas on health:

- Concerned Health Professionals of New York has published a compendium of scientific, medical and media findings demonstrating risks and harms of tracking, which references over 300 pieces of research.
- A US National Institute of Environmental Health Sciences study which found a correlation between intensity of shale gas development and heart and neural defects in newborns, within a 10 mile radius of maternal residence.
- A pilot study from the US Centres for Disease Control and Prevention found dangerous levels of human exposures of benzene from shale gas sites, which is known to leak from wells, along with methane, during drilling and tracking operations.

- Breast Cancer UK has reviewed the evidence on health risks and the chemicals used in drilling and tracking fluids and concluded that "Breast Cancer UK has strong concerns about the potentially adverse health effects of increased exposure to harmful chemicals as a result of tracking".
- The US National Institute for Occupational Safety and Health (NIOSH) identified exposure to silica (from sand used in tracking process) as a health hazard to workers conducting some hydraulic fracturing operations during field studies.
- The Umweltbundesamt (German Federal Environment Ministry) has found that "there is great lack of basic information that would be needed for any well-founded assessment of the pertinent risks and the degree to which they can be controlled by technical means".
- The ES does not review the evidence of known and unknown adverse public health impacts of unconventional gas. The industry is evolving quicker than the research into health impacts.
- Occupational health not addressed despite US evidence of harmful effects to workers from air quality, waste, wastewater, fracking fluid.
- Fracking fluid information is vague and there are no details of chemicals in the drilling fluids.
- The community profile does not include communities in the immediate vicinity of the site, e.g. Carr Bridge.
- Relevant data on demographics and deprivation in Blackpool is excluded.
- Impacts on physical activity have not been considered.
- HGVs carrying drilling and fracking chemicals and hazardous wastewater may deter cyclists and pedestrians using local roads.
- Air quality assessment should include fixed point sources of air emissions (e.g. generators).
- Cuadrilla has overstated safety claims, through misleading advertising, exaggeration and subjective claims.
- US evidence of negative health impacts of shale gas development.
- US evidence of heart and neural defects in newborns within 10 mile radius of maternal residence to shale gas developments.
- Dangerous levels of human exposure to benzene.
- Exposure to silica as a health hazard to workers.
- Breast Cancer UK expressed strong concerns about the potential adverse health effects from exposure to harmful chemicals as a result of fracking.
- Germany environment agency has stated that there is a lack of information to assess risks and how they can be controlled.
- Operator has a poor track record in running operations properly.
- The impact on health has been well-identified by Medact, which is critical of the failures of the Public Health England report.

Friends of the Earth also question the impact of the proposal on cycling and walking in the area; the decision to leave air emissions from the generators out of scope of the ES; and the track record of the applicant.

Friends of the Earth submitted a second representation on 19 December 2014. The public health aspects of the representation are summarised as follows:

- Peer reviewed medical evidence from the USA and other countries on the impacts on health of shale gas extraction cannot be ignored
- Reference is made to research by the Council of Canadian Academies and by Physicians, Scientists and Engineers for Healthy Energy from North America which indicates adverse health impacts.

Medact: Is a public health charity whose members are public health specialists. Medact has produced a position paper on the health effects of hydraulic fracturing in the UK. Medact say the risks and serious nature of the hazards associated with fracking, coupled with the concerns and uncertainties about the regulatory system, indicate that shale gas development should be halted until a more detailed health and environmental impact assessment is undertaken.

Preston New Road Action Group:

- Development is contrary to Policy EP26 as it will emit chemicals into the air from the flaring process, with a negative impact on local residents, especially those with breathing disorders. Alternatives to flaring should be used.
- Chemicals in the air could enter Westby reservoir
- Polyacrylamide when heated breaks down into component chemicals which are hazardous and could affect people's health
- Failure rates for wells are high, all wells eventually leak with a risk of polluting the surrounding land. Preese Hall well was subject to failure

Little Plumpton Awareness Group

- The escape of methane from failed wells will be damaging in the long term.
- Unacceptable risks associated with hydrogeology and should be refused.
- Applicants risk assessment not fit for purpose.
- UK geology is heavily faulted provided pathways for the migration of contamination.

Defend Lytham

- Unacceptable impacts on health, economy, rural Fylde and at odds with emerging policies of the Fylde Local Plan.
- Unacceptable levels of noise and vibration that would be felt considerable distance away.

Frack Free Fylde

- Unknown impacts on the agricultural industry if ground is contaminated.
- Would cause damage to roads and health shouldered by the tax payer.

Residents Action on Fylde Fracking (RAFF)

- Proposals would significantly affect health. A summary assessing the impacts of shale gas will be published by Medact soon.
- LCC public health assessment is limited.

- Public health is a material consideration

Representations

The following is a summary of the issues raised in representations that refer specifically to public health:

- Full short term and long term public health effects are unknown.
- Growing evidence of serious risk to human health.
- Other countries have banned shale gas development on health grounds.
- American reports have linked air pollution/gas flaring, contamination and groundwater contamination from shale gas developments with health impacts
- US shale gas air pollution reported to have 50 hazardous chemicals of which 35 affect the brain and nervous system.
- In New York State a 3 year moratorium on shale gas followed a report from hundreds of health professionals regarding health impacts.
- Lancet, British Medical Journal and the Medical Journal of America have linked the proximity of shale gas sites with increased health risks.
- Lancet article reported insufficient regulations to safeguard public health.
- NHS website states that the gases emitted are highly toxic and cancer inducing.
- Breast Cancer UK has reported that fracking chemicals are linked to an increased risk of breast cancer.
- The risk to human health is frightening, Lancashire residents are terrified.
- The council should protect people's lives and not destroy them, it's too dangerous to risk the health of local people.
- People will get sick and die, it will be a living hell.
- Need before and after baseline check on residents health.
- Reported health risks include neurological conditions (brain damage, memory problems, sensory conditions), cancer, breast cancer, leukaemia, heart defects, respiratory disease, infertility, neural tube defects, congenital heart defects, reduced Apgar scores for newborn babies, dermatological conditions (skin rashes), chemical burns, poisoning, sickness, stress, emotional distress and sleep problems.
- Risk of exposure to sulphur dioxide, polyaromatic hydrocarbons, radon and particulate matter which have health implications.
- Risk of exposure to carcinogenic gases (benzene) neurotoxins (toluene) and central nervous system impacts (xylene).
- Elderly residents (including Carr Bridge residents) with respiratory conditions including COPD, asthma and heart problems have moved to the countryside to improve their health and life expectancy, but now concerned that the development will affect their health, particularly from methane which is an asphyxiate.
- Potential for toxins to enter the food chain risking starvation and death.
- Silica sand can cause pulmonary, lung cancer and cardio vascular diseases
- Blind people will not be able to see that water is discoloured.
- Health impacts will cause a strain on the NHS as people become ill.
- Need to think about present and future generations including elderly and younger generation's safety.

- The EIA does not consider impacts on humans.
- There are no guarantees that the health of local people will not be adversely affected. No decision should be made until a Health Impact Assessment (HIA) / investigation into health risks (supported by empirical data) has been completed.
- Regulations can't mitigate against health impacts from accidental waste spillage and well failure.
- No amount of money is worth the risks of the health of the community.
- Will Cuadrilla pay compensation for health impacts?
- The proposal is contrary to NPPF Paragraphs 120 and 144 as it poses a considerable risk to human health.
- The proposal is contrary to Policy EMP5 as the chemicals in the air make it contrary to health.

Policy

National Planning Practice Guidance states that the range of issues that could be considered through the decision-making processes in respect of health includes, among other issues, how potential pollution and other environmental hazards, which might lead to an adverse impact on human health, are accounted for in the consideration of new development proposals.

Policy DM2 of the JLMWLP states that development for minerals operations will be supported where it can be demonstrated 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 current best practice and recognised standards.

Policy EP27 of the Fylde Borough Local Plan states that development which would unnecessarily and unacceptably result in harm by way of noise pollution will not be permitted. Where appropriate, planning permission will be granted subject to conditions to minimise or prevent noise pollution.

Assessment of Impacts

The County Council's Director of Public Health has provided specific advice to inform the planning process and provide public health advice to protect and improve the health of local residents living near the proposed shale gas exploration sites of Preston New Road (planning application numbers LCC/2014/0096 and 0097) and Roseacre Wood (planning application numbers LCC/2014/0101 and 0102). The advice was published as a Health Impact Assessment (HIA) in November 2014.

The Health Impact Assessment makes 45 recommendations to a broad range of agencies, suggesting actions before, during and after any permissions or permits are granted. Appendix J contains 16 specific recommendations to inform this planning process.

Given the advice is specific to this application, it is appropriate that an assessment is undertaken in relation to each of the 16 recommendations in Appendix J.

1. *Consider the need for further noise assessment, particularly on the proposed Roseacre Wood site and if necessary, require additional mitigation measures to reduce noise associated with the development of the sites and more particularly the drilling and hydraulic fracturing phases of the development and which could be controlled by conditions attached to any planning permission.*

The applicant's noise models for drilling and hydraulic fracturing have been revised using more detailed inputs, particularly in relation to the drilling noise based on measurements of the actual rig proposed for the application sites.

The adopted noise prediction methodology is appropriate, and is implemented in widely used noise modelling software. The majority of the noise model inputs are clearly set out in the report, and simplified noise predictions undertaken by Jacobs using the same input data produce similar results to those calculated by the applicant.

During the Jacobs noise survey that was commissioned by the County Council last year, undertaken between 00:00 and 03:00 at Staining Wood Cottages, background noise levels as low as 29.5dB were recorded. Between 00:00 and 03:00 L_{Aeq} noise levels varied between 46.2 - 56.2 dB with an averaged noise level of 52.2dB L_{Aeq} . Based on the results of the Jacobs noise survey existing night time ambient noise levels are approximately 7 to 17 dB higher than the predicted 39dB L_{Aeq} from the applicant's Preston New Road site. In addition during the Jacobs survey between 00:00 and 03:00 maximum noise levels varied between 62.8 - 73.9dB L_{Amax} . Notes taken during the survey detailed that "*Noise at Staining Wood Cottages was dominated by frequent passing cars on A583 with distant background noise from motorway traffic. Plumpton Hall Farm was dominated by frequent cars passing on A583 and with distant background noise from motorway traffic. Other occasional noise was distant helicopters, farm animals, and infrequent birdsong.*" Noise from the site would not significantly increase existing ambient L_{Aeq} noise levels experienced at Staining Wood Cottages.

The applicant's predicted noise level of 39 dB L_{Aeq} at night is less than 10 dB above the modal background noise level, and does not exceed the upper limit value of 42 dB $L_{Aeq, 1h}$ as set out in national guidance. Given the extensive noise mitigation measures that will be implemented by the applicant, the predicted noise level of 39 dB L_{Aeq} might well be regarded as the minimum achievable without undue burden, although the applicant has stated achieving this level is onerous and goes beyond limits set in precedents in planning conditions.

Moreover, given the existing ambient noise levels (46 – 56 dB $L_{Aeq, 15min}$) and maximum noise levels (63 – 74 dB $L_{Amax, 15min}$) recorded by Jacobs at Staining Wood Cottages, the nearest sensitive receptor to the site, the introduction of a night time noise source contributing 39 dB L_{Aeq} with no tonal or significant impulsivity would result in an increase in ambient noise level of less than 1 dB L_{Aeq} during the quietest parts of the night. To put this in context, the objector's noise consultant MAS describe a 3dB change in noise as 'just perceptible'.

The proposed noise mitigation measures are therefore considered to be practicable, and the claimed noise reductions achieved by each of the measures are based on guidance in International and British standards.

With the additional mitigation measures proposed by the applicant, it is considered that efforts have been made to reduce any adverse noise impacts that would arise from the drilling and hydraulic fracturing activities to a minimum. Furthermore, the resulting noise levels from the activities are considered to be in accordance with relevant government guidance.

The proposed development is therefore consistent with Policy DM2 of the JLMWLP and Policy EP27 of the Fylde Borough Local Plan. It has been satisfactorily demonstrated that noise impacts would be reduced to acceptable levels and would not result in harm to the amenity of neighbouring properties by way of noise pollution.

2. *Establish with the Applicant that liability and compensation arrangements are in place to cover any structural damages to properties that can be attributed to an unlikely event of induced seismicity.*

The applicant has provided a letter of confirmation from their insurance brokers (Willis Energy). This confirms Cuadrilla Resources Ltd (Cuadrilla):

- Purchased Third Party Liability insurance on an industry standard policy form which will respond to valid claims for their legal liability for loss or damage to third parties.
- Willis Energy have benchmarked for Cuadrilla the limit of liability purchased by other onshore Oil and Gas operators with similar type and scale of operations and found Cuadrilla's limit to be in the upper quartile of this group.
- For the avoidance of doubt this policy covers Cuadrilla Resources Ltd and all subsidiaries including Cuadrilla Elswick Ltd and Cuadrilla Bowland Ltd.

3. *Undertake an independent verification of the assessment of air quality, transport, waste management and induced seismicity prior to determining the planning applications.*

Air Quality

Lancashire County Council Scientific Services (LCCSS), Ricardo AEA, and the Environment Agency carried out a review of the air quality chapters (including radon) of the Environmental Statements.

The LCCSS review concluded that the documents provide sufficient detail to show that the companies have carried out the assessment in a satisfactory manner and that the conclusions drawn from the assessment are valid.

The review found that the documents for both sites identified the following emissions from the activities before, during and after operations: fugitive dust, nitrogen oxides and particulate matter, volatile organic compounds (VOCs) and odours.

The review suggested there are other potential pollutants not mentioned in the assessment which may adversely affect air quality. These include sulphur dioxide, hydrogen chloride and other potentially carcinogenic VOCs. It was suggested that the assessment should explicitly consider these chemicals, but if the consideration concludes these chemicals are of little or no concern this should be confirmed. Further information has been provided by the applicant in relation to these points:

Sulphur Dioxide & Hydrogen Chloride

Results of testing of gas from Cuadrilla's Preese Hall well did not detect any sulphurous compounds or chlorine compounds in the gas. It is therefore assessed as very unlikely that there will be any significant concentrations of sulphur dioxide or hydrogen chloride in the gas produced at the proposed site. Monitoring of the gas quality will be undertaken once the site is operational. This will mitigate the risk of any unexpected pollutant emissions going undetected. In addition, the EA permit (which incorporates the Waste Management Plan) provides for ambient sulphur dioxide monitoring.

VOCs

The air quality assessment has identified the most significant VOCs (volatile organic compounds) as benzene and benzo[A]pyrene (BaP) (selected to represent carcinogenic VOCs). The main pollutants of concern which are included in the air quality objectives are benzene and BaP (Benzo[a]pyrene). The benzene results are included within the ES, section 6.7.5.

BaP: Due to limited amounts of information on polycyclic aromatic hydrocarbons (PAHs) being available in the UK, for the assessment at Preston New Road and Roseacre Wood a precautionary approach has been taken by the applicant by making assumptions based on data from Alberta, Canada. The information has been used to determine the emissions of BaP that could potentially result in a breach of the UK objective for BaP (0.25ng/m³ annual mean).

Analysis undertaken by M.Strosher et al looking at the composition of flare gas from natural gas extraction sites in Canada has been used for the assumptions made for the Preston New Road and Roseacre Wood sites, which in discussion with the Environment Agency is considered the best source of information regarding BaP content of shale gas.

The applicant has made a worst case assumption for the Preston New Road site in the ES (chapter 6) that assumes that C6 hydrocarbons constitute 0.1% of the total emissions. The Alberta report indicates that BaP is around 1/1000th of the amount of Benzene. Using this as the worst case assumption, the potential contribution from the Preston New Road site can be calculated. Based on this approach the highest predicted annual mean concentration is 0.0224 ng/m³ which is well below the UK objective (0.25ng/m³).

In summary, the findings in the ES and the further information submitted by the applicant conclude that the risk of any impacts of VOCs emissions from the flare on local receptors would be not significant.

In addition, the EA permit (which incorporates the Waste Management Plan) requires ambient monitoring of VOCs and BTEX (benzene, toluene, ethylbenzene, and xylenes) and indirect monitoring of the flare of VOCs among other chemicals.

The Environment Agency has undertaken its own detailed assessments of the emissions to air that will arise from the flow testing operations (i.e. from the flare) and the potential impact of these emissions on human health and ecological receptors.

Detailed air dispersion modelling has been carried out by the Agency. This considered the potential impacts of the main pollutants that could be emitted from the combustion of natural gas based on its expected composition:

- Oxides of nitrogen / nitrogen dioxide
- Benzene (a volatile organic compound)
- PAH emissions (a reference to benzo-a-pyrene)

Particulate emissions have been covered by a qualitative assessment as the Agency would not expect particulate (PM10) to result from gaseous emissions.

Sulphur dioxide (SO₂) was not included in the Agency's assessment because the applicant provided information based on other gas extraction locally that no hydrogen sulphide (H₂S) has been identified during monitoring of the drilling muds or gas.

Having undertaken a detailed assessment, the Agency is satisfied that the emissions from the flare would be insignificant at locations closest to the site.

In terms of public health impact of the flare emissions, the Agency's audit checks, modelling and sensitivity analysis confirms there will be no breach of standards established for human protection. Indeed, the modelling assumed the flares would be operating for 24 hours, 365 days per year per well. The actual proposal is for the flares to operate for no more than 90 days per well.

Transport

The County Council's Strategic Highways Planning Manager has assessed the applicant's transport assessment. With consideration for all the information provided, he can support the application for Preston New Road in respect of the transport element as long as all necessary access works and associated measures are delivered and secured through appropriate conditions as necessary.

Waste Management

Under the Mining Waste Directive, an operator of a mining waste operation must draw up a waste management plan (WMP) for the minimisation, treatment, recovery and disposal of extractive waste.

The EA has assessed the applicant's WMP and approved the plan as a whole, subject to conditions in the permit. The Agency is satisfied that the permit requirements, including the requirements of the WMP, will protect the environment and that the Mining Waste Directive is met.

Induced Seismicity

The County Council commissioned AB Consulting (Edinburgh) to undertake an assessment of induced seismicity of the planning applications for Roseacre Wood and Preston New Road.

AB Consulting (ABC) reviewed the ES submitted by Arup, on behalf of the applicant, and presented a number of questions on key issues in order to seek clarification. Arup then responded.

A discussion meeting then took place between Arup, Cuadrilla, and ABC, providing the opportunity to better understand the background to these exchanges and clarifications.

Through these exchanges more clarity on the key issues was identified to the extent that ABC is satisfied with the applicant's proposal to manage induced seismicity.

4. *Seek agreement with the Applicant to establish an independent comprehensive baseline and on-going long term monitoring of environmental and health conditions prior to any activity on the sites. An indicative framework is described at the end of this document.*

The Royal Society/Royal Academy of Engineering report 'Shale Gas Extraction in the UK' (2012) recommends that monitoring arrangements should be developed to detect possible well failure post abandonment. The report says that continuous ground gas monitoring and aquifer sampling could be similar to that carried out before and during fracturing operations. Temporary monitoring equipment could be used, such as that used to monitor emissions from landfill sites or even semi-permanent monitoring stations could be installed. The report suggests that monitoring would be at a reduced frequency, perhaps every few years, but says this requires techniques that can reliably distinguish between methane from non-shale operations in the areas of abandoned wells.

The report recommends:

"Arrangements for monitoring abandoned wells need to be developed. Funding of this monitoring and any remediation work needs further consideration."

The applicant has agreed to undertake baseline monitoring before the project starts. Indeed the EA permit requires monitoring for a period of three months before operations commence. The Agency requires over 50 determinants to be monitored for air, surface water and ground water.

Post decommissioning monitoring will require the operator to provide sufficient evidence to satisfy the EA that, following decommissioning of the well, there will not be any unacceptable residual, on-going impacts on the environment before surrender of the permit would be accepted by the EA. Monitoring at the site will therefore continue into the post decommissioning period and will have to demonstrate this. The EA's powers to set monitoring requirements are also more flexible than planning conditions or a section 106 legal agreement because any requirements imposed by the EA may then be adjusted by it according to conditions at the site and monitoring data derived at the time.

A planning authority's reliance on other (non-planning) regulatory bodies to provide the appropriate controls and conditions in relation to their statutory responsibilities has been established through the courts on many occasions. Most recently it was re-confirmed in the Balcombe Judgment (Frack Free Balcombe Residents Association v West Sussex County Council– 5th December 2014). Paragraph 102 of the judgment is particularly relevant:

“the existence of the statutory regimes applied by the HSE, the EA and the DECC shows that there are other mechanisms for dealing with the very proper concerns which the Claimant's members have about the effects on the environment. The Claimant and its members' concerns are in truth not with the planning committee's approach of relying on the other statutory regimes, but rather with the statutory bodies whose assessments and application of standards they disagree with. That does not provide a ground of legal challenge to the decision of the planning committee.”

In light of this judgment as well as national guidance (NPPF paragraph 122) it is not appropriate to impose planning conditions or a section 106 legal agreement with respect to matters, such as longer term monitoring, that are within the remit of other regulatory regimes.

Nevertheless, while there is a question around the appropriateness of using a planning condition or section 106 agreement to provide for such monitoring, the County Council would welcome a voluntary agreement with the applicant to provide for such in the event of a recommendation to grant permission.

The Director of Public Health's locally commissioned Health Impact Assessment has highlighted potential health impacts arising from a perceived mistrust of the regulatory bodies involved in the process. He has recommended that an independent monitoring body should be set up – supported by funding from the applicant. This body would be intended to be an additional independent repository for all of the information collected (both environmental and health related) – enabling a single point of reference and providing independent, easily understandable interpretation of the publicly available data.

The proposed arrangements, if planning permission is granted, would include data and information collected by other agencies and would not seek to be a replacement of the functions provided under other statutory provisions. It would provide the local repository and independent interpretation of monitoring data as well as filling any missing gaps that may be required to provide local reassurance. Local governance

of the monitoring arrangements would provide the reassurance to the local communities.

So far, the applicant has demonstrated to the County Council's Director of Public Health a willingness to support monitoring arrangements if planning permission is granted.

5. *The Director of Public Health should be informed of the results of the measurements and any breaches to the planning condition or environmental permit.*

The Director of Public Health will be informed of the results of the measurements and any breaches to the planning conditions if planning permission is granted. The Environment Agency, Health and Safety Executive and Department of Energy and Climate Change will be invited to do similar if permission is granted.

6. *Consider the need to seek further clarification from the Applicant that the cumulative impacts of the operations from the flare, generators, vehicles and drilling will not exceed the national air quality objective thresholds, particularly for PM 24 hour mean levels.*

Further clarification was sought from the applicant through a Regulation 22 information request as follows:

PM10 from generators and vehicles:

An assessment of PM10 (particulate matter of 10 microns diameter or less) from generators and vehicles has been undertaken and presented for both the Preston New Road and the Roseacre Wood proposed exploration sites as part of a further information request. Detailed dispersion modelling has been used to assess the impacts from the generators and the vehicle movements to/from the site. A number of worst case assumptions have been made in the modelling to ensure a conservative approach has been taken. The modelling shows that no significant effects are likely to result.

In order to calculate the total cumulative impacts from generators and traffic the scheme related concentrations are added together. The findings from this cumulative assessment of PM10 for the Roseacre Wood and Preston New Road site during operations are that the results indicate no receptor is likely to experience a change of greater than, or equal to 1% of the annual mean objective (40µg/m³). As such no significant effects are likely to result from cumulative impacts. The total concentrations are also well below the air quality objectives for PM10

PM10 from Flaring

The generation of PM10 emissions from the flare has been scoped-out of the assessment due to the gas composition and high efficiency of combustion. This has been agreed with the Environment Agency and is described in the permit:

"Particulates have been covered by a qualitative assessment as we would not expect PM10 to result from gaseous emissions. It formed part of the air quality assessment submitted by the applicant and is included in the habitats section for completeness".

Indeed the Agency has further clarified its position in relation to particulates from flaring of natural gas in that when there is full and efficient combustion (based on temperature and retention time) the emissions are not likely to contain particulate matter.

An enclosed flare, which is a requirement for these activities, allows more control of the process, and the temperature can be continuously monitored along with the retention time to ensure the combustion process is complete. The gas flow to the flare and the gas composition are also measured.

In this case the applicant will produce an Environmental Management and Monitoring Plan before they are operational which will need to be approved by the EA; this plan will contain details of appropriate control measures they will put in place should efficient combustion not be achieved.

PM10 from Drilling

No PM10 emissions from drilling would be expected as the material drilled would be wet. Also any dust-creating processes on site would be mitigated by following the site Environmental Operating Standard (see ES:4.13.1 & Appendix E).

7. As part of either the planning or permitting process, the Applicant should be required to submit regular data on the ambient air quality on site measuring all the common air pollutants relevant to the activity and report them regularly. PM10 and PM2.5 should be reported separately.

The EA permit requires, through the Waste Management Plan, monitoring of 13 ambient air quality parameters including PM2.5 and PM10. This will be done prior to operations commencing to establish a baseline, during operations and after operations have ceased. Four sampling positions will remain constant at the perimeter of the site. The parameters are: methane, carbon monoxide, hydrogen sulphide, nitrogen dioxide, nitrogen monoxide, sulphur dioxide, ozone, total petroleum hydrocarbons, VOCs, BTEX, PM2.5 and PM10, dust. Results will be published monthly and submitted to the Agency for check and verification.

Monitoring of particulates will be undertaken throughout the operational period of the site using Frisbee-type dust gauges with directional adhesive strips (for nuisance dust) plus pumped gravimetric sampling for PM10 and PM2.5 will be located at four locations in close proximity to key receptors. The sampling period for gravimetric monitoring for PM10 and PM2.5 will be 24 hours.

In addition the EA requires point source emission monitoring from the flare for oxides of nitrogen, carbon monoxide, total volatile organic compounds, and methane (using emission modelling calculations)

8. *The Roseacre Wood site is within 55m of a National Grid gas transmission pipeline. Interconnections into national transmission pipelines are proposed at both sites. Advice should be sought and an assessment undertaken as to whether the nearby gas transmission pipelines are considered to be a major hazard.*

This recommendation is not relevant to this Preston New Road application. However, advice has been sought from the Health and Safety Executive and National Grid, and there is not a major hazard.

9. *Any extended flow testing provided for by any planning permissions should be aligned with the permits to be issued by the Environment Agency.*

This planning application includes extended flow testing and the Environment Agency has confirmed the permit does similar.

10. *An assessment of light pollution as part of the site operations should be carried out, and if there are likely to be significant impacts associated with light pollution from the sites that cannot be mitigated or controlled, the Applicant should be requested to consider the opportunity to offer to fit blackout blinds to those homes most likely to be affected*

An assessment of light pollution has been undertaken as part of the determination.

The project will involve 24 hour operations during drilling and hydraulic fracturing. Lighting of working areas will also be necessary during winter when standard working hours overlap with the hours of darkness. Low-level security lighting will also be required so that the site operatives and security staff can carry out their monitoring activities during night time hours.

Lighting has properly been assessed; it concludes there would be some light pollution at night. This would be for a temporary period but would be significant particularly when seen from the A583, nearest residential properties at Staining Farm and the villages of Little and Great Plumpton. Notwithstanding it would be for an extended period of time, with the mitigation measures proposed, and which could be controlled by condition, on balance, it is considered that lighting could be made acceptable and that the impacts associated with such would not be so great to affect amenity on a permanent basis or lead to unacceptable effects on nature conservation to constitute a sustainable reason for refusal. It would not be appropriate to require blackout blinds to be fit to those properties most likely to be affected.

Subject to the mitigation measures proposed, and which could be controlled by condition, it is considered on balance that the proposed lighting for a temporary period would be acceptable for the purposes of the NPPF Policy DM2 of the LMWLP and Policy EP28 of the Fylde Local Plan.

- 11 *Further clarification or new information on the occurrence and magnitude of equipment likely to be contaminated with radioactive waste and how such waste would be managed on the site and disposed of should be sought.*

It is important to stress that the levels of radiation associated with contaminated waste are very low and come from Naturally Occurring Radioactive Materials (NORM). Nevertheless, NORM is regulated through the Radioactive Substances Regulations.

The applicant has provided further information following an information request. Section 5.2 of the Waste Management Arrangement of the Radioactive Substances Regulations (RSR) permit applications to the Environment Agency state the build-up of insoluble carbonate and/or sulphate scales inside pipes is a possibility due to a change in pressure or temperature as the water is brought to the surface. It is highly unlikely however, due to the short term nature of the operations that any significant scale will build up inside the pipes. In the unlikely event that significant scaling of components occurs (and is identified via the proposed contamination monitoring regime), it shall be ensured that the pipework/component is capped/sealed to prevent release of material, and the Agency will be contacted for advice.

Similarly, physico-chemical changes within the accumulating waters may lead to the formation of small volumes of precipitate, which could contain elevated concentrations of radionuclides. The potential for such waste will be addressed by the contamination monitoring regime.

The Best Available Technique (BAT) statement section 3.2 of the RSR permit application to the Environment Agency states: *“given the potential for the scaling-up of pipework (with insoluble radium carbonate and sulphate scales), and/or the contamination of phase separator equipment/material, allowance has also been made for the generation of a relatively small quantity of solid radioactive waste. Accumulation and disposal of a nominal 40 MBq each of Ra-226 and Pb-210, and 16 MBq each of Ra228 and Th-228 has been requested within the Permit application.”*

Section 7.1 goes on to state: *“As soon as practicable, after identification and characterisation, low-level solid waste would be transferred to a suitable EPR10-permitted treatment or disposal facility.”*

Section 7.2 (contamination monitoring) states: *“A number of baseline samples will be taken prior to commencement of works on the sites, to determine background concentrations of radionuclides in the local area. A background contamination survey will also be performed (using a suitable alpha/beta contamination monitor). A contamination monitoring programme will be devised, to ensure that any significant (albeit improbable) environmental contamination is promptly identified. This will include alpha/beta contamination monitoring of key areas/surfaces, including:*

- *Well-head (and immediately surrounding site surface)*
- *Separator equipment [external surfaces, and any internal surfaces opened for maintenance/access (and the immediately surrounding site surface)]*
- *Storage tanks (internal surfaces where practicable, external valves and immediately surrounding site surface)*

Consignments of flowback fluid will also be screened externally for contamination, prior to leaving site. At close of works, all potentially-contaminated equipment will be screened prior to leaving site. The frequency, actions and responsibilities associated with monitoring shall be documented in the site Environmental Management and Monitoring Plan (EMMP)”.

Section 7.3 goes on to state: *“Solid waste would be stored within a secure container, or within a secure lay-down area, as appropriate. Where appropriate, pipework/components would be capped to prevent release of contamination.*

In addition flowback tanks will be monitored on arrival at site to establish a baseline radiation contamination level. Prior to leaving site further radiation contamination monitoring will identify any elevated levels of radiation. In the unlikely event an elevated level is identified above baseline levels the tanks will be cleaned to remove any precipitate and subsequently disposed at an offsite waste treatment facility.”

12. *Should planning permission be granted, it should be a pre requisite that no activity can start until the onsite and offsite waste treatment capacity is defined*

The Environment Agency permit (through the Waste Management Plan which it incorporates) sets out controls for the management of waste onsite and offsite.

Onsite, the permit controls the storage arrangements for different the waste types. The maximum volume of storage and storage structure are prescribed. For example, a maximum of 3,000m³ is given for flowback fluid at any one time, and this must be regularly removed to an offsite permitted waste facility. Flowback fluid must be stored in steel solid tanks (approx. 6mm thickness with annual non-destructive testing inspection)

The Agency has assessed the application and is satisfied that the waste can be safely dealt with. If an appropriate permitted outlet for the waste cannot be found, the Agency permit requires that operations will have to stop.

As explained in the assessment of recommendation 4, in light of case law as well as national guidance (NPPF paragraph 122) it is not appropriate to impose planning conditions with respect to matters that are within the remit of other regulatory regimes. The mineral planning authority should 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. The County Council should assume that these regimes (in this case the regulation of waste disposal) will operate effectively.

In terms of onsite waste management spill containment protocols, assessment of the containment capacity of the well pad is presented in the ES. Appendix B to the ES identifies that a total volume of 1170m³ will be provided to contain spilt fluids. This volume is provided by use of the perimeter ditches, voids within the stone matrix and min 50mm air freeboard. Section K2.4 of Appendix K to the ES refers to Environment Agency guidance, in particular EA PPG26 'Drums and intermediate bulk containers', on the recommended storage capacity to contain spills and leaks of

potentially polluting liquids. Where more than one tank is situated in a single bund the bond volume should be at least 25% of the aggregate tank contents. Section K2.4 of the ES details the aggregate tank contents as 3176m³ and identifies that 25% of this volume (795m³) is significantly less than proposed containment volume provided at the site. It is concluded that there is adequate capacity to contain spills assessed in accordance with EA guidance.

Section 4.5.4 of the ES describes the proposed construction of the well pad. Migration of any spilt fluid to underlying soils and ground waters will be prevented by the 1mm thick fully welded HDPE [plastic] membrane - such membranes are commonly used to construct water retaining structures such as swimming pools. Joints in the membrane are fully tested for water tightness and certified as part of the construction process. The membrane is protected against puncturing by the geotextile materials placed above and below the membrane. Further protection against puncturing is also provided by the geogrid placed below the granular sub-base layer (see Appendix B of the ES).

13. *Further clarification should be sought that any specific risks due to using the MoD site for accessing the Roseacre Wood site have been addressed before any planning permission is granted.*

This recommendation is not relevant to the Preston New Road proposal. Nevertheless, the MOD maintains no safeguarding objections to the application but requested some further assessments are undertaken. The MOD does not object to the applicant's proposal to utilise this route across MOD property and will establish relevant terms of access directly with the applicant to facilitate this.

14. *A full assessment of the impacts of additional traffic associated with the proposals on road safety should be carried out and appropriate traffic management options considered to address the public concerns, particularly in respect of the Roseacre Wood site.*

A full assessment of traffic impacts associated with the proposed development has been carried out by the applicant as part of the ES and the further information that has been submitted more recently. An assessment of the impacts has been carried out against the policies of the NPPF, the development plan policies and in light of advice received from the Highways Agency, LCC Developer Support (Highways) and with regard to those views received in representations. The assessment is in Appendix 17.

The applicant proposes to access the site via a new access from the north side of the A583 (Preston New Road). Traffic to the site could travel either east or west along the A583 in order to gain access to the M55 at junctions 3 or 4. Both routes to the motorway are comprised of major roads and would not require HGV traffic to pass through major built up areas.

The peak traffic flows would occur as a result of combined traffic associated with activities at more than one well. The total traffic numbers in the ES are based on such conditions. The peak traffic generated would be around 50 two way HGV

movements per day which would occur for around one week on eight occasions over the life of the project.

The forecast traffic flows are below the thresholds in Department for Transport Guidance for Transport Assessments which define when a full transport assessment is required. The main traffic impacts arising from the development therefore relate to the size of vehicles rather than vehicle numbers. The assessment has therefore concentrated on selection of the appropriate access routes to the site.

The site is located on the A583 which is a major highway carrying around 13,000 vehicles per day including over 250 HGV's. The proposed development would therefore only increase total traffic on this road by around 1%.

The proposed route via the motorway network would be acceptable and would not pass through any major residential areas. There would be an increase in HGV movements on the strategic highway network but it is considered there is sufficient capacity to accommodate such

The proposed route and access would be acceptable to the Highways Agency and to LCC Developer Support (Highways). Subject to conditions controlling the detailed junction design, access, the usage of such during restricted hours to minimise impacts, ensure vehicle cleanliness and replace any lost hedgerow, it is considered that the development would be acceptable in terms of highway safety and capacity issues and would not be in conflict with the policies of the development plan.

15 Should planning permission be granted, provision should be made with the Applicant to maintain road safety, particularly on the access routes to Roseacre Wood site and road safety and any related incidents on the access to both the sites should be monitored.

Should planning permission be granted, conditions can be imposed to ensure road safety is not compromised.

16. In the event planning permissions are granted, any breach of planning conditions should be reported to the Director of Public Health so that necessary steps can be taken in protecting and improving the health of local communities from issues arising due to the alleged or identified breaches of planning control

Should planning permission be granted, any breaches of control will be reported to the Director of Public Health.

Health studies referred to in representations.

Many representations received by the County Council refer to research conducted in North America and overseas that indicate shale gas extraction is linked to adverse health impacts. A large number of studies are referenced. Some of the research referred to examines a wide range of other studies to draw conclusions about health impacts.

While much research exists, and is growing in volume each year, it is difficult to gain an objective view of the veracity of the research. Anti-fracking campaigners frequently point to studies that indicate increased health risks (e.g. elevated risks of cancer or birth defects) as a result of shale gas activity in North America. Conversely, pro-fracking campaigners point to numerous methodological flaws in the research. It is also difficult to translate the findings of research from North America into the UK environment. Operating and regulatory practices are very different.

In June 2014, Public Health England (PHE) published a review into the potential health impacts of shale gas extraction. The review drew on significant scientific evidence in peer reviewed or published reports up to January 2014. Much of the research cited in representations to the County Council was reviewed by PHE.

PHE say there have been very few epidemiological studies or health risk assessments published in the peer reviewed literature. Epidemiology is the branch of medical science that investigates all the factors that determine the presence or absence of diseases and disorders. It aims to assess the cause of a disease, and seeks to look beyond associations which might be a result of chance, bias or confounding effects.

Two of the most frequently cited studies in representations relate to work by a research group in the School of Public Health at the University of Colorado. The studies look at possible associations between health status and exposure to air pollutants from shale gas activities.

McKenzie et al (2012) used a risk assessment methodology which considers cancer and non-cancer endpoints separately to assess the potential health impact of air emissions from shale gas extraction and related activities. PHE say it should be noted that the risk assessment methodology used in this study is not recommended for use in the UK.

McKenzie et al (2014) examined a possible link between air pollution and adverse birth outcomes, including congenital malformations.

Both papers are considered in some detail by PHE.

In McKenzie et al (2012) the key finding was that the estimated risks for cancer were elevated for those residents living within half a mile of the gas wells during well completion.

PHE say the research has a number of limitations and uncertainties, many of which are acknowledged by the authors. These include:

- Small sample size and the limited amount of data on emissions around well completion sites
- Further work is needed to profile emissions during the stages of gas well development
- Non-methane pollutant emissions appear to vary substantially by field type, number of well heads, completion process and types of controls in place. This makes application of the results to other shale gas extraction sites difficult

- A limited number of volatile organic compounds was explored. Other pollutants such as aldehydes, diesel exhaust, ozone and particulate matter, were not considered.
- The existing background level of pollution needs further assessment to enable pollution caused by shale gas extraction and related activities to be reliably assessed
- The impact of local meteorology and topography means that the results are not easily applicable to other areas and other extraction sites.

Also, PHE point out the approach used for cancer risk assessment in the US is not recommended for use in the UK by the UK advisory Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC) if the risk values used are derived from animal data.

The same research group has examined a possible link between maternal exposure to air pollutants associated with shale gas extraction activities and birth outcomes such as congenital heart defects, neural tube defects and low birth weight (McKenzie et al, 2014). Public Health England has similarly reviewed this study.

McKenzie et al (2014) reported a positive association between exposure and prevalence of congenital heart defects. The association with neural tube defects was considerably weaker.

PHE's review concludes that the reported risks have wide confidence intervals which weaken the reported association and chance findings cannot be excluded, given the number of analyses carried out. The exposure assessments relied upon an indirect approach rather than direct measurements of exposure. Furthermore, the study was unable to differentiate between the phases of well development, which could be important in terms of the type of and amount of pollutants emitted.

Maternal education, age, smoking status and alcohol consumption were considered as potential confounding factors, but it is not clear that confounding was adequately addressed for socioeconomic status or previous experience of birth defects.

Overall, the study suggests a possible link between maternal exposure to air pollutants which may arise from shale gas extraction activities and a range of birth defects, particularly congenital heart defects, although the authors acknowledge that further research is needed to examine whether a link with shale gas drilling was causal.

PHE state the obvious limitations in terms of exposure assessment highlight the need for such health studies to have access to robust assessments of exposure both before and after development of a site for gas exploration and extraction.

Further criticism of the McKenzie et al (2014) research came from the Chief Medical Officer and Executive Director of the Colorado Department of Public Health and Environment in the USA. In a statement from the Department, the Chief Medical Officer said:

“...we disagree with many of the specific associations with the occurrence of birth defects noted within the study. Therefore, a reader of the study could easily be misled to become overly concerned.”

Among a range of limitations, the statement points out:

- *“The study showed decreased risk of pre-term birth with greater exposure. This seems counterintuitive, and again, makes the study difficult to interpret. (The study data showed that the nearer the mother lived to a well, the less likely the mother was to give birth prematurely or to have a low-birth-weight baby.)”*
- *“As the authors noted, they don’t necessarily know where the mother lived at the time of conception or during the first trimester of pregnancy, when most birth defects occur. This makes interpretation of their study difficult.”*

Another study cited in representations is the research by Kassotis et al (2013). The study, reported in the national media at the time, indicated that chemicals used in fracking could cause infertility, cancer and birth defects.

PHE reviewed the study. The researchers detected endocrine disrupting activity (oestrogenic, anti-oestrogenic or anti-androgenic activity) in laboratory tests for a selection of 12 chemicals used in natural gas extraction in the US. Endocrine disruptors are chemicals that, at certain doses, can interfere with the endocrine (or hormone) system in mammals. These disruptions can cause cancerous tumors, birth defects, and other developmental disorders.

Endocrine disrupting activity was also detected in groundwater and surface water considered to have been contaminated by fluids/wastewater from natural gas extraction processes (i.e. from spills/leaks), again using a laboratory test system.

PHE report that the authors suggested that the reported endocrine disrupting activity of the chemicals used in natural gas extraction may have contributed to the endocrine disrupting chemical activity detected in the water samples, i.e. in areas where contamination spills of fluids/wastewater used in gas extraction may have occurred. PHE say this is a single study showing a relatively weak response in laboratory tests.

The County Analyst has also reviewed this research and highlighted limitations in the study which include a lack of direct identification of shale gas chemicals in the water that was tested. In other words, the chemicals found in water samples could have come from many sources, including agriculture, industry or from natural sources.

Many objectors refer to the 2015 report of the public health charity Medact. Medact say the risks and serious nature of the hazards associated with fracking, coupled with the concerns and uncertainties about the regulatory system, indicate that shale gas development should be halted until a more detailed health and environmental impact assessment is undertaken.

The Medact report has not produced new epidemiological research but has reviewed published literature and has requested short papers from relevant experts in particular subject areas. It has also interviewed academics and experts.

Unfortunately, one of the contributors (contributing to three of the report's six chapters – chapters 2, 4 and 5) has led a high profile campaign in the Fylde related to shale gas. Another contributor to the report (chapter 3) has previously expressed firm views on shale gas and has objected to this application. This has led to questions from some quarters about the report's objectivity.

In light of these uncertainties it is not clear how much weight the County Council should attach to the report.

PHE has reviewed other research on health and shale gas, and its report can be found here:

<https://www.gov.uk/government/publications/shale-gas-extraction-review-of-the-potential-public-health-impacts-of-exposures-to-chemical-and-radioactive-pollutants>

In summary, as well as highlighting the limitations of the studies, PHE state that direct application of the North American research to the UK situation is impossible because of the wide differences between the two countries. It is clear from experience in the US that emissions vary widely depending on the phase of development, operational practices, the geology, local topography and meteorology, and the types of activities and equipment on-site.

PHE state that such variability makes direct application to the UK situation impossible, but shows that control of emissions from shale gas extraction and related activities will be of central importance. PHE say that comprehensive air monitoring and associated assessments of health risks will be required in the UK to inform regulation of each phase of the operation. Such assessments should also consider the cumulative impact of multiple wells. It will be important to ensure that environmental monitoring is undertaken in advance of, as well as during, operations.

At present there is limited environmental and health surveillance data within the published literature in relation to existing shale gas extraction operations. There have been very few epidemiological studies (as opposed to statistical associations) and those that have been carried out generally lack robust exposure assessments according to PHE.

There are also fundamental differences between North America and the United Kingdom in relation to the potential risks from shale gas, according to the Royal Society/Royal Academy of Engineering report 'Shale Gas Extraction in the UK':

- The operating practices of shale gas companies in the USA are different from those in the UK (Para 3.1.4).
- The UK's regulatory approach is commended (Para 6.1)

Conclusion

The County Council's Director of Public Health has provided specific advice to inform the planning process and provide public health advice to protect and improve the health of local residents living near the proposed shale gas exploration sites of Preston New Road (planning application numbers LCC/2014/0096 and 0097) and Roseacre Wood (planning application numbers LCC/2014/0101 and 0102). The advice was published as a Health Impact Assessment (HIA) in November 2014.

The Health Impact Assessment makes 45 recommendations to a broad range of agencies, suggesting actions before, during and after any permissions or permits are granted. Appendix J contains 16 recommendations to specifically inform the determination of this application (together with the Roseacre Wood applications).

Given the advice is specific to this application, an assessment has been undertaken in relation to each of the 16 recommendations in Appendix J of the HIA.

Recommendation 4 states: 'Seek agreement with the Applicant to establish an independent comprehensive baseline and on-going long term monitoring of environmental and health conditions prior to any activity on the sites'.

The applicant has shown a willingness to enter into discussions with the County Council's Director of Public Health to support an independent, long term monitoring programme in the event that planning permission is granted.

Many representations received by the County Council refer to research conducted in North America and overseas that indicate shale gas extraction is linked to adverse health impacts.

While much research exists, and is growing in volume each year, it is difficult to gain an objective view of the veracity of the research. Anti-fracking campaigners frequently point to studies that indicate increased health risks (e.g. elevated risks of cancer or birth defects) as a result of shale gas activity in North America. Conversely, pro-fracking campaigners point to numerous methodological flaws in the research. It is also difficult to translate the findings of research from North America into the UK environment. Operating and regulatory practices are very different.

In June 2014, Public Health England (PHE) published a review into the potential health impacts of shale gas extraction. The review drew on significant scientific evidence in peer reviewed or published reports up to January 2014. Much of the research cited by objectors in representations to the County Council was reviewed by PHE.

PHE say there have been very few epidemiological studies or health risk assessments published in the peer reviewed literature. Epidemiology is the branch of medical science that investigates all the factors that determine the presence or absence of diseases and disorders. It aims to assess the cause of a disease, and seeks to look beyond statistical associations which might be a result of chance, bias or confounding effects.

PHE highlight significant methodological flaws in the research that has been cited to the County Council.

Moreover, one study frequently cited by objectors (McKenzie, 2014) has been publically criticised by the Chief Medical Officer and Executive Director of the Colorado Department of Public Health and Environment in the USA as follows: "*we disagree with many of the specific associations with the occurrence of birth defects noted within the study. Therefore, a reader of the study could easily be misled to become overly concerned.*"

PHE state that direct application of the North American research to the UK situation is impossible because of the wide differences between the two countries. It is clear from experience in the US that emissions vary widely depending on the phase of development, operational practices, the geology, local topography and meteorology, and the types of activities and equipment on-site. PHE state that such variability makes direct application to the UK situation impossible. There are also different regulatory practices in the UK.

At present there is limited environmental and health surveillance data within the published literature in relation to existing shale gas extraction operations. There have been very few epidemiological studies (as opposed to statistical associations) and those that have been carried out generally lack robust exposure assessments according to PHE.

Nevertheless, from the modelling, audit checks and sensitivity analysis conducted by the Environment Agency it is expected there will be no exceedance of standards that protect public health. Public Health England is satisfied the currently available evidence indicates that the potential risks to public health from exposure to the emissions associated with such extraction are low if the operations are properly run and regulated. Noise and air quality assessments undertaken by the County Council and its specialist consultants indicate that potential risks to public health are low if the operations are properly run and regulated.