

## Appendix F

### **Community engagement report**

Technical report

Health Impact Assessment support, shale gas exploration

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## Abbreviations and acronyms

AQMA	Air Quality Management Area
BAT	Best Available Technology
CAPs	Climate-Altering Pollutants
CO <sub>2</sub>	Carbon Dioxide
COMAH	Control of Major Accident Hazards
COMEAP	The Committee on the Medical Effects of Air Pollutants
DCLG	Department of Communities and Local Government
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food & Rural Affairs
DETR	Department of the Environment Transport and the Regions
DH	Department of Health
DPH	Director of Public Health
DsPH	Directors of Public Health
EA	Environment Agency
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
ES	Environmental Statement
GHG	Green House Gas
HAP	Hazardous Air Pollutants
HGV	Heavy Goods Vehicle
HIA	Health Impact Assessment
HPA	Health Protection Agency (part of Public Health England from 1 <sup>st</sup> April 2013)
HSE	Health and Safety Executive
HSSE	Health Safety, Security and Environment
ICRP	International Commission on Radiological Protection
LCC	Lancashire County Council
LEP	Local Enterprise Partnership
LFL	Lower Flammable Limit
LLWR	Low level Waste Repository
MSDS	Material Safety Data Sheet
NICE	National Institute of Health and Care Excellence
NORM	Naturally Occurring Radioactive Materials
NO <sub>x</sub>	Oxides of Nitrogen (NO & NO <sub>2</sub> )
PAH	Polycyclic Aromatic Hydrocarbons
PHE	Public Health England
PM	Particulate Matter (e.g. PM <sub>10</sub> & PM <sub>2.5</sub> )
QRA	Quantitative Risk Assessment
REVIHAAP	Review of evidence on health aspects of air pollution
UU	United Utilities Plc
VOC	volatile organic compounds
WHO	World Health Organisation



# 1 Introduction

- 1.1.1 We conducted two structured workshops with participants from local communities.
- 1.1.2 LCC organised the publicity, the venue, and the invitations in liaison with the two Parish Councils most closely affected.
- 1.1.3 The purpose of the workshops was to solicit local views on issues associated with shale gas exploration and extraction and health and wellbeing.
- 1.1.4 Approximately 30 people attended the first workshop. Approximately 80 people attended the second workshop.
- 1.1.5 Each workshop ran for approximately 2 ½ hours.
- 1.1.6 The views expressed in the workshops have been reproduced as faithfully as possible in this report.
- 1.1.7 The responses from workshop participants were collected, collated and recorded according to a schedule of determinants of health relevant to the exploration for, and extraction of, shale gas. BCA were not commissioned to align responses in the Community Engagement Report with information in the published or grey literature. The Community Engagement Report has not been shared with participants prior to publication and the factual statements it contains have not been verified. These steps could be undertaken in any further HIA work.
- 1.1.8 We were keen to ensure that all participants had a chance to express their opinions and relay their knowledge and experience. In the first workshop the participants stated that they wanted to hold the discussion in one large group. In the second workshop the discussion took place in facilitated small discussion groups. There were plenary sessions to give an opportunity for feedback to the whole group.
- 1.1.9 The participants were asked to identify
- positive expectations about the proposal,
  - barriers to, or conflicts around, the proposal,
  - the potential impacts (beneficial and adverse) of the proposal on various determinants of health; and
  - any suggestions to address the potential impacts (beneficial and adverse) identified.
- 1.1.10 The effects were identified against a list of determinants of health prepared by the HIA team and so the feedback in the workshops was structured and provided in systematic way.
- 1.1.11 Names have been anonymised.
- 1.1.12 The materials used to introduce the workshop and to explain the approach are provided on page 45.
- 1.1.13 We thank the workshop participants for the time they gave and for their insights.
- 1.1.14 Further information about the wider study is presented in documents which accompany, and need to be read in conjunction with, this report:
- Overview report (1);
  - Review of Preston New Road Environmental Statement (2);
  - Review of Roseacre Wood Environmental Statement and IPPC application (3); and
  - Annexe to Overview Report (4).



## 2 Method

### 2.1 Introduction

- 2.1.1 Lancashire County Council (LCC) commissioned two community engagement workshops.
- 2.1.2 The aim of each workshop was to elicit the views of communities living in the vicinity of the Preston New Road site and the Roseacre Wood site regarding shale gas exploration and extraction and health and wellbeing.
- 2.1.3 The required output was a Community Engagement Report. No other community engagement interventions were commissioned from BCA.
- 2.1.4 The responses in this report reflect the views of people from the local communities in the vicinity of the two sites proposed for shale gas exploration who attended the workshops (n= approx.110).

### 2.2 Process

- 2.2.1 Lancashire County Council Public Health Department liaised with the relevant Parish Council in each case, sent out the invitations to the workshops, and undertook the workshop administration including organising the venue.
- 2.2.2 Apart from people living in the immediate vicinity of the two sites, some participants who were from the local area but not from the two parishes concerned also attended the workshops.
- 2.2.3 The workshops were structured and facilitated by BCA according to the general method in Ison (5). Each workshop was 2.5 hours in length.
- 2.2.4 Ben Cave Associates prepared the materials for the workshops. Attendees were given a programme and a briefing note on HIA (see Section 5.1 on page 45).
- 2.2.5 Participants were welcomed by the Director of Public Health (DPH), who introduced the event. Ben Cave Associates then gave the following as brief presentations (see Section 5.2 on page 50):
- an overview of the applications;
  - an introduction to HIA in general;
  - a summary of the Public Health England (PHE) Health Profile 2014 for Fylde District; and
  - a description of the specific tasks in which attendees would be asked to take part.
- 2.2.6 The presentations were followed by a question-and-answer session in which participants were able to clarify the nature and role of the HIA-related work on the two proposals, and the outputs from the process. Participants were also able to ask questions during the presentations.
- 2.2.7 For the tasks, participants were asked to identify the following in relation to shale gas exploration and extraction:
- positive expectations and concerns about the proposals;
  - barriers to, or any conflicts around, the proposals;
  - the potential effects (direct and indirect, through the determinants of health, beneficial and adverse) of the proposals on health and wellbeing; and
  - suggestions to address the potential effects on health and wellbeing that had been identified.



- 2.2.8 To ensure that the identification of potential effects on health and wellbeing was systematic, BCA prepared a schedule of determinants of health that might be of relevance in relation to shale gas exploration and extraction. The schedule covered the following domains in relation to the determinants of health:
- environmental factors;
  - economic factors;
  - social factors;
  - personal factors;
  - access to services/facilities.
- 2.2.9 Participants were able to add to this schedule if they thought that certain determinants were missing.
- 2.2.10 To ensure that all participants at both workshops felt they had been able to express their opinions and relay their knowledge and experience, BCA consulted the people attending about how they would prefer to undertake the HIA tasks. Participants in the first workshop (Preston New Road), attended by approximately 30 people, chose to be facilitated as one large discussion group. At the second workshop (Roseacre Wood), attended by approximately 80 people, it was agreed to split participants into smaller discussion groups, which were facilitated by members of BCA and members of the Public Health Department at LCC. Notes of the discussions were taken by facilitators in both workshops. In addition, at the end of the second workshop, participants were invited to write any responses they felt they had not had the chance to express while in their discussion groups onto Post-it® notes/paper for inclusion in the report of the workshops.
- 2.2.11 Feedback of responses was not necessary for the first workshop because participants were facilitated as one group; however, at the second workshop, there was feedback by the facilitator from each of the smaller discussion groups, which in some cases was supplemented by members of the group. This general feedback was also noted.
- 2.2.12 Both workshops were closed by the DPH, who explained the next steps in the process for the Public Health Department and his role in particular, both within LCC and in liaison with external agencies, such as the Environment Agency, Health and Safety Executive and Public Health England.

## 2.3 Reporting the responses

- 2.3.1 In reporting the responses to the tasks, all responses have been anonymised, and cannot be attributed to any individual attendees. If a direct quotation has been used, it appears in inverted commas.

### Structure of the report

- 2.3.1 The responses from each workshop have been reported separately in case there are any differences that needed to be noted: see section 2 for the responses in the workshop with participants living in the vicinity of the Preston New Road site, and see Section 3 for the responses in the workshop with participants living in the vicinity of the Roseacre Wood site.
- 2.3.2 Within each section, responses are presented as follows: positive expectations and concerns about the proposal, potential impacts of the proposal, and suggestions to address any of the impacts identified.

### Categorisation and codification of responses

- 2.3.1 In general, the responses have been reported according to a framework for categorisation.



- 2.3.2 When reporting people's concerns, BCA devised a flexible framework that reflected such issues as the context for shale gas exploration and extraction, not only in Lancashire but also nationally, the specific planning applications and the approach of the Applicant, the regulatory system, the process and its implications, including construction and operation, and the nature of potential effects on a range of issues, from personal health and safety to local industries. Thus, the framework for people's concerns is similar but not identical for the first and second workshops, the differences being dependent on people's responses.
- 2.3.3 When reporting the potential impacts on health and wellbeing that participants identified, the framework is based on the schedule of determinants of health prepared by BCA, but is supplemented by additional determinants as identified during the workshops. Thus, the framework for the potential impacts on health and wellbeing is very similar with only a few differences relating to any determinants that participants added during the workshop, or determinants that participants did not address.
- 2.3.4 When reporting the suggestions, these were organised under headings according to the main focus of participants' recommendations, and as such there are only some similarities.
- 2.3.5 In allocating responses to categories within the frameworks, responses were summarised and codified into a formal language (e.g. colloquialisms were not used, neither were personal references in case people could be identified), and in particular the language in relation to the potential impacts on health and wellbeing has a public-health orientation in order to align responses to the schedule of determinants of health.

### Collation of responses

- 2.3.1 There was no need to collate responses from the first workshop (Preston New Road) because the tasks were undertaken in one large discussion group (although records of the discussion were made by two members of BCA in order to cross-check accuracy of reporting).
- 2.3.2 When reporting the responses to the second workshop (Roseacre Wood), it was necessary to collate those responses from the six smaller discussion groups according to the issue of concern or the determinant of health. Thus, responses for these two sections reflect an amalgamation of views from various people and/or groups, and therefore in many cases cover several aspects of one issue of concern or determinant. When reporting suggestions for action from the second workshop, it was possible to amalgamate some of the general suggestions that were similar, but when suggestions were highly specific they have been left as such.

### Accuracy of reporting workshop responses

- 2.3.1 Although participants' responses have been categorised, summarised, codified and, in the case of the second workshop, collated and amalgamated, BCA have tried to present the responses as faithfully as possible albeit within the context of a structured and systematic HIA approach.
- 2.3.2 The report has not been verified by workshop participants.

### Additional response

- 2.3.1 One written response was sent to BCA after the second workshop; this has not been amalgamated with the other responses, but with the permission of the author it has been anonymised and it is available on request from BCA.





### 3 Views expressed by residents in the vicinity of the Preston New Road site

*Workshop held on 14<sup>th</sup> July, 2014*

#### Positive expectations about the proposal

- 3.1.1 Participants stated they had no positive expectations about the proposed planning applications.

#### Concerns about the proposal

- 3.1.1 Participants expressed concerns about the proposed planning applications. These are set out in Table 3-1.

Table 3-1: Concerns about the planning applications for exploration of shale gas at the Preston New Road site

Topic	Concern
Proximity of site (Preston New Road) to residential dwellings	9 families live within 230 metres of the site. 300 older people (70-90 years) live within 1,000 metres of the site.
Pre-existing health status	Many older people residing within 1,000 metres of the site have pre-existing chronic conditions, e.g. heart disease, diabetes, chronic obstructive pulmonary disease (COPD), and low levels of mobility.
Monitoring of potential impacts	The appropriateness of monitoring to <b>protect</b> the health of people was questioned. There were concerns that monitoring would detect only those problems that had already arisen, which it may not be possible to remedy, rather than detecting incipient problems that it would be possible to address without irreversible damage being done to a person's physical and/or mental health and wellbeing.  If the Applicant is to be responsible for all or some aspects of monitoring, residents are concerned that they cannot trust them. Moreover, the Applicant is highly unlikely to be around when some of the health impacts come to light.
Regulation of shale gas exploration and operation: general	Residents were concerned that, given the degree of uncertainty about some of the potential impacts of shale gas exploration, operation and abandonment, it is not possible for the various regulatory authorities to be aware of all the factors that need to be subject to regulation.
Regulation of shale gas exploration and operation: Applicant of current planning applications	It was suggested that the Applicant may have undertaken hydraulic fracturing elsewhere (?) for shale gas in the absence of a licence to do so, which had created a source of distrust among members of the local community.



Table 3-1: Concerns about the planning applications for exploration of shale gas at the Preston New Road site ... *continued*

Topic	Concern
Previous experience of hydraulic fracturing of shales	The experience of “fracking” at the Preese Hall site, which had been restored after abandonment, did not appear to have generated any learning points for the regulatory authorities and other stakeholders.
Information provided by the Applicant to residents in the vicinity of the sites	There was concern that the information provided in briefings to residents was not accurate about the potential effects of factors such as the risk of road traffic accidents, noise levels, induced seismicity, flaring, and the location of sites for “fracking”.
Use of terminology by the Applicant	<p>The use of the term “mitigation” by the Applicant in the Environmental Statement (ES) is not accurate, because some of the measures proposed under this heading, e.g. monitoring, are not mitigatory. Moreover, what has been suggested by the Applicant as mitigation is not considered by the community living in the vicinity of the site to be sufficient to protect their health and wellbeing.</p> <p>When describing the potential impacts of the proposal in the ES, the term “not significant” is used repeatedly, to the extent of its being over-used.</p>
The quality of the Environmental Statement (ES)	<p>The nine residential dwellings within 250 metres of the proposed site for exploratory “fracking” were not included in the risk assessment in the ES, which exacerbates concerns about the accuracy of the ES.</p> <p>Residents are concerned that in the ES the possibility of human error has not been taken into account in the assessment of risks of accidents and incidents.</p> <p>There are inconsistencies between the two ESs accompanying the planning applications; this raises concerns about the accuracy of the information provided.</p> <p>Residents are concerned that the noise levels from pumps on site and from the HGVs transporting waste water have been underestimated in the ES.</p> <p>Residents are also concerned that the sites for the disposal of flowback fluid have not been named by the Applicant – in some places in the USA, the flowback fluid is buried</p>



Table 3-1: Concerns about the planning applications for exploration of shale gas at the Preston New Road site ... *continued*

Topic	Concern
Approach of the Applicant	<p>Some of the reassurances given by the Applicant to members of the community about the potential impacts of “fracking” operations and what will be involved to mitigate them are potentially worse in nature, e.g. the reduction in height of the stacks from 15 to 10 metres will effectively bring the emissions closer to the ground and therefore to any sensitive receptors, whether human beings or animals (agricultural, domestic or wildlife). The community therefore question whether such responses by the Applicant are fully thought through or whether there is a risk of a “knee-jerk” reaction which could have unintended negative consequences.</p> <p>The Applicant has given reassurances to members of the community that the fracking operations and their management will be of “gold standard”, but residents are not necessarily convinced this will be so because they do not believe the Applicant cares about the effects on the community</p>
Appropriateness of siting of hydraulic fracturing operations	<p>When “fracking” was first developed as a mining operation, it was intended for remote areas not in the vicinity of human habitation. In this area of Lancashire, it is not possible to identify a greenfield site that does not include residential dwellings within a 2-kilometre radius.</p>
Life-cycle of wells, and well productivity	<p>Residents are concerned that as the life-cycle of wells is relatively short operators need to keep drilling to maintain revenue, therefore numerous ongoing sites are required.</p> <p>It is expensive to undertake fracking, and as revenues decline operators may not be as concerned about safety and control issues.</p>
Future drilling activities	<p>It was suggested that the Applicant is planning to drill into a fault at Plumpton, which was of great concern to residents.</p>
Determination of planning applications	<p>Some residents highlighted the potential for inconsistency in the determination of planning applications. One applicant had submitted a planning application for a paddock, which had been refused on the grounds of the volume of traffic that would be generated. Residents pointed out that the volume of traffic associated with fracking operations is likely to be greater than that associated with the operation of a paddock, and yet they fear the planning applications for fracking operations will be permitted.</p>
Company structure and governance	<p>Residents are concerned that the company structure and governance chosen by the Applicant mean it is possible for them to close the company and to set up as a different company.</p>



Table 3-1: Concerns about the planning applications for exploration of shale gas at the Preston New Road site ... *continued*

Topic	Concern
Community involvement and engagement in the general proposals to introduce hydraulic fracturing operations in Lancashire	Members of the community emphasised that the issue of “fracking” had dominated their lives for around 2.5 years, during which time they felt that their concerns had not been taken into account in the process. This circumstance had exacerbated the level of distrust about the information provided by various stakeholders involved in the introduction of “fracking” in Lancashire, including that provided by the Applicant, and the Public Health England, and the underlying intentions of the Applicant.
Synergistic effects with other developments in the area	Residents were concerned about the potential for synergistic effects of fracking operations with other developments in the area: <ul style="list-style-type: none"> <li>• a mental health facility within a few miles of the New Preston Road site (Whyndyke Farm), under construction at present;</li> <li>• the construction of a new road.</li> </ul> The potential for synergy was focussed on: <ul style="list-style-type: none"> <li>• the combined increase in traffic movements, traffic volume, the level of congestion and the emissions to air;</li> </ul> the extent of fracking operations, which were likely to run underneath the mental health facility.
Potential effects on existing businesses in the area	Existing industries in the area are agriculture and tourism, both of which are dependent on different aspects of the quality of landscape. Community concern about “fracking” with regard to agriculture was the contamination of soil and/or water resources, which could be ingested by people, either indirectly through the food chain (via agricultural animals or plants) or directly through drinking water supplies. Community concerns with regard to tourism was the intrusion of fracking installations on the visual aspect of landscape, and the disturbance to tranquillity via the different sources of noise associated with fracking operations (flaring, fracking equipment, traffic associated with fracking, and low-frequency sources).
National political context	Residents expressed concerns that if the national Government is in favour of hydraulic fracturing of shales for oil and gas within the country then it is likely that the proposals currently subject to the local planning process will go ahead irrespective of any local objections that might be raised.
Nature of the impacts	There is concern that: <ul style="list-style-type: none"> <li>• some of the impacts on health and wellbeing will have a long lag-time between exposure and appearance;</li> <li>• there is the potential for the contamination of water supplies, which will affect people’s health but residents may not be aware of the presence of the contaminant(s) or of the effect on their health</li> </ul>



Table 3-1: Concerns about the planning applications for exploration of shale gas at the Preston New Road site ... *continued*

Topic	Concern
Noise levels at the site in Balcombe	At the site in Balcombe, noise levels have regularly exceeded the 43dBA level set as a planning condition for operation; residents are concerned a similar situation will occur in the local area
Waste management	Residents are concerned about the way in which flowback fluid will be managed, and in particular the site for its disposal. These questions have been put to the Applicant, and by the time of the engagement event no satisfactory answers had been received
Emergency preparedness/planning	<p>The Emergency Plan of Lancashire County Council is out of date (2009), and residents are concerned it no longer reflects the nature of the risk/situation faced by residents in the local area, the wider population and the emergency services, who would have to respond to any accident or incident.</p> <p>Residents are also concerned that the emergency services in the area may not have the capacity to cope with the nature of emergencies that might arise as a result of fracking operations in the local area.</p>



## 3.2 Potential impacts on health and wellbeing

### Potential positive impacts on health

3.2.1 Participants did not identify any positive impacts on health and wellbeing.

### Potential negative impacts on health and wellbeing

3.2.1 Direct effects, particularly on mental health and wellbeing, reported by residents in the period prior to the determination of planning applications include:

- anxiety;
- stress;
- isolation;
- depression.

3.2.2 In this case, high levels of stress and anxiety are caused by many factors including:

- The attitude of the Applicant to the residents' and community concerns;
- The strain on family and other relationships caused by engaging in the planning and other processes relating to the applications for fracking in the local area;
- fears about impacts on health, particularly for people in the community who are vulnerable due their pre-existing health status or age.

3.2.3 In general, residents were extremely worried about the potential of fracking operations to affect their health and wellbeing, and they asked who would be able to reverse the effect if their lives were shortened.

3.2.4 One resident described their position as living in the "sacrifice zone".

3.2.5 The worry experienced by residents is accompanied by enormous distrust of the process for the consideration of planning and other applications related to fracking. Residents felt that they as people "came at the bottom of the list".

3.2.6 Participants identified many potential negative impacts on health and wellbeing as a result of fracking operations, which are shown in Table 2. Groups in the population residents considered to be particularly susceptible to impacts on health and wellbeing are:

- children and young people;
- older people, especially those who have pre-existing medical conditions.



Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site

Determinant of health	Potential negative impact
<b>Environmental factors</b>	
Air quality	<p>There are several sources of air pollution:</p> <ul style="list-style-type: none"> <li>• flaring during flow testing, with the pollutants carbon, nitrogen dioxide, benzene, toluene, and xylene;</li> <li>• leakages of methane gas.</li> </ul> <p>Air pollutants may have an impact on respiratory health, particularly in:</p> <ul style="list-style-type: none"> <li>• older residents who have pre-existing respiratory and other conditions;</li> <li>• younger residents, whose lung tissue is still developing.</li> </ul>
Soil quality	<p>There is the potential for soil contamination due to the leakage of contaminated water from the fracking process; any contamination of the soil in the area could affect the agriculture and market-gardening sectors in the area, and contaminants could enter the food chain</p>
Local topography	<p>Local topography can increase the exposure of some residents to the effects of fracking. In the vicinity of the Preston New Road site, some residences are built in a basin or depression and may be at increased risk of exposure to contaminated water either rising to the surface (having leaked from the well) or draining into it, and other effects of microclimate (e.g. air pollutants remaining in the depression)</p>
Local meteorological conditions	<p>The prevailing wind is from the southwest, which will determine which residents will be most exposed to the pollutants associated with flaring</p>
Water quality	<p>There are several ways in which water quality could be affected:</p> <ul style="list-style-type: none"> <li>• the flaring of gases at the Preston New Road site could contaminate the water in the reservoir;</li> <li>• there is the risk of aquifers becoming contaminated, through leakages or changes to the underlying geology through induced seismicity – 11% of the local water supply from United Utilities comes from aquifers;</li> <li>• in periods of heavy rain (8 hours or more in duration), the capacity of any sumps is likely to be exceeded, in which case drainage into local watercourses is likely to occur;</li> <li>• any spillages on or off site have the potential to enter the water cycle.</li> </ul> <p>Any contamination of the various water supplies in the area could affect residents and local industry, particularly the agriculture and market-gardening sectors.</p>



Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site ... *continued*

Determinant of health	Potential negative impact
Water and sewage infrastructure	<p>Any bursts or leaks in the water infrastructure could mean that contaminated water underground is drawn into the supply system</p> <p>The pipelines that carry drinking water from the reservoir are lined with asbestos; induced seismicity could fracture these pipes with the risk of releasing asbestos (and dust) into the water supply – asbestos is a hazard to human health when inhaled</p>
Noise levels	<p>There are four sources of noise which could affect health and wellbeing:</p> <ul style="list-style-type: none"> <li>• Operation of plant equipment, such as diesel pumps;</li> <li>• Flaring;</li> <li>• Traffic associated with the site (HGVs in particular);</li> <li>• Extra low-frequency noise, to which some people are sensitive.</li> </ul>
Waste generation, storage, management and transport	<p>Flowback fluid contains toxic chemicals and radio-activity, and residents and other people could be exposed if there are any spillages on or off site, particularly during the transport of waste water.</p>
Odour	<p>Residents identified the nuisance of any odour from the operation of the site, which may also lead to a loss of amenity in the enjoyment of their gardens and/or other leisure and recreation opportunities in the rural environment.</p>
Hazards	<p>There is a risk of spillages from the transport of waste offsite to the waste management facility</p>
Induced seismicity	<p>The potential impacts of induced seismicity are:</p> <ul style="list-style-type: none"> <li>• damage to residential and other dwellings, which will affect the value of properties, and also will incur additional repair expenses for owners;</li> <li>• leakage of water, which may be contaminated;</li> <li>• increased potential for flooding of low-lying land;</li> <li>• increased potential for flooding of residential and other buildings on low-lying land;</li> <li>• damage to water and sewerage infrastructure.</li> </ul>





Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site ... *continued*

Determinant of health	Potential negative impact
Landscape: visual impact	<p>In terms of visual impact on the landscape, there are two aspects of fracking operations:</p> <ul style="list-style-type: none"> <li>• The size and extent of plant infrastructure;</li> <li>• The flaring.</li> <li>• These visual impacts will affect two groups of people:</li> <li>• They are likely to reduce the amenity of residents living in the vicinity of the site, and their opportunities for leisure and recreation in the rural environment;</li> <li>• They are likely to reduce the attractiveness of the area to tourists which is one of the main industries in the local economy. Any reduction in the number of tourists is likely to have effects for the wider population through a reduction in the amount of money circulating in the local economy.</li> </ul>
Landscape: tranquillity	<p>People have chosen to retire to the area because it is quiet and peaceful. The introduction of fracking will disrupt the tranquil nature of the countryside through increased noise levels, visual intrusions, such as the size of the rig and flaring activity, and increased activity on the roads, particularly of large HGVs.</p>
Biodiversity	<p>The potential impacts of fracking, and in particular the noise levels, are likely to reduce biodiversity in the area, particularly with respect to bird populations; in turn, this will have a negative effect on the mental well-being of residents who appreciate the varied wildlife in the locality, and is one reason why they may have taken up residence in the area.</p> <p>It was noted that at Balcombe the birds in the area ‘disappeared’ when drilling commenced.</p>
Traffic volume	<p>There will be an increase in traffic volumes as a result of fracking operations from:</p> <ul style="list-style-type: none"> <li>• HGVs used to transport waste water;</li> <li>• transport of site equipment;</li> <li>• transport relating to workers’ journeys to and from work.</li> </ul> <p>An increase in traffic volume will increase:</p> <ul style="list-style-type: none"> <li>• emissions to air;</li> <li>• the potential for congestion;</li> <li>• the risk of road traffic accidents, especially for pedestrians, cyclists, and horse-riders.</li> </ul>
Nature of traffic	<p>There will be a change in the nature of traffic in the local area. Large HGVs will be used for the transport of waste water, in an area characterised by rural roads/country lanes</p>
Level of congestion	<p>Congestion already occurs locally as a result of visitors and tourists to the area, particularly Blackpool. It is likely that this level of congestion will be exacerbated by the increase in traffic volume on local roads as a result of fracking operations</p>



Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site ... *continued*

Determinant of health	Potential negative impact
Emergency planning & preparedness	If planning permission is given and fracking goes ahead, a new set of risks to health and safety will be introduced into the area, for which emergency services need to plan and prepare
<b><i>Economic factors</i></b>	
Condition of residential properties and other buildings	The potential effects of fracking operations, and in particular induced seismicity, is likely to cause damage to residential properties, including structural elements (NB: “before” and “after” photos of damage to wall from Mr ██████████)
Value of residential properties and other buildings	<p>The price of residential properties in the vicinity of the site subject to current planning applications has declined sharply. One resident had their property valued in 2012 at £800,000 and had been told by an estate agent in 2014 that the property was now “worthless” due to the proximity to proposed site for fracking. Currently, the average decline in property values was thought to be 24%; for all the properties in the vicinity of the two sites, the estimated loss in property values is £6 billion.</p> <p>Many of the residents had paid a “premium” to live in and/or retire to this particular environment for its landscape and wildlife value; if fracking operations were to take place in the area, this investment would be lost due to the sharp decline in property values.</p> <p>Given the decline in property values, house-owners may not be able to sell their properties, especially if they wish to move to an area where prices have not been affected: owners feel trapped, unable to recoup the money invested in the property, and for some residents this may mean it is not possible to purchase elsewhere.</p> <p>The decline in property values is a source of stress and anxiety for house-owners, especially for residents who feel they need to move from the area to protect their health or the health of their children</p>
Sustainability of existing businesses and industries: Tourism	<p>Tourism is one of the main industries in the area. The number of visitors to the area could decline as a result of:</p> <ul style="list-style-type: none"> <li>• changes to the landscape with the introduction of installations for fracking, and the flaring as a result of fracking operations;</li> <li>• the increase in traffic volume and the change in the nature of traffic</li> </ul> <p>A decline in visitor numbers will affect the local economy, with the potential for a decline in profit margins and/or reduced viability of some of the tourist-related businesses</p>



Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site ... *continued*

Determinant of health	Potential negative impact
Sustainability of existing businesses and industries: Agriculture and other land-based concerns	<p>The potential for contamination of soil and/or water could affect:</p> <ul style="list-style-type: none"> <li>the agricultural sector in the local area;</li> <li>other land-based businesses such as plant nurseries</li> </ul> <p>Any contamination could affect the profit margins/viability of local businesses, which if reduced could result in the loss of jobs. The viability of these businesses could also be affected by consumers' perceptions of the level of contamination as a result of fracking, and their willingness to buy the products.</p> <p>There is no compensation scheme for local businesses</p>
Job creation	The number of jobs created by fracking is only 11 fte, which is small and is unlikely to have a positive effect for local residents/in the local area
Retention of money in the local economy	The small number of jobs created by fracking will probably be taken by people from outside the area, and if the viability of local businesses (relating to tourism and agriculture/food production) is affected, this combination will act against money being retained in the local economy
Community benefit payments	The £100,000 community benefit payment per site will not necessarily benefit the local communities affected by fracking. The money goes into a Community Fund which is administered as a charity to which any organisation can apply for funds.
<i>Social factors</i>	
Social contact, cohesion and capital	<p>For older residents with pre-existing medical conditions, e.g. COPD, they are fearful of their condition(s) being exacerbated by exposure to air pollution and other pollutants. In this situation, it is likely they will be afraid to go outside, and as a result experience reduced levels of social contact and social support, which will affect their mental health and wellbeing. One resident with COPD described it as being "a prisoner in my own home".</p> <p>The tensions around the possible introduction of fracking in the local area has divided the community, and reduced social cohesion, which has affected the mental wellbeing of all involved</p>
Public safety	With the introduction of fracking operations, there will be the risk of explosions; in the USA, 2 workers have been killed by explosions during operation.



Table 3-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Preston New Road site ... *continued*

Determinant of health	Potential negative impact
Risk of road traffic accidents	<p>With the increase in traffic volume and the changes in the nature of the traffic (use of HGVs), there is an increased risk of road traffic accidents:</p> <ul style="list-style-type: none"> <li>• older people living in the vicinity of the Preston New Road site, who have mobility problems but rely on public transport, may be particularly at risk;</li> <li>• if HGVs carrying waste water are involved, there may be spillages which would affect any pedestrians, cyclists, horse-riders and animals involved in or on the road in the vicinity of the accident.</li> </ul>
<b>Access factors</b>	
Access to Accident & Emergency services	<p>Existing ambulance response times in the area are poor, and in the light of increases in traffic volumes, particularly from the introduction of HGVs, which could increase the level of congestion, this could worsen ambulance response times and affect people's access to Accident &amp; Emergency services at either the Blackpool Victoria Hospital or the Royal Preston Hospital.</p>
Access to health services	<p>If there are negative impacts on people's health and wellbeing, this will:</p> <ul style="list-style-type: none"> <li>• create increased demand for health services and interventions;</li> <li>• reduce access to some services/interventions if demand cannot be met;</li> <li>• increase cost to the NHS in the local area;</li> <li>• create opportunity costs in the local NHS.</li> </ul>
<b>Personal factors</b>	
Residential amenity	<p>For all residents, it is likely that residential amenity, especially the use and enjoyment of gardens, will be negatively affected due to:</p> <ul style="list-style-type: none"> <li>• concern about the potential health impacts of inhaling emissions to air generated by flaring;</li> <li>• the levels of noise from flaring, from the operation of on-site equipment, and from the HGV transport of waste water.</li> </ul>



### 3.3 Suggestions/Recommendations to address the potential impacts on health

3.3.1 The following suggestions to address the potential impacts on health and well-being were made by members of the residential community living in the vicinity of the Preston New Road site.

#### General

3.3.1 Cuadrilla need to be guided by the four values for health impact assessment (HIA) as laid down in the World Health Organization Gothenburg Consensus Paper:

- Sustainability, or sustainable development and sustainable communities;
- Ethical use of evidence;
- Democracy – extending people’s right to participate in open and transparent decision-making processes;
- Equity.

#### Regulation

3.3.1 To establish impartial regulation of the fracking industry.

3.3.2 To ensure representation of local communities/local groups in the monitoring processes.

3.3.3 If “fracking” is to take place, to confine installations/operations to remote areas with no residential dwellings within 2 kilometres of the site.

3.3.4 To ensure that any water used during the fracking process is not re-used but taken out of the water cycle.

3.3.5 To implement all 10 of the recommendations about fracking in the report of the Royal Engineering Society (6).

#### Emergency planning and preparedness

3.3.1 For the management of any emergencies that could occur:

- to provide local residents with the names and contact details of professionals/experts responsible for responding in the event of an emergency in various parts of the region (e.g. Chorley, Leeds)
- to establish a dedicated team in the local area who know what to do and how to deal with all types of emergency

3.3.2 To ensure that key stakeholders are involved in the consultation about fracking operations, such as Blackpool Airport, the Civil Aviation Authority, and BAE Systems, especially in relation to emergency planning and preparedness.

#### Need for assessments

3.3.1 To assess the pre-existing health status of local people, and to monitor this during operation and post abandonment

#### Other responses during the first consultation event

3.3.1 The time allocated to the HIA engagement event (2 hours) is not enough.

3.3.2 There are differences in impact between the situation in the USA and Australia, where fracking has a longer history, in particular, the density of population in the vicinity of the sites is much greater in Lancashire.

3.3.3 Local residents need help and support to deal with this situation.



- 3.3.4 It is important that general practitioners in the local area are able to highlight any impacts on health and wellbeing that they see in the local population.
- 3.3.5 For future consultation events, groups in the community have extensive contact databases that can be used for invitation.



## 4 Views expressed by residents in the vicinity of the Roseacre Wood site

*Workshop held on 15<sup>th</sup> July, 2014*

### 4.2 Public confidence and trust

4.2.1 Considerable lack of trust and of confidence was expressed not only in the regulatory and planning authorities but also in the fracking industry by many participants at the event. In particular:

- a lack of confidence was expressed about the planning process for shale gas, and some residents believe the determination of planning applications is already a “done deal”.
- no confidence was expressed about the paper on shale gas produced by Public Health England (7), with residents remarking that it is “weak” and more issues have been scoped out of the paper than scoped in;
- anxiety, concern and distrust were expressed about the regulatory function, including inspection, on the grounds of whether it is effective and independent.

4.2.2 Some of the reasons for the lack of trust include:

- the relatively short time-period for determination of the planning applications, which does not allow sufficient time to investigate concerns about public and personal safety and impacts on human health and wellbeing;
- the apparent reluctance on behalf of the relevant regulatory authorities to establish a baseline of environmental and other data prior to allowing hydraulic fracturing;
- residents’ awareness of the literature from other countries, including the United States of America, Canada and Australia (see Box 1), on the negative impacts of fracking on health and wellbeing;
- residents’ awareness that fracking has been banned in some countries, such as France and Germany, or is subject to a moratorium until a health study has been completed, as in New York State, USA;
- questioning whether the current HIA is “window dressing” by Lancashire County Council.

4.2.3 These feelings of distrust and lack of confidence mean there is a lack of credibility for many of the organisations with responsibilities for or around the fracking process. This has led the local community to begin to take on the role of regulators, using their own resources (time and money) to highlight and give voice to their concerns.



Figure 4-1: Information supplied by residents

National Institute for Occupational Safety and Health (NIOSH) reported at least 4 gas-field workers have died from acute chemical exposure since 2010 (19 May 2014)  
North Dakota Report: the area now has a fatality rate 5 times higher than the national US average  
Bamberger Oswald  
Elaine Hill (birth defects)  
Public Health England's reply to editorial on its draft report on shale gas extraction (8)  
Kovats et al (9)

### 4.3 Public fears

- 4.3.1 If test drilling is successful and production does occur, residents are fearful that there will be thousands of wells in the local area, with the nature of rural life in surrounding villages and communities destroyed.
- 4.3.2 There is also a large amount of anxiety and fear of the unknown, of residents not knowing what will happen to them and their children.

#### Positive expectations about the proposal

- 4.3.1 Participants stated they had no positive expectations about the proposed planning applications.

#### Concerns about the proposal

- 4.3.1 Participants expressed concerns about the proposed planning applications. These are set out in Table 4-1Table 3-1.





Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site

Topic	Concern
Proximity of site (Roseacre) to residential dwellings	For both planning applications, people reside in close proximity to the wells, which is of concern to residents because of the potential for blow-outs, spillages and on-site accidents; some residents live within 500 metres of the Roseacre Wood site
Demography and population composition	There is concern that as a result of the introduction of fracking: <ul style="list-style-type: none"> <li>• there will be migration out of the area, particularly of younger or future generations;</li> <li>• people will not want to move into the area (e.g. Roseacre, Wharles, Little Plumpton, and surrounding villages), and TRW (Treales, Roseacre, and Wharles) will cease to be sustainable;</li> <li>• a large number of young people in the local area will be affected, particularly their mental health, which could lead to self-harm – there are two secondary schools in Kirkham with &gt;2000 pupils in total, and children at local primary schools</li> </ul>
Geographical area affected	Communities living in Kirkham and Wesham, between the two sites (Preston New Road and Roseacre Wood) will also be affected by fracking operations
Pre-existing health status	Some residents in the vicinity of the site have pre-existing cancer, COPD, asthma, hypertension and heart disease
Pre-existing access to emergency services	There are concerns about emergency response times. Ambulance response times in the area are already poor, and there is at least one case where the ambulance did not initially locate the residence from which an emergency call had come. Delays in response cause a delay in treatment, and there are concerns that with an increase in the volume of traffic as a result of fracking operations: <ul style="list-style-type: none"> <li>• the response times will increase further;</li> <li>• access to emergency services, including ambulance and emergency hospital services, will worsen</li> </ul>
Pre-existing access to primary care	Access to primary care in the area is relatively poor – people have to wait a long time to obtain appointments with the GP; this situation could worsen with: <ul style="list-style-type: none"> <li>• the possible increase in demand from the potential effects of fracking on existing residents' health and well-being;</li> <li>• the addition of ~1000 households in the area</li> </ul>



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
Emergency preparedness and planning	<p>The Fylde Borough Local Disaster Evacuation Plan is thought by some residents to be inadequate for the current situation, especially during the summer period when there is an increase in the total population in the local area. Concerns were raised about whether:</p> <ul style="list-style-type: none"> <li>• emergency response and emergency planning issues have been considered as part of the decision-making about fracking;</li> <li>• local authorities and other emergency services have the capacity to cope with the nature and scale of emergencies that could occur as a result of fracking operations;</li> <li>• whether contingency plans for water supplies in times of drought have been developed</li> </ul>
Monitoring of potential impacts	<p>A range of organisations have told residents that Lancashire County Council (LCC) is the lead agency responsible for monitoring the shale gas process, and there is concern that LCC might lack the expertise necessary to monitor the process</p> <p>There is concern that the monitoring of fracking operations will not be adequate</p> <p>Some of the environmental factors that need to be monitored are not “obvious”, e.g. chemical pollutants of water, and therefore may be overlooked; moreover, by the time such factors have been identified, they may have already had a negative impact on people’s health and wellbeing</p> <p>None of the statutory authorities involved in the regulation of this industry seem to be prepared to develop a baseline of environmental and other factors which would enable/facilitate monitoring during well operation and post abandonment</p> <p>There is concern about which organisation or authority holds the responsibility for monitoring the impacts of fracking over the long term, particularly post abandonment; this is necessary due to the potential for a long lag-time to occur between exposure and the appearance of health impacts</p>
Supporting infrastructure for fracking operations	<p>There is concern that the fracking operation at Roseacre Wood is not connected to the main sewerage infrastructure, which increases the risk of local watercourses being polluted with waste water</p>



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
Nature of the planning applications	<p>There is concern that the nature of the current planning applications is not truly “temporary” – several residents reported that a Cuadrilla representative had made statements that indicated the timespan was longer than what most people would consider temporary:</p> <ul style="list-style-type: none"> <li>• at the Winter Gardens meeting, it was stated that Cuadrilla’s business relationships with suppliers would last for 20-40+ years;</li> <li>• at a Parish Council meeting, it was stated that Cuadrilla were looking to develop the Roseacre site into full production</li> </ul> <p>Some residents feel that it is a reasonable assumption that if test drilling is allowed, production will follow.</p>
Determination of planning applications	<p>There is concern that Lancashire County Council do not have the skill, capacity and expertise to consider and deal with the planning applications</p> <p>If the current planning applications are agreed, it will set a precedent for similar planning applications in the future</p>
Regulation of shale gas exploration and operation: general	<p>There is a lack of regulations in place to protect people’s health and wellbeing, including the effects of exposure to radiation, and the inhalation of radon</p> <p>There are gaps in the regulation of waste, particularly waste water</p> <p>There is a democratic deficit associated with the monitoring of waste management and waste disposal – although it is the role of the Environment Agency, the organisation is not answerable to locally elected members</p> <p>There is insufficient regulation during operation, for instance, workers could be on site 24/7</p> <p>One resident reported that the Environment Agency had stated there would be no leaks/leakages from fracking operations; local residents doubt this statement is true</p>
Regulation of shale gas exploration and operation: proponent of current planning applications	
Previous experience of hydraulic fracturing of shales	<p>Environment Agency (EA) with regard to water for fracking at <b>Preese Hall</b>: this was treated as confidential corporate information by the EA, a decision of concern to local residents, who need clarity on this issue</p>



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
Insurance and legal liability of Applicant	The Applicant has not provided documentary evidence of its insurance policy, which is a cause for concern among local residents; Cuadrilla have mentioned “fairness insurance” without any supporting documents being made available Residents believe that, as Cuadrilla is a corporate organisation, there is no single person who has responsibility and/or accountability for any potential negative effects that arise
Compensation for residents	There is concern: <ul style="list-style-type: none"> <li>• about which organisation would be responsible for compensation of local people (residents and businesses) for the impacts of fracking, particularly post abandonment and over the long term;</li> <li>• that compensation for any damage to properties, for example, from subsidence due to induced seismicity, would be difficult to obtain because of the burden of proof required</li> </ul>
Quality of information provided by the Applicant to residents in the vicinity of the sites	Some residents reported that the Applicant had been inconsistent in what had been said to different people. There is concern about: <ul style="list-style-type: none"> <li>• inconsistencies/anomalies in the data provided by the Applicant;</li> <li>• the percentage of wells that are likely to leak – a figure of 6% has been cited by the Applicant but this was questioned by residents who feel that the proportion would be higher</li> <li>• where the waste water produced by fracking will be stored – it is not clear whether it will be stored on site</li> </ul>
Length of the Environmental Statement	At 4,500 pages, the document is too long for inexperienced people to consider and comment upon
Quality of the Environmental Statement	There are inconsistencies/anomalies in the ES data provided by the Applicant The assumptions made in the ES about the penetration of pollutants into the local food chain are incorrect Residents doubt the accuracy of the data on noise levels from fracking operations In the transport assessment in the ES, the Applicant’s consultant undertook counts of cyclists during the winter months, which is unrepresentative of the use by cyclists during the summer months Residents do not believe the estimates of the number of jobs the Applicant suggests will be created



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
Approach of the Applicant	<p>There is concern:</p> <ul style="list-style-type: none"> <li>about the timing of these two particular planning applications, and the difficulties/uncertainties that the timing causes;</li> <li>that there may be plans to submit more planning applications in the future, which could “open the flood gates” or have a “domino effect” (~3,000 wells)</li> </ul> <p>Residents also feel:</p> <ul style="list-style-type: none"> <li>profit for a corporate organisation is being put before the health and well-being of local people;</li> <li>there is much secrecy surrounding the plans for fracking operations.</li> </ul>
Operation of the site	Residents are concerned that fracking operations (drilling) will take place 24 hours a day.
Use of sub-contractors	There is concern about the use of sub-contractors to undertake the work, which could lead to a lack of governance, and best practice may not be used.
Disposal of waste	<p>Residents are concerned about:</p> <ul style="list-style-type: none"> <li>the disposal of contaminated waste water and other waste products from fracking;</li> <li>which waste processing/disposal site(s) will receive the waste products from fracking.</li> </ul> <p>They also questioned whether the waste could ever be disposed of safely.</p>
Security for the site	The Applicant has already introduced security on the site, which is a cause for fear among the community.
Appropriateness of siting of hydraulic fracturing operations	Residents do not feel it is appropriate to site fracking installations in a populated area such as Fylde, and highlight the existence of a regulatory 2-km band around fracking installations in New South Wales in which no people should be living.
Community involvement and engagement in the general proposals to introduce hydraulic fracturing operations in Lancashire	<p>Residents feel:</p> <ul style="list-style-type: none"> <li>their concerns are being/have been dismissed by industry;</li> <li>they do not have a ‘voice’ and are not being listened to;</li> <li>there is a lack of community engagement by industry;</li> <li>they are being treated as if they are guinea-pigs;</li> <li>their rights and wellbeing are being taken from them.</li> </ul> <p>Overall, participants likened their situation to the same as that of David against Goliath.</p>
Information and evidence about the effects of fracking	Residents feel that there is a great deal of evidence documenting the impacts of fracking in other countries which supports their concerns about the impacts of fracking on people’s health and wellbeing in the local area.



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
Well and operational integrity	<p>Residents are concerned about the monitoring that will be in place to check for well integrity not only during operation but also post abandonment, what will be required legally, and how this will be managed. There is particular concern about the risks of:</p> <ul style="list-style-type: none"> <li>• well failure;</li> <li>• gas leaks;</li> <li>• leakage of contaminated waste water during drilling;</li> <li>• spillages on and off site</li> </ul>
Competency of the operator, & Competency of the regulators	<p>Some residents have concerns about the competency of both the operator and the regulators, given that four wells have been drilled and subsequently there have been two earthquakes in the local area.</p>
Synergistic effects with other developments in the area	<p>There is concern about the total demand on the local water supply, not only from existing housing and businesses but also from planned developments in the area, especially at times of drought.</p>
Potential effects on existing businesses in the area	<p>The introduction of fracking into the area and the associated pollution and risk of contamination may have implications for the farming and food production industry in the locality:</p> <ul style="list-style-type: none"> <li>• chemicals produced as a result of the fracking process may enter the food chain;</li> <li>• may alter the nature of the farming practices that can be used in the area.</li> </ul>
National political context	<p>There is pressure on Lancashire County Council to approve the planning applications in line with national policy. The Government want:</p> <ul style="list-style-type: none"> <li>• to realise the potential of the country's energy resources;</li> <li>• to increase the security of the country's energy supplies, including using oil and gas from fracking.</li> </ul> <p>The Government are prepared to pay £1.75 million per well to local, and Lancashire County Council is in debt and in need of money, therefore, residents feel that the decision has already been made.</p> <p>Residents are concerned that:</p> <ul style="list-style-type: none"> <li>• the decision-making power and oversight role for fracking are being removed further away from local people/local government, and brought under the control of central Government;</li> <li>• the process of fracking may not actually be able to deliver cheaper energy sources for the UK</li> </ul>



Table 4-1: Concerns about the planning applications for exploration of shale gas at the at the Roseacre Wood site ... *continued*

Topic	Concern
<p>Nature of the geographical area subject to planning applications</p>	<p>Residents are concerned that these planning applications represent the beginning of the ‘industrialisation’ of the area, which due to its rural nature is not suitable for industrial development, and in particular fracking.</p> <p>If the exploratory wells are found to be viable/successful, it is likely that there will be many more wells in the area, changing the nature of the landscape – it is not possible to mitigate the visual impact of the rigs using tree planting.</p> <p>Cuadrilla own licences in the whole of the Fylde and Pedli? area, which is at risk of the major development of fracking operations.</p>
<p>Nature of the potential impacts on health and wellbeing</p>	<p>There is concern that the impacts on health and wellbeing will be:</p> <ul style="list-style-type: none"> <li>• cumulative;</li> <li>• teratogenic, leading to an increase in birth defects;</li> <li>• irreversible (especially impacts resulting from accidents);</li> <li>• long term, i.e. the “legacy effect” , for up to 50 years;</li> <li>• inter-generational;</li> <li>• unknown.</li> </ul> <p>A further concern is that if exploration is successful the full nature of the impacts from fracking cannot be taken into account by the various agencies currently involved in decision-making because of the lag-time between exposure and the appearance of some of the health effects.</p>
<p>Nature and timing of the HIA</p>	<p>Some residents:</p> <ul style="list-style-type: none"> <li>• hoped that the HIA would include independent measurements of environmental and other variables, e.g. noise levels, which is not the case;</li> <li>• feel the HIA and associated community engagement events are “too late in coming”.</li> </ul>
<p>Animal health</p>	<p>There was concern about how animal health – for livestock and wildlife – would be monitored during fracking operations and up to five years post abandonment.</p>



## 4.4 Potential effects on health prior to the determination of planning applications

### Direct effects on health during the planning process

4.4.1 Direct effects on mental health and wellbeing reported by residents in the period prior to the determination of planning applications include:

- loss of control over life, and feeling there is no escape;
- helplessness, and an inability to change the outcome of the decision-making process;
- disenfranchisement;
- inability to protect themselves or take responsibility for their health;
- anxiety, and facing the unknown;
- stress;
- sleep disturbance;
- depression.

4.4.2 In this case, high levels of stress and anxiety are caused by many factors including:

- The attitude of the Applicant to the residents' and community concerns;
- Residents do not feel supported by Lancashire County Council;
- The strain on family and other relationships caused by engaging in the planning and other processes relating to the applications for fracking in the local area;
- The fears about impacts on health, for instance from air pollution, particularly for people in the community who are vulnerable due their pre-existing health status (hypertension, respiratory conditions, cardiovascular conditions, cerebrovascular conditions, mental health problems).

4.4.3 Direct effects on healthcare and other care provision include increased requirements for:

- sleep medication from GPs;
- pastoral care.

### Potential indirect effects on health and wellbeing during fracking operations

4.4.1 Overall, the introduction of fracking operations will create a source of disadvantage for local residents, some of whom feel as if they are "guinea-pigs in an unsure human experiment".

4.4.2 Moreover, residents do not believe there will be any positive effects for local people, including the irony that gas is not an energy source used in the villages surrounding the site. Residents think there may be some positive effects regionally, but the Government is the most likely to benefit from the introduction of fracking in Lancashire.

4.4.3 The potential negative impacts of fracking operations identified by residents are shown in Table 4-2. Groups in the population residents thought were particularly susceptible to the potential negative impacts of fracking are shown in Figure 4-2.





Figure 4-2: Groups in the population particularly susceptible to the potential negative impacts of fracking

<p>Children and young people.</p> <p>Older people.</p> <p>People with pre-existing medical conditions, chronic or acute.</p> <p>Smokers.</p>
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Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site

Determinant of health	Potential negative impact
<b>Environmental factors</b>	
Air quality	<p>Some parts of the local area already experience air pollution from vehicles using the M55. The effects of air pollution from the M55 will combine with the effects of air pollution from fracking.</p> <p>There are three sources of increased emissions to air as a result of fracking: flaring, operation of equipment, and the use of vehicles associated with fracking operations (transport to and from the site). Pollutants of concern to residents include:</p> <ul style="list-style-type: none"> <li>• particulate matter (PM<sub>2.5</sub>) – an EU Directive mentions lowering all levels above 8.5 micrograms, whereas the legal limit in England is 25 micrograms – there is no safe limit;</li> <li>• volatile organic compounds (VOCs) – benzene, toluene, xylene and ethylene – from flaring;</li> <li>• methane from flaring, which will add to the methane already generated by &gt;1500 cows in the local area, and may have a cumulative effect.</li> </ul> <p>Apart from any physical effects of air pollution especially for people with respiratory or cardiovascular conditions, people’s anxiety about the effects of air pollution will cause them to stay indoors (particularly older people in the community), and/or reduce their levels of physical activity, both of which will lead to reduced social contact, and social isolation, and affect people’s mental health and wellbeing</p>
Soil quality	<p>There is potential for soil contamination during fracking operations (from aerosols, spillages, leakages).</p> <p>The failure rate for wells is 5%, rising to 50% at 15 years – the concrete casing cracks and contaminated water travels up the drill casing and through the cracks to reach the soil surface</p>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Water quality	<p>During fracking, there is potential for the pollution of:</p> <ul style="list-style-type: none"> <li>• aquifers, which are a source of water for farmers and others in the local area who have licensed boreholes for water abstraction;</li> <li>• local watercourses, e.g. brook, especially from flowback</li> </ul> <p>The failure rate for wells is 5%, rising to 50% at 15 years – the concrete casing cracks and contaminated water travels up the drill casing and through the cracks, which could enter the water cycle</p>
Water resources	<p>The large volume of water required to undertake fracking may compromise the supply (both quality and pressure) for local residents, and local farmers and their livestock:</p> <ul style="list-style-type: none"> <li>• especially in the light of plans for a new residential development in the area (~1000 dwellings);</li> <li>• during times of drought or exceptionally high demand</li> </ul> <p>For residents, this could affect personal hygiene, and leisure and recreation opportunities, such as gardening.</p> <p>For local businesses reliant on water (e.g. agriculture, market gardening, etc.), it could compromise their viability</p> <p>Local water resources, especially for farming, could also be compromised if underground aquifers become contaminated as a result of induced seismicity or of leakages of waste water</p>
Risk of flooding	<p>The local area is already subject to flooding; fracking operations may introduce the risk of bringing deep water to the surface, or shifting it to other locations</p>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Noise levels	<p>Some residents already experience noise from the M55. With the introduction of fracking, there will be increased levels of noise in the local environment from:</p> <ul style="list-style-type: none"> <li>• drilling operations (flaring, and the operation of generators, compressors and other equipment);</li> <li>• increased volume of traffic, particularly HGVs, transporting waste water on local roads</li> </ul> <p>Disturbance from noise will take place seven days a week, and 24 hours a day.</p> <p>The impact of noise on different people will vary according to:</p> <ul style="list-style-type: none"> <li>• the level of background noise to which they are currently exposed – some residents live in an exceptionally quiet area, and any increase in noise is likely to affect them;</li> <li>• prevailing wind direction.</li> </ul> <p>The impact of noise levels from different sources is cumulative.</p> <p>Noise at night from whatever source will cause sleep disturbance.</p>
Light levels	<p>There will be increased levels of light due to the illumination of the rig:</p> <ul style="list-style-type: none"> <li>• will be a source of visual disturbance to residents in the vicinity, which at night is likely to cause sleep disturbance;</li> <li>• will change the nature of the rural environment, and may affect the number of visitors/tourists to the area, which will then impact on the local economy</li> </ul>
Waste generation, storage, management and transport	<p>Waste water from fracking (thousands of gallons of flowback fluid) can contain toxic chemicals and radio-active elements; benzene and radon are of particular concern.</p> <ul style="list-style-type: none"> <li>• The waste from fracking could have long-term and inter-generational effects given its radio-active and toxic nature</li> <li>• It is likely that there will be on-site storage of waste water, and waste water will also be transported in tankers (HGVs) from the site to waste treatment/disposal sites. Residents, other road users and visitors to the area could be exposed to this waste water if there are spillages and/or leakages, including during the transport of the waste water</li> <li>• Road users will try to avoid the designated routes for HGVs carrying waste water, which may lead to increased traffic volumes and congestion in other parts of the road infrastructure</li> </ul>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Odour	There are several sources of odour as a result of fracking operations: methane, diesel, and emissions from vehicles. Odour from fracking operations is likely to cause a nuisance to residents, and may reduce the amenity of their property, especially during hot weather.
Hazards	There are hazards associated with aspects of the fracking process, which could affect residents and visitors to the local area: <ul style="list-style-type: none"> <li>• blow-outs;</li> <li>• spillages;</li> <li>• on-site and off-site accidents.</li> </ul>
Induced seismicity	Residents are fearful of the potential for earthquakes, which is a cause of anxiety and stress. Induced seismicity could cause: <ul style="list-style-type: none"> <li>• movement in the faults in the local geological strata, leading to contamination of underground aquifers</li> <li>• fracturing of underground pipes for water and sewage, leading to the contamination of drinking water and soil;</li> <li>• fracturing of underground pipes for gas (there is a main gas pipeline 50 metres from the site), leading to leakages;</li> <li>• disturbance to underground hazardous waste storage facilities in the vicinity, e.g. for World War II materials, and BNFL.</li> </ul>
Well failure	The failure rate for wells is 5%, rising to 50% at 15 years – the concrete casing cracks and contaminated water travels up the drill casing and through the cracks to reach the surface.
Landscape: visual impact	Several factors will affect the visual quality and the appearance of the landscape: <ul style="list-style-type: none"> <li>• flaring from the stacks;</li> <li>• the height of the rig, which will be taller than an electricity pylon;</li> <li>• the concrete pads;</li> <li>• the increased volume of traffic, and the nature of that traffic (HGVs).</li> </ul>
Landscape: tranquillity	The tranquil, rural nature of the area will change with the introduction of fracking operations, and the associated traffic volumes and changes to the nature of that traffic; this will reduce social contact and interaction, and ultimately community cohesion, affecting people’s mental health and wellbeing.
Landscape	High-sided hedges are a feature of the local area; these could be damaged or removed as a result of the need to transport waste water from fracking in HGVs down narrow country lanes; this would change the nature of the local landscape.



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Land use	At present, the local area is known as the “food basket of Fylde”, comprising high-grade agricultural land supporting a dairy and grain industry – the introduction of fracking operations changes the balance of land use in the local area, introducing an industrial element and reducing the traditional farming and tourism land uses.
Biodiversity	<p>Existing levels of biodiversity in the local area are a source of pleasure for residents, and help to attract tourists and visitors to the area. The various types of pollution – light, noise and air pollution, particularly flaring – associated with fracking could reduce levels of local biodiversity, and thereby have a negative effect on:</p> <ul style="list-style-type: none"> <li>• residents’ mental health and wellbeing;</li> <li>• the number of tourists/visitors to the area, which could reduce the amount of money brought into the local economy.</li> </ul> <p>Local fauna that could be affected include:</p> <ul style="list-style-type: none"> <li>• bats;</li> <li>• great-crested newts;</li> <li>• kites (which are relatively rare elsewhere in the country);</li> <li>• buzzards;</li> <li>• hares;</li> <li>• pheasants;</li> <li>• owls</li> </ul>
Food safety	<p>There is the potential for pollutants and soil and water contaminants from the fracking process to enter the human food chain via:</p> <ul style="list-style-type: none"> <li>• grass and/or cereals managed as part of the local agricultural sector;</li> <li>• home-grown fruit and vegetables.</li> </ul>
Traffic volume	<p>There will be an increase in traffic volume as a result of fracking operations, leading to:</p> <ul style="list-style-type: none"> <li>• increased levels of noise;</li> <li>• increased emissions to air;</li> <li>• increased risk of road traffic accidents;</li> <li>• increased levels of congestion;</li> <li>• reduced access to the road infrastructure for local residents and others;</li> <li>• potential increase in ambulance response times, which are currently a problem for local communities in the area.</li> </ul>
Nature of vehicular traffic	The nature of vehicular traffic will change as a result of fracking operations, most notably with the regular transit of HGVs on rural roads.



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Level of congestion	<p>Increased traffic volumes:</p> <ul style="list-style-type: none"> <li>• will exacerbate existing traffic management problems in the area, especially in the vicinity of the Preston New Road site;</li> <li>• will increase the level of congestion, affecting local road users, including the school buses;</li> <li>• may increase ambulance response times</li> </ul>
Emergency planning/preparedness	<ul style="list-style-type: none"> <li>• If fracking takes place, it introduces new risks into the local area, for which all emergency services need to plan and prepare in order to protect the health of residents exposed to any accidents or incidents</li> <li>• Emergency response times could be compromised by levels of congestion on local roads</li> </ul>
Greenhouse gas emissions	<p>Greenhouse gas emissions could increase – over the whole process fracking is “dirtier” than coal – this will increase the potential for climate change, which has negative health impacts for the wider population.</p>
<b><i>Economic factors</i></b>	
Condition of residential properties and other buildings	<p>Induced seismicity could cause damage to residential and other buildings, incurring repair and maintenance costs for owners with a reduction in disposable income.</p> <p>The potential for accidents and incidents associated with the fracking of shales, including induced seismicity, may affect either residents’ ability to obtain insurance (buildings or other insurance) or the price of insurance, which could increase; difficulties in obtaining insurance will be a source of additional stress for residents.</p>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Value of residential properties and other buildings	<p>Existing house-owners paid a high market price to move to the area for reasons of tranquillity and the 'healthy' environment. Prior to determination of the planning applications, the value of residential properties is already decreasing; one resident cited a figure of £100,000 decrease in value. It is anticipated property values will continue to decline during fracking operations, leading to negative equity, and stagnation in the area's housing market. In this situation, residents will not be able:</p> <ul style="list-style-type: none"> <li>• to sell their properties, or to recover any capital invested in them (e.g. from building an extension or making other improvements);</li> <li>• to obtain a mortgage to buy elsewhere;</li> <li>• to move from the area, and will be "trapped" with limited life options (e.g. may not be able to take up a job offer in another area without financial ruin);</li> <li>• to 'downsize' and/or execute retirement plans;</li> <li>• to leave a legacy/an inheritance for their children and grandchildren</li> </ul> <p>All these outcomes will increase residents' levels of stress, anxiety and depression.</p> <p>Moreover, people outside the area may not choose to move in, exacerbating the stagnation in the housing market. Given this situation, some house-owners could be forced to rent out properties, meaning that the community becomes transient.</p>
Sustainability of existing industries: Tourism	<p>One of the major industries in the local area is tourism; changes in the nature of the landscape with the introduction of fracking could affect:</p> <ul style="list-style-type: none"> <li>• tourist-related leisure activities such as cycling, horse-riding and walking;</li> <li>• caravanning in the area;</li> <li>• tourist activities associated with the local wildlife</li> </ul> <p>A reduction in the number of tourists/visitors could result in a loss of jobs, a reduced viability for some local businesses, and a reduction in the amount of money circulating in the local economy.</p>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
<p>Sustainability of industries: Agriculture and other land-based concerns (e.g. market gardening, plant nurseries)</p>	<p>The grain and dairy industry is important to Fylde, and there is the potential for pollution and/or contamination of water and soil from fracking operations, which could affect:</p> <ul style="list-style-type: none"> <li>• the quality of pasture and arable land;</li> <li>• the human food chain with contaminants entering via grass/pasture for cattle, and/or cereals</li> </ul> <p>As a result some farmers may not be able to sell on their products from farming, which in turn could reduce the viability of some local farms with a loss of jobs, and increase the risk of bankruptcy.</p> <p>The workload for farmers in the area will be increased due to the need to monitor the impact of fracking, particularly the levels of soil and/or water contamination, on their business.</p> <p>Some landowners (farmers and others) on whose land it is proposed to build the wells will benefit financially; some may have benefitted already from the exploratory process undertaken by the Applicant thus far.</p>
<p>Sustainability of existing businesses</p>	<p>Some people may avoid the area and/or use alternative routes due to fracking operations and/or community severance; this could mean that shops in Great Ecclestone or Kirkham experience a reduction in footfall and sales, which could reduce their viability.</p>
<p>Job creation</p>	<p>It is likely that:</p> <ul style="list-style-type: none"> <li>• residents in the local area will not benefit from any job creation directly associated with fracking operations due to a lack of the necessary skills;</li> <li>• workers from outside the local area will obtain the jobs</li> </ul> <p>The number of jobs relating to the temporary applications will be small (estimated by one resident as 1.6 fte over the lifetime of the project at Roseacre Wood).</p> <p>Some residents do not believe that the local area will obtain a commensurate proportion of the jobs it has been estimated will be created by the fracking industry across the country (~79,000).</p>
<p>Level of skills</p>	<p>Residents in the local area may not have the skills to take advantage of any job opportunities created by the fracking industry.</p>
<p>Retention of money in the local economy</p>	<p>If workers employed by the fracking industry do not reside in the local area, the money they earn is unlikely to benefit the local economy, and will be spent elsewhere.</p>
<p>Community benefit payments</p>	<p>Residents did not perceive the community benefit payments as positive. The way in which the fund is administered means that residents local to the fracking sites may not necessarily receive any direct benefit from the money.</p>





Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Infrastructure	<p>Existing road infrastructure has been built for low volumes of traffic and farming vehicles, and is not suitable for heavy traffic or industrial use; the increase in traffic volume and the change in the nature of vehicles (i.e. trips by HGVs) is likely:</p> <ul style="list-style-type: none"> <li>to increase wear and tear on the roads and roadside verges, thereby increasing the need for maintenance;</li> <li>to 'destroy' the nature of the roads and roadside verges as country lanes</li> </ul>
Total economic costs of fracking	The total costs of the impacts of fracking – on people's health, on agriculture, on tourism, and on the environment – could be 'enormous'.
<b>Social factors</b>	
Reputation/image of the area	<p>Owing to the presence of fracking installations, people may no longer wish to move into the area, contributing to a stagnation in the local property market, increasing the difficulty for people who wish to move out.</p> <p>The planning applications/proposed fracking operations are changing the character of the local area, the way in which it is perceived, and its reputation as a quiet, close-knit, rural farming community.</p> <p>There is the potential for environmental activists to come into the area to stage protests, which could have several impacts, including:</p> <ul style="list-style-type: none"> <li>disruption to the local community;</li> <li>dissension within the local community, potentially leading to reduced social cohesion and animosity;</li> <li>misrepresentation of the local community in the media;</li> <li>police involvement, and the potential for criminalisation of the local community;</li> <li>increased waste production by the activists, police and the media in the area, leading to degradation of the local environment, for instance, the waste produced at Balcolme took a long time to clean up</li> </ul> <p>This possible scenario is a source of anxiety for some residents.</p>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
<p>Social contact, cohesion and capital</p>	<p>Social contact and interaction will be reduced by:</p> <ul style="list-style-type: none"> <li>• anxiety about effects of fracking operations on health and wellbeing, as people remain indoors;</li> <li>• the change in the nature of the surrounding environment (loss of rurality due to fracking operations and increased traffic volumes/changes to the nature of traffic)</li> </ul> <p>Reduced social interaction will affect residents’ mental health and wellbeing, and community cohesion.</p> <p>There is also some tension among members of the community about the objections to the introduction of fracking in the local area, which will reduce social cohesion and might split the community.</p> <p>If home-owners are unable to sell their properties (due to a decrease in value), they may be forced to rent them out, thereby creating a more transient community which is likely to reduce social cohesion and social support (this is beginning to happen in Roseacre).</p>
<p>Community severance</p>	<p>There is the potential for community severance, with the fracking operations creating a “border” between Roseacre and Wharles, which could lead to reduced social contact, support and cohesion in the community and in particular affect people’s mental health and wellbeing.</p>
<p>Risk of road traffic accidents</p>	<p>An increase in traffic volume, and a change in the nature of the traffic, is likely:</p> <ul style="list-style-type: none"> <li>• to increase the risk of road traffic accidents, especially for pedestrians, runners, cyclists, horse-riders and local drivers;</li> <li>• to induce a change in the nature of leisure and other activities undertaken using the roads;</li> <li>• to halt some leisure and other activities undertaken using the roads.</li> </ul>
<p>Public safety</p>	<p>Residents identified several risks to public safety:</p> <ul style="list-style-type: none"> <li>• Potential for the contamination of the environment (particularly water and soil) may mean that chemicals involved in and produced by the fracking process enter the food chain, affecting food safety</li> <li>• An increase in traffic volumes and changes in the nature of the traffic could reduce road safety for users, particularly walkers, runners, cyclists and horse-riders</li> <li>• An increase in the risk of major accidents and incidents associated with fracking, such as an explosion of the pipeline, which could have irreversible impacts</li> <li>• Fracking installations could be the target for an act of terrorism.</li> </ul>



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Emergency and contingency planning and preparedness	<p>The introduction of fracking operations in the local area will:</p> <ul style="list-style-type: none"> <li>• increase the risk of accidents and incidents to which local communities are exposed;</li> <li>• change the nature of the accidents and incidents to which the local community could be exposed.</li> </ul> <p>These changes to the potential for accidents and incidents could increase the levels of stress and anxiety in local communities.</p>
Level of crime	There may be an increase in levels of crime in the area with the introduction of fracking operations.
<b>Access factors</b>	
Access to water resources	<p>Pre-existing water pressure is poor for some residents living in the local area; this could worsen as a result of the high demand for water that fracking requires.</p> <p>Access to water resources may be compromised for local residents and local businesses by:</p> <ul style="list-style-type: none"> <li>• the volume of water required for fracking;</li> <li>• the potential for contamination of local aquifers from fracking operations.</li> </ul> <p>Access to water resources may also be compromised for populations living elsewhere which currently obtain their water from this region of the country.</p>
Access to leisure and recreation opportunities in the rural environment	<p>The increase in traffic volume on local roads, and the nature of the traffic generated, as a result of fracking operations will reduce the level of access to leisure and recreation opportunities in the rural environment, including walking and rambling, running, cycling, horse-riding, and dog-walking; this is likely to decrease levels of physical activity, reduce social contact and cohesion, and affect mental wellbeing.</p>
<b>Personal factors</b>	
Level of physical activity	<p>Several factors may affect the level of physical activity from walking, running, cycling, horse-riding, and dog-walking:</p> <ul style="list-style-type: none"> <li>• the increase in traffic volume on local roads;</li> <li>• the nature of the traffic on the roads generated by fracking operations;</li> <li>• remaining indoors due to the potential effects of fracking on the environment (particularly air quality) and on residents' health and wellbeing.</li> </ul>
Personal safety	The gaps in regulation, particularly of some waste products from fracking, will increase risks to personal safety for residents and other road users (through leakages, spillages).
Residential and other amenity	There will be a loss of residential amenity (enjoyment of gardens) and a quiet rural way of life based on farming and other rural pursuits, which will affect people's mental health and wellbeing negatively.



Table 4-2: Potential negative impacts on health and well-being identified by residents living in the vicinity of the Roseacre Wood site ... *continued*

Determinant of health	Potential negative impact
Level of disposable income	
Availability and quality of employment opportunities	<p>As some of the employment opportunities created by fracking will be highly specialised, they will not be available to or benefit the local residents; it is likely that workers will be recruited from outside the local area.</p> <p>The initial employment opportunities (cable-laying) were filled by workers external to the area (even though the jobs required low levels of skill).</p> <p>There may be job losses if the viability of local producers' businesses (e.g. Honeywells, Treales Beef) is reduced by the potential for contamination of soil and water through fracking.</p>
Personal transport	<p>Worsening road conditions, arising from wear and tear from HGVs and other vehicles associated with fracking, will cause damage to people's cars, increasing the need for repair and/or replacement.</p>



## 4.5 Suggestions to address the potential impacts of exploration for, and extraction of, shale gas

### Regulation and inspection

- 4.5.1 To establish an independent body to regulate and inspect the entire process of hydraulic fracturing from exploration to post abandonment, the funding for which is provided by the industry but administered by Government/a Government agency, to ensure robust quality assurance of the fracking process.
- 4.5.2 To establish an independent regulator for the fracking industry.
- 4.5.3 To establish a system of ‘community regulation’ of fracking operations, in which local residents are empowered to take an active role.
- 4.5.4 To involve residents in overseeing the regulation of the fracking industry.
- 4.5.5 To ensure that as part of the fracking process, the Applicant/operator is not expected or allowed to self-regulate.
- 4.5.6 There is insufficient regulation during operation, for instance, workers could be on site 24/7, and the Health & Safety Executive need to take such factors into account.

### Monitoring and evaluation

- 4.5.1 To establish independent monitoring and evaluation of:
- industrial fracking operations, including establishing a baseline of local environmental factors (air quality including dust, water quality, soil quality, level of contamination, noise levels, light pollution) and pre-existing health data prior to operation;
  - relevant environmental factors (e.g. air quality including dust, water quality, soil quality, level of contamination, noise levels, light pollution), and the health status of residents in local communities (with appropriate information governance for confidential health data) and other relevant personal data (e.g. value of property) at each stage of industrial fracking operations.
- 4.5.2 To have the capacity to halt fracking operations should there be a deterioration in the environment and/or people’s health when assessed against the baseline (see suggestion above).

### Transparency

- 4.5.1 To increase the level of transparency from stakeholders in the hydraulic fracturing industry.

### Legal liability of the operator

- 4.5.1 To ensure that the legal liability of the hydraulic fracturing industry is covered and maintained over the long term – the current situation of establishing limited liability companies does not ensure liability or long-term monitoring of effects.

### Determination of the planning applications

- 4.5.1 To use an evidence-based approach when considering the current planning applications, and to apply public health principles and the concept of sustainable communities.
- 4.5.2 To consider the existing evidence of impacts on health and wellbeing as a result of fracking operations, particularly evidence from the United States of America, Canada and Australia .
- 4.5.3 For the planning authority, to request from Cuadrilla an extension to the time-period for consultation and determination of the planning applications to ensure a consideration of all the evidence prior to decision-making, including the conduct of a ‘proper’ HIA.



- 4.5.4 For Cuadrilla, owing to the recent development of the hydraulic fracturing industry and the lack of experience of fracking in England, to agree to requests to extend the deadline for the determination of the planning applications so that all stakeholders have the opportunity to consider and analyse the planning applications submitted.
- 4.5.5 For Lancashire County Council, to adopt the precautionary principle when considering fracking operations.
- 4.5.6 To conduct an independent analysis of the planning applications, which includes peer-review of the analysis by experts from abroad.
- 4.5.7 To consult with residents and businesses in a wider area (Fylde, across the area for the Petroleum Exploration and Development Licence), within a radius of 1,100 metres of both sites, and also with users of local roads, for example, schools (school buses) and the equestrian society.

### **Conditions attached to any planning permission**

- 4.5.1 To prevent the storage of flowback fluid on site, and to prevent the re-use of flowback fluid.
- 4.5.2 For Cuadrilla, to demonstrate a 'successful' track record in the fracking industry.
- 4.5.3 For Cuadrilla, to consider the implications of the Duty of Care, and to incorporate good neighbourliness within its policies and plans for corporate social responsibility.
- 4.5.4 For Cuadrilla, to mitigate impacts on air, water and soil quality and the visual quality of the landscape by enclosing the sites, and by restricting the height of any rigging/equipment and buildings to the height of trees in the local environment.
- 4.5.5 For Cuadrilla, to undertake not to use hazardous chemicals at any stage in the exploration and operation of fracking processes, including undertaking not to use drilling additives.
- 4.5.6 For Cuadrilla, and any sub-contractors, to use hybrid engines for all vehicles associated with fracking operations.
- 4.5.7 With respect to vehicles associated with the fracking process, particularly the HGVs and other industrial vehicles, to establish alternative routes that do not pass through residential areas, which means providing traffic access to the Roseacre site via a temporary route created from the A585 Fleetwood Road.
- 4.5.8 To establish a one-way traffic system for the HGVs involved in the transport of waste water from the fracking installations to the waste management/disposal sites using the shortest route possible, and to enforce the use of these designated routes.
- 4.5.9 To retain the high-sided hedges that are a feature of the local environment (and not remove them to facilitate the transport of waste water from fracking in HGVs).

### **Legislation/regulation**

- 4.5.1 To advocate for legislation or statutory regulation that defines a minimum distance from fracking operations to residential dwellings, schools, and businesses of 2 kilometres, following the example of New South Wales, Australia.

### **Assessments**

- 4.5.1 To undertake a 'hazard' assessment of all pollutants prior to operations, and link this to subsequent monitoring of effects during operation.
- 4.5.2 To undertake a cumulative noise assessment.
- 4.5.3 For Lancashire County Council, to take the lead and ensure public confidence in the HIA process.



- 4.5.4 To conduct a full health study prior to any work commencing on the sites, as undertaken in New York State, United States of America.
- 4.5.5 To conduct a full and extensive HIA, before any determinations are made and any permissions are granted in relation to the current applications; the HIA to take into account evidence from other countries where fracking is taking place.
- 4.5.6 To undertake a literature review of peer-reviewed studies of the health impacts of fracking, for example, studies from the USA, and by Bamberger Oswald, and by Elaine Hill (birth defects).
- 4.5.7 In future and over the long term, to allocate a longer period of time to an HIA such that baseline data and thorough local assessments can be made before planning applications are considered, thereby allowing a detailed consideration of the relevant information .
- 4.5.8 For Cuadrilla to pay for health and property studies prior to any fracking taking place.

### **Emergency planning and preparedness**

- 4.5.1 To develop and test (prior to the start of any fracking operations) a full-scale Emergency Plan involving all emergency services – police, fire and rescue, ambulance.

### **Compensation for home-owners**

- 4.5.1 For the national Government, to provide compensation/an option for home-owners in the area to sell their houses at market value plus 10%, as is the case for the “High Speed 2” (HS2) project in England.

### **National review of energy policy**

- 4.5.1 For the Government, to review national energy policy, and re-assess the approach to hydraulic fracturing of shales for gas and oil.

### **Other responses to the second community engagement event**

#### *Community benefit payments*

- 4.5.1 Some residents at the second community engagement did not wish for the award of community benefit payments but would rather the situation stayed the same and hydraulic fracturing for shale gas did not occur in the local area.

#### *Determination of the planning applications and associated permissions*

- 4.5.1 Local residents who attended the second community engagement events did not want fracking to be allowed in the local area.
- 4.5.2 The regulatory and other authorities involved in the determination of permissions and licences relating to the operation of fracking need to understand what they are doing

#### *Impacts on public safety and health and wellbeing*

- 4.5.1 If regulatory authorities are not 100% certain of public safety issues, there should be more research before exploration begins.
- 4.5.2 The air quality limits are not acceptable.

#### *Proximity of communities to fracking installations*

- 4.5.1 The fracking industry should not be allowed to operate in a populated area.

#### *Information needs of the local community*

- 4.5.1 The information needs identified by residents at the second community engagement event are shown in Figure 4-3.



Figure 4-3: Information needs about fracking, and associated issues, identified by the local community

The chemicals that will be used by Cuadrilla during the fracking process  
The reason(s) why flaring of gas is undertaken, and its effects  
The use of HGVs and their effects  
The source(s) of water used for consumption in residential dwellings in the Fylde area  
The location where noise measurements have been and will be taken





## 5 Materials used in workshops

### 5.1 Briefing on Health Impact Assessment

**Authors:** *Erica Ison (Independent Specialist Practitioner in HIA); & Ben Cave (Ben Cave Associates Ltd).*

**Date of issue:** *2<sup>nd</sup> July 2014*

#### Introduction

Lancashire County Council has received a planning application for exploratory drilling of shale gas.

The Public Health Directorate is examining the application and is considering conducting a Health Impact Assessment (HIA).

Lancashire County Council wants communities that are in the localities of the proposed shale gas developments to have the opportunity to express their views on the potential health effects of these proposed developments.

There are two workshops to hear community views. These will be held at Ribby Hall at the following times

Monday, 14<sup>th</sup> July 2014,  
6 – 8pm

Tuesday, 15<sup>th</sup> July 2014  
6 – 8pm

This briefing document covers general principles of Health Impact Assessment. It describes the process from the point of view of a County or District Council that is considering conducting an assessment.

Throughout this document we generally talk about ‘proposals’. We use this term to emphasise that HIA is carried out while a policy, plan, programme or project is in preparation.

This document is based upon a briefing provided to the World Health Organization’s Healthy Cities Network (10). In this document we look at:

- [Why should we assess the impact on health?](#)
- [What is health?](#)
- [What is HIA?](#)
- [What values underpin HIA?](#)
- [It is a pragmatic approach: what are the limitations?](#)

HIA can also be conducted as part of statutory assessment for example Strategic Environmental Assessment/Sustainability Appraisal on a plan or programme. It can also be required of a developer/project Applicant as part of a planning application, either within, or alongside an Environmental Impact Assessment.

We consider this use of HIA in [the final section](#) of this briefing document.



## Why should we assess the impact on health?

Decisions made by elected members and council officers are difficult and sometimes complex due to the demands of competing priorities and the constraints of limited resources. Decisions are made under increasing scrutiny so they are accountable and transparent.

Health Impact Assessment (HIA) is one way by which politicians and other decision-makers can get robust and accessible information about the potential any type of proposal has to affect health and well-being.

The information generated by the use of HIA means that decision-makers are aware of:

- the implications for health and well-being of any decisions they might take about a particular proposal;
- the choices available with respect to optimising the health benefits a proposal might have, and possible ways in which to manage any potential harm.

HIA helps to identify the potential health effects of a proposal. Then it identifies ways to enhance any benefits and avoid or minimise any harms.

The potential benefits of HIA for communities taking part are shown in Figure 5-1.

Figure 5-1: Benefits of HIA for the community

- a) Involvement in processes related to municipal decision-making.
- b) The potential to extend the democratic process, particularly to groups in society who may be excluded.
- c) Empowerment.
- d) Skills development.
- e) Highlighting ways to reduce sources of disadvantage or inequality.
- f) Involvement in the development and provision of services that better meet the needs of local people.

## What is health?

Many factors can influence the health of communities and the health of individuals within communities. These factors can have positive or negative effects.

Figure 5-2 below summarises some of the main determinants of health and their spheres of influence, starting with those at an individual level and moving through to those at a societal level. Some factors that influence health are outside an individual's control, such as age, but individuals have more control over other factors such as lifestyle factors including physical activity and smoking.

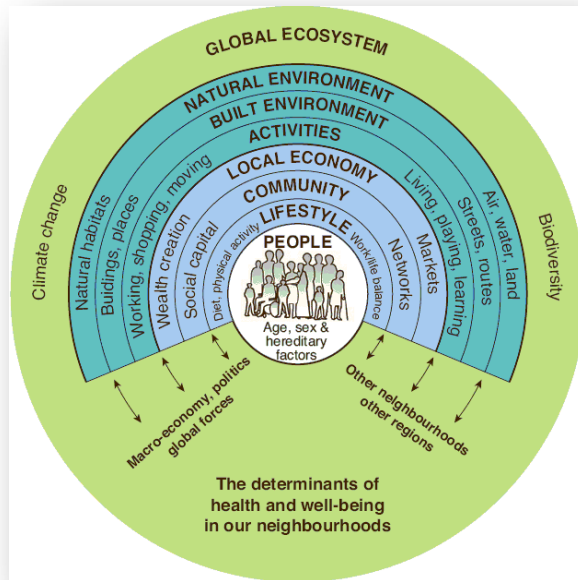
County and district councils often shape many of the determinants from community to natural environment.

Figure 5-2 is good but it does not catch everything. There may be other determinants that are important with regard to any particular proposal.



In addition, Figure 5-2 does not account for the political context in which people live and work.

Figure 5-2: Determinants of health and wellbeing in our neighbourhoods



Source: Based on the Whitehead and Dahlgren (11) diagram as amended by Barton and Grant (12)

## What is Health Impact Assessment?

Health Impact Assessment is ... (13)

... a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on both the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects.

So we can see that HIA uses different methods to examine the proposal in question. It looks into the future. It is concerned with the general health of a population but also inequalities in health. HIA also seeks to identify ways in which potential health effects can be managed.

Any proposal can affect health in two main ways:

- directly, such as imposing a speed limit to reduce fatalities from road traffic accidents;
- indirectly through the many determinants of health (see Figure 5-2).
- In both cases, there are outcomes for health, and HIA seeks to predict what these outcomes might be and what should be done.



## What values underpin HIA?

Improving and protecting the health and well-being of the people in communities affected by a proposal is central to HIA.

The core values of HIA are (14):

- sustainability;
- equity;
- ethical use of evidence; and
- democracy.

These values mean that HIA tends to have the following characteristics:

1. It is **multidisciplinary**: it draws knowledge, information and experience from all disciplines relevant to a proposal.
2. It is **intersectoral**: it involves people from all sectors to identify and address potential effects on health.
3. It is **participatory**: wherever feasible, it seeks to involve all the stakeholders in an individual HIA, including the communities affected by proposal implementation.
4. It uses a **range of methods**: this gives flexibility and adaptability to select the most appropriate and effective methods, taking into account local circumstances, timing, and resource constraints.
5. It has a focus on **inequalities**: HIA seeks to identify potential effects on health and well-being being for people who are vulnerable, marginalised or disadvantaged as well as for the whole community – it also helps to identify actions targeted at health protection and health improvement for the vulnerable.
6. It uses **both quantitative and qualitative evidence** to identify potential health effects: this ensures that it gives an indication not only of the size of the potential health effects but also the reasons for the potential health effects and how they might be managed.

## It is a pragmatic approach: what are the limitations?

As for other types of impact assessment HIA attempts to predict the future.

It holds a mirror up to a proposal and shows the potential health effects.

However, the accuracy and detail of the predictions depends on the quantity and the quality of information, data and evidence that is available in relation to the specific proposal.

This in turn can depend on the human and financial resources it is possible to invest in a particular HIA.

The resources invested in conducting the HIA always need to be balanced against the nature of the output required by those who have commissioned the study. It is a pragmatic approach.



## Health and assessment in spatial planning

In conclusion we look briefly at ways in which the assessment of health and wellbeing is used in spatial planning. These include

- Strategic Environmental Assessment;
- Environmental Impact Assessment; and
- Standalone HIA.

### *Strategic Environmental Assessment*

The SEA Directive explicitly requires the consideration of “*the likely significant effects on the environment, including on issues such as ... human health ...*” (15).

The SEA Directive (15) refers to public plans and programmes. SEAs are most commonly carried out for land-use planning at various levels of government, but are also applied to other sectoral plans, such as for energy, water, waste, transport, agriculture and industry (16).

In 2010 the SEA Protocol (17) was ratified. This goes further than the SEA Directive: it uses the term ‘environment and health’ throughout and it indicates that health authorities should be consulted at the different stages of the process.

The Department of Health has issued guidance on health in SEA (18). Although it was issued in 2007 it remains a draft document.

### *Environmental Impact Assessment*

Recent EIA Directive changes (to be transposed into national legislation by spring 2017) require that ‘human health’ is included in the scoping of all EIAs (19).

The changes require that EIA shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on population and human health.

### *Standalone HIA*

HIAs may be submitted, alongside an SEA or EIA, respectively, as part of a plan development or as part of a planning application.

For each of the options listed above the County or District Council will be interested in establishing a policy to require an HIA and standards by which the HIA should be judged.




## 5.2 Presentation


# Local views: shale gas exploration & health and well-being

**community engagement workshops**

July 2014  
Preston, Lancashire



What		When
A. Welcome		18:00
B. Introduction		
C. Summary of the proposal, and key points from the community profile	<i>presentation</i>	
D. Positive expectations about the proposal and Barriers to/conflicts around the proposal	<i>facilitated session 1</i>	
E. How to identify impacts on health and well-being	<i>presentation</i>	
F. Identifying impacts on health and well-being, and suggestions how to enhance any benefits from the proposal and to address/reduce any negative effects from the proposal	<i>Facilitated session 2 Carousel format of 3 rotating groups of participants who visit 3 facilitators in turn, each of whom is responsible for recording discussions on particular issues relating to the proposal</i>	1 <sup>st</sup> rotation: 18:55 2 <sup>nd</sup> rotation: 19:15 3 <sup>rd</sup> rotation: 19:30
G. Summarised feedback	<i>Carousel facilitators</i>	19:40
H. Next steps and closing remarks		19:55
H. Close		20:00





## Land north of Preston New Road, Little Plumpton, Preston

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



From LCC – Shale Gas - <http://bit.ly/1nnBf91>

## Land north of Preston New Road, Little Plumpton, Preston

- Monitoring works in a 4km radius of the proposed Preston New Road exploration site, near Little Plumpton
- Planning permission is sought for monitoring works in a 4 km radius of the proposed Preston New Road exploration site comprising:
  - the construction, operation and restoration of two seismic monitoring arrays comprising of 80 buried seismic monitoring stations and 10 surface seismic monitoring stations. The seismic monitoring stations will comprise underground installation of seismicity sensors; enclosed equipment and fenced enclosures. The surface array will also comprise monitoring cabinets.
- The application is also for the drilling of three boreholes, each installed with 2 monitoring wells, to monitor groundwater and ground gas, including fencing at the perimeter of the Preston New Road exploration site.



From LCC – Shale Gas - <http://bit.ly/1nnBf91>



## Roseacre Wood Site, Roseacre and Wharles, Preston

- ◎ Planning permission is sought for construction and operation of a site for drilling up to four exploration wells, hydraulic fracturing of the wells, testing for hydrocarbons, abandonment of the wells and restoration, including provision of access roads and improvement of accesses onto the highway, security fencing, lighting and other uses ancillary to the exploration activities, including the construction of a pipeline and a connection to the gas grid network and associated infrastructure to land west, north and east of Roseacre Wood and between Roseacre Road, Roseacre and Inskip road, Wharles



From LCC – Shale Gas - <http://bit.ly/1nnBf91>

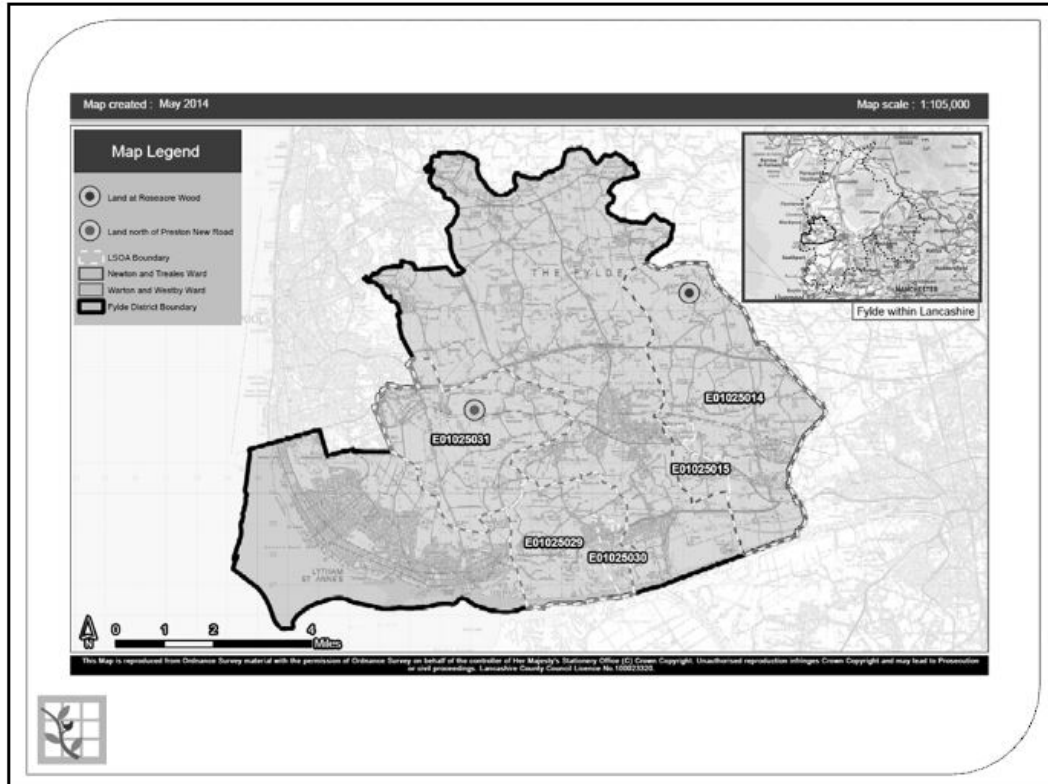
## Roseacre Wood Site, Roseacre and Wharles, Preston

- ◎ planning permission is sought for monitoring works in a 4km radius of the proposed Roseacre wood exploration site comprising:
  - the construction, operation and restoration of two seismic monitoring arrays comprising of 80 buried seismic monitoring stations and 8 surface seismic monitoring stations. The seismic monitoring stations will comprise underground installation of seismicity sensors; enclosed equipment and fenced enclosures. The surface array will also comprise monitoring cabinets.
- ◎ The application is also for the drilling of three boreholes, each installed with 2 monitoring wells, to monitor groundwater and ground gas, including fencing at the perimeter of the Roseacre wood exploration site



From LCC – Shale Gas - <http://bit.ly/1nnBf91>





## Responsibility for health and well-being

- Lancashire County Council has taken on a new role that will see it play a bigger part in helping people to improve and protect their health.



# Health summary for Fylde

Domain	Indicator	Local No Per Year	Local value	Eng value	Eng worst	England Range	Eng best
Our communities	1 Deprivation	2,575	3.4	20.4	83.8		0.0
	2 Children in poverty (under 16s)	1,435	12.5	20.6	43.6		6.4
	3 Statutory homelessness	10	0.3	2.4	33.2		0.0
	4 GCSE achieved (5A*-C inc. Eng & Maths)	422	65.1	60.8	38.1		81.9
	5 Violent crime (violence offences)	586	7.7	10.6	27.1		3.3
	6 Long term unemployment	224	5.0	9.9	32.6		1.3
Children's and young people's health	7 Smoking status at time of delivery	121	18.3	12.7	30.8		2.3
	8 Breastfeeding initiation	n/a	-	73.9	40.8		94.7
	9 Obese children (Year 6)	70	12.8	18.9	27.3		10.1
	10 Alcohol-specific hospital stays (under 18)	7	48.6	44.9	126.7		11.9
	11 Under 18 conceptions	33	26.9	27.7	52.0		8.8
Adults' health and lifestyle	12 Smoking prevalence	n/a	13.4	19.5	30.1		8.4
	13 Percentage of physically active adults	n/a	50.6	56.0	43.8		68.5
	14 Obese adults	n/a	21.1	23.0	35.2		11.2
	15 Excess weight in adults	139	69.1	63.8	75.9		45.9
	16 Incidence of malignant melanoma	27	31.8	14.8	31.8		3.6

From <http://bit.ly/1zBhq7W>



# Health summary for Fylde ... cont

Disease and poor health	17 Hospital stays for self-harm	182	268.5	188.0	596.0		50.4
	18 Hospital stays for alcohol related harm	513	637	637	1,121		365
	19 Drug misuse	282	6.1	8.6	26.3		0.8
	20 Recorded diabetes	3,638	6.1	6.0	8.7		3.5
	21 Incidence of TB	1	2.6	15.1	112.3		0.0
	22 Acute sexually transmitted infections	437	574	804	3,210		162
	23 Hip fractures in people aged 65 and over	130	581	568	828		403
Life expectancy and causes of death	24 Excess winter deaths (three year)	59	19.6	16.5	32.1		-3.0
	25 Life expectancy at birth (Male)	n/a	79.1	79.2	74.0		82.9
	26 Life expectancy at birth (Female)	n/a	82.8	83.0	79.5		86.6
	27 Infant mortality	4	5.8	4.1	7.5		0.7
	28 Smoking related deaths	167	286	292	480		172
	29 Suicide rate	7	-	8.5			
	30 Under 75 mortality rate: cardiovascular	58	74.9	81.1	144.7		37.4
	31 Under 75 mortality rate: cancer	111	143	146	213		106
	32 Killed and seriously injured on roads	40	53.0	40.5	116.3		11.3





## What is health?

“... a state of complete physical, social and mental well-being, and not merely the absence of disease or infirmity”.

*World Health Organization,  
Constitution, 1948  
<http://bit.ly/lcgnJ3S>*



## What is health?

“... the extent to which an individual or group is able, on the one hand,  
... to identify and to realize aspirations and satisfy needs, and on the other,  
... to change or cope with the environment.  
  
... Health is therefore seen as a resource for everyday life, not the objective of living;  
... it is a positive concept, encompassing social and personal resources as well as physical capacities.”

*Ottawa Charter for Health Promotion, 1986  
<http://bit.ly/lmNesmL>*





## ... Health Impact Assessment

- ... is a combination of procedures, methods and tools
- ... that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project
- ... on both the health of a population and the distribution of those effects within the population.
- ... **HIA identifies appropriate actions to manage those effects.**

International Association for Impact Assessment, 2006  
<http://bit.ly/X2iOxM>



## Community engagement workshops

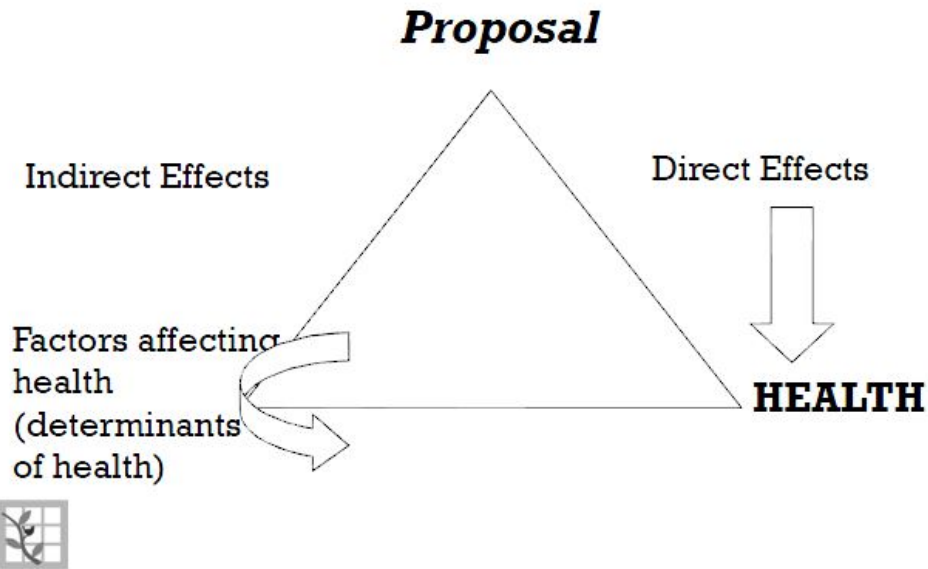
We are interested in how the proposal will affect people's health and well-being:

- ◉ What will affect people? *We will look at direct and indirect effects*
- ◉ Which people will be affected? *We will look at whether some people are more vulnerable or susceptible to particular effects*
- How will people be affected? *We will look at the nature of the effects, e.g. Will they occur in the short or long term? How frequent will they be? How much of an effect will there be?*





## Looking at the potential effects of a proposal on people's health and well-being



**Thank you**



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