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22 November 2013

Dear Councillor

I am now able to enclose, for consideration at the meeting of the **COUNCIL** on Wednesday 27 November 2013 at 6.00 pm, the following reports that were unavailable when the agenda was printed.

12 **RESPONSE TO THE MOTION REFERRED TO THE SCRUTINY (COMMUNITY AND REGENERATION) COMMITTEE** (Pages 2 - 59)

To consider the report of the Scrutiny (Community and Regeneration) Committee in respect of the following Motion referred to the Committee by Council at its meeting held on 18 September 2013:

"This Council is concerned by the prospect of fracking and related drilling activity in the Dover District area and requests that a report is brought forward to the next meeting of this Council to inform the Council of the nature of the process, the potential impact on subsurface water resources and geological formations, the type and scale of the surface structures, and the impact of anti-fracking demonstrations in the light of recent experience in Sussex on the local communities and on the police."

The original Motion was proposed by Councillor M R Eddy.

The report of the Scrutiny (Community and Regeneration) Committee is attached.

Yours sincerely

A handwritten signature in black ink, appearing to be "Nicky", written over a white background.

Chief Executive

DOVER DISTRICT COUNCIL

COUNCIL – 27 NOVEMBER 2013

RESPONSE TO THE MOTION REFERRED TO THE SCRUTINY (COMMUNITY AND REGENERATION) COMMITTEE

That it be recommended to Council:

- (a) That it note that the Scrutiny (Community and Regeneration) Committee, while not anti-energy and accepting that there are risks inherent in the extraction of any natural resource, has the following primary concerns in the absence of sufficient independent peer reviewed data to reassure it:
 - (i) That the long term consequences of any pollution of the groundwater supply in the district due to chemicals used as part of the fracking process itself or contamination via improper management, storage and disposal of contaminated 'flowback' water were unclear.
 - (ii) The impact of the high volume of water consumption involved in the hydraulic fracturing process on groundwater resources given that the Dover District is an identified area of water stress.
 - (iii) The risk of seismicity arising from the hydraulic fracturing process given the particular characteristics of the local geology and the close proximity of population centres to the areas identified to date as potential drilling sites.
- (b) That it note that the Scrutiny (Community and Regeneration) Committee also has secondary concerns over the impact of noise, air pollution, light pollution and traffic on rural roads which it anticipates will be dealt with by the appropriate statutory bodies as part of the Kent County Council planning process in the event of any future applications.
- (c) That the Council be mindful of (a) and (b) above in its response to any future planning application considered by Kent County Council involving hydraulic fracturing and/or associated drilling activity until such time as sufficient independent peer reviewed data exists to mitigate the concerns expressed by the Committee.



Council Motion on Fracking and Associated Drilling

Scrutiny (Community & Regeneration) Committee

Recommendation of the Scrutiny (Community and Regeneration) Committee

RECOMMENDATION: That it be recommended to Council:

- (a) That it notes that the Scrutiny (Community and Regeneration) Committee, while not anti-energy and accepting that there are risks inherent in the extraction of any natural resource, has the following primary concerns in the absence of sufficient independent peer reviewed data to reassure it:
 - (i) That the long term consequences of any pollution of the groundwater supply in the district due to chemicals used as part of the fracking process itself or contamination via improperly management, storage and disposal of contaminated 'flowback' water are unclear.
 - (ii) The impact of the high volume of water consumption involved in the hydraulic fracturing process on groundwater resources given that the Dover District is an identified area of water stress.
 - (iii) The risk of seismicity arising from the hydraulic fracturing process given the particular characteristics of the local geology and the close proximity of population centres to the areas identified so far as potential drilling sites.
- (b) That it note that the Scrutiny (Community and Regeneration) Committee also has secondary concerns over the impact of noise, air pollution, light pollution and traffic on rural roads which it anticipates will be dealt with by the appropriate statutory bodies as part of the Kent County Council planning process in the event of any future applications.
- (c) That the Council be mindful of (a) and (b) above in its response to any future planning application considered by Kent County Council involving hydraulic fracturing and/or associated drilling activity until such time as sufficient independent peer reviewed data exists to mitigate the concerns expressed by the Committee.

Executive Summary of the Views of the Committee

The Scrutiny (Community and Regeneration) Committee having considered the views received from those organisations that accepted the invitation to meet with it or respond in writing and the contents of the research report, has formed the following view at its meeting held on 18 November 2013.

The Scrutiny (Community and Regeneration) Committee, while not anti-energy and accepting that there are risks inherent in the extraction of any natural resource, has significant concerns around the limited availability of authoritative independent peer reviewed information in respect of the risks to the districts water supply and the possibility of seismic activity arising from the use of hydraulic fracturing to extract unconventional shale and coal-bed methane gas.

The main areas of risk where the Committee feels that it is unable to reassure local residents of their concerns are:

- (iv) The long term consequences of any pollution of the groundwater supply in the district due to chemicals used as part of the fracking process itself or contamination via improperly management, storage and disposal of contaminated 'flowback' water.
- (v) The impact of the high volume of water consumption involved in the hydraulic fracturing process on groundwater resources given that the Dover District is an identified area of water stress.
- (vi) The risk of seismicity arising from the hydraulic fracturing process given the local geology and the close proximity of population centres to the areas identified so far as potential drilling sites.

The Committee recognises that the issues of traffic movements, air and light pollution and noise are a concern to the local community that will need to be addressed through the planning process.

The Committee does however, does note that a number of reports are expected to be published in 2014 that may provide the level of authoritative independent peer reviewed information necessary in the view of the Committee to provide clarity as to the realistic risks of the process of hydraulic fracturing in the UK.

Scope of the Review and Report

The Council at its meeting held on 18 September 2013 requested that the Scrutiny (Community and Regeneration) Committee action the following Motion:

“This Council is concerned by the prospect of fracking and related drilling activity in the Dover District area and requests that a report is brought forward to the next meeting of this Council to inform the Council of the nature of the process, the potential impact on subsurface water resources and geological formations, the type and scale of the surface structures, and the impact of anti-fracking demonstrations in the light of recent experience in Sussex on the local communities and on the police.”

This motion was formally accepted by the Scrutiny (Community and Regeneration) Committee at its meeting on 5 November 2013.

It should be noted that the motion does not require a conclusion to be made by the Committee on the merits of hydraulic fracturing (otherwise known as ‘fracking’) and related drilling activity and this report does not seek to draw any.

Research Report

Introduction

In compiling this report it should be noted that there is still a considerable amount of work being conducted by Government Departments, Non-Governmental Organisations and regulatory organisations in the UK into the risks involved in hydraulic fracturing. This has led to much emphasis being placed on the experience in the United States and Australia as an example of the risks involved in hydraulic fracturing.

In compiling this report there has been a necessity to use some information relating to other nations to achieve the objectives of the motion. While this has usefulness in compiling the report it should be noted that differences in geology, drilling techniques and regulatory frameworks mean that not all the data is directly applicable to the Dover District.

“Many apprehensions over fracking in the UK are a result of the experience of regulation in the US. There each State regulates separately and to varying levels of stringency. A further key difference is that land owners own the mineral rights and these circumstances have led to a rapidly expanding industry with limited environmental controls.”¹

In England petroleum rights are held by the Crown not by individual land owners and ‘unconventional’ gas is regulated by the Department of Energy and Climate Change (DECC), the Health and Safety Executive (HSE), the Department for Communities and Local Government (DCLG), the Local Planning Authority (Kent County Council in respect of minerals), and the Environment Agency (EA). The DECC, the HSE and the EA are responsible for drafting appropriate regulations for the control and monitoring of well design for safety, drinking water protection and the disposal and/or recycling of fracture fluids.

Water companies are not currently statutory consultees in the planning process and it has been argued by bodies such as Water UK that they should be made so.

The recent (now withdrawn) applications to Kent County Council (as the Local Planning Authority) by Coastal Oil and Gas Ltd for 3 exploratory boreholes in the Dover District are not directly addressed by this report due to the scope of the motion but some information has been gathered in relation to them as part of the fact-finding process.

Nature of the Process (Fracking and Related Drilling Activity)

How does hydraulic fracturing work?

Hydraulic Fracturing is the fracturing of rock by a pressurised liquid and can occur naturally creating most mineral vein systems. Induced Hydraulic Fracturing or Hydrofracturing (more commonly known as ‘fracking’) is an industrial process for fracturing rock that involves the pumping of a pressurised liquid (a mixture of water together with other materials and chemicals) into the underlying strata in order to create small fractures within which oil and gas can flow towards a wellhead from where it can be extracted.

The hydraulic fracturing process is usually performed at the start of the life of a well, with several rounds of fracturing lasting no more than one to two hours each, spaced out over several weeks while readings are taken and assessed. Once fracturing is completed the well can go on to produce for 30-50 years without the need for further treatments.

Why fracking? (Conventional and Unconventional Gas)

¹ Chartered Institute of Water and Environmental Management

The process of hydraulic fracturing allows for the extraction of hydrocarbon reserves that were previously inaccessible using conventional extraction methods.

Conventional gas deposits are contained in porous reservoirs, often limestone or sandstone, which have interconnected spaces that allow the gas to flow freely in the rock and through well boreholes. These reservoirs may be many miles from the organic material that was the original source of the gas.

In contrast, unconventional gas deposits are contained in reservoirs of lower porosity, such as shale and coal which require greater levels of technology. The gas is held in fractures, tiny pore spaces and adsorbed on to the organic material of the rock. Unconventional gas reservoirs are often also the source of the gas. Unconventional gas cannot be extracted by conventional means due to being absorbed on to the organic material so it is extracted by cracking (fracturing) the rock at high pressure to create narrow fractures that allow the gas to flow into the well bore and to the surface.

How much oil and gas is obtained from this process?

Shale gas is classified in terms of 'resource' (the amount of gas in the ground) and 'reserve' (the amount of gas that can be extracted).

Table 1 Terms used in shale gas estimation ²

Terms for resources and reserves	Term	Acronym	Summary	Excludes
Resource 'How much gas is in the ground'	Original gas in place	OGIP	Total volume of gas	
	Gas (initially) in place	GIIP/GIP	Total volume of gas	
	Ultimately recoverable		Total recoverable volume	Gas not expected to be recovered
	Technically recoverable		Limited by technology	Ditto, as well as gas not recoverable with current technology
	Economically recoverable		Limited by economics	Ditto, as well as gas not economic to recover
Reserve 'How much gas could be extracted'	Reserves		Total producible gas	Ditto
	Proved reserves	1P	Probability of reserves (proven)	Probable and possible reserves
	Median figure of reserves	2P	Proven and probable	Possible reserves
	High figure of reserves	3P	Proved, probable and possible	

The first commercially successful applications of hydraulic fracturing were in 1949 and by 2010 it was estimated that 60% of all new oil and gas wells worldwide were the subject of this process. The US Department of Energy estimates that out of the more than 4 million oil

² House of Commons Select Committee on Energy and Climate Change:
<http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenergy/writev/isg/m17.htm>

and gas related wells that have been drilled in the US over the last 150 years, at least 2 million have been the subject of hydraulic fracturing. Currently, 95% of new wells drilled in the US are hydraulically fractured accounting for over 40% of total US oil production and nearly 70% of US natural gas production.

In the UK the estimates for the amount of shale gas resources (resource and reserve) are variable but recent estimates suggest that the figure for resource may be very substantial. How much is technically and economically recoverable remains the subject of much speculation but even with a recovery rate of 10% there is the potential for substantial additional gas resources.

The UK Licensing Regime

Hydraulic Fracturing has taken place in the UK since the mid-1970s in the North Sea and elsewhere and it is estimated that in the last 20 years 200 wells have been 'fracked'.³ The Elswick site operated by Cuadrilla Resources was hydraulically fractured in 1993 and has generated approximately 1MW of electricity.⁴

DECC has produced a map of the United Kingdom setting out the current fields and licences for onshore oil and gas (as of 6 November 2013). While the Petroleum Act 1998 vested all rights for the UK's petroleum resources in the Crown the Government can grant licences that confer exclusive rights to 'search and bore for and get' petroleum. Each Petroleum Exploration and Development License (PEDL) is conferred for a specific period and time. Each licence takes the form of a deed, which binds the licensee to obey the licence conditions regardless of whether or not they are using the licence at any given moment.

Due to concerns that a number of the licences have remained unexploited by the licence holders, DECC through its PILOT group, has instigated the 'Fallow Initiative' to ensure that licences are worked optimally to maximise economic recovery of oil and gas. The Fallow Initiative works by placing undeveloped prospective acreage into the hands of companies that wish to develop it.

Petroleum Exploration and Development Licences (PEDL) in East Kent

The areas marked in yellow indicate areas currently under license. Areas where there has been a discovery are marked in red (oil field), Green (gas field) or Black (Coal Bed Methane Field). A coloured dot is indicative of a well. The above image shows four areas where Petroleum Exploration and Development Licences (PEDL) have been granted in East Kent. These are centred on the Dover District.

The four licences in East Kent were awarded in July 2008 for a 6 year period to Eden Energy (UK) Ltd and Coastal Oil and Gas Ltd jointly. The PEDL listed the addresses of both companies as the same address in Port Talbot. However, Eden Energy (UK) Ltd has subsequently been sold by its Australian parent company Eden Energy Ltd to Shale Energy PLC in September 2013.

Each licence granted carries with it an annual charge, known as a rental, based on an escalating rate for each square kilometre the licence covers at the time of the annual charge. The purpose of this is to encourage licensees to surrender unwanted acreage and focus on the acreage that they do want to exploit.

A PEDL licence is divided into 3 terms, with qualifying criteria for continuation into a following term defined by the minimum amount of progress that the licensee must make. They confer

³ The Telegraph, 'The Town Where Fracking is Already Happening' (10 August 2013): <http://www.telegraph.co.uk/earth/earthnews/10233955/The-town-where-fracking-is-already-happening.html>

⁴ Cuadrilla Resources: <http://www.cuadrillaresources.com/what-we-do/hydraulic-fracturing/>

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the right to search for, bore for and get hydrocarbons, but do not confer any exemption from other legal/regulatory requirements such as:

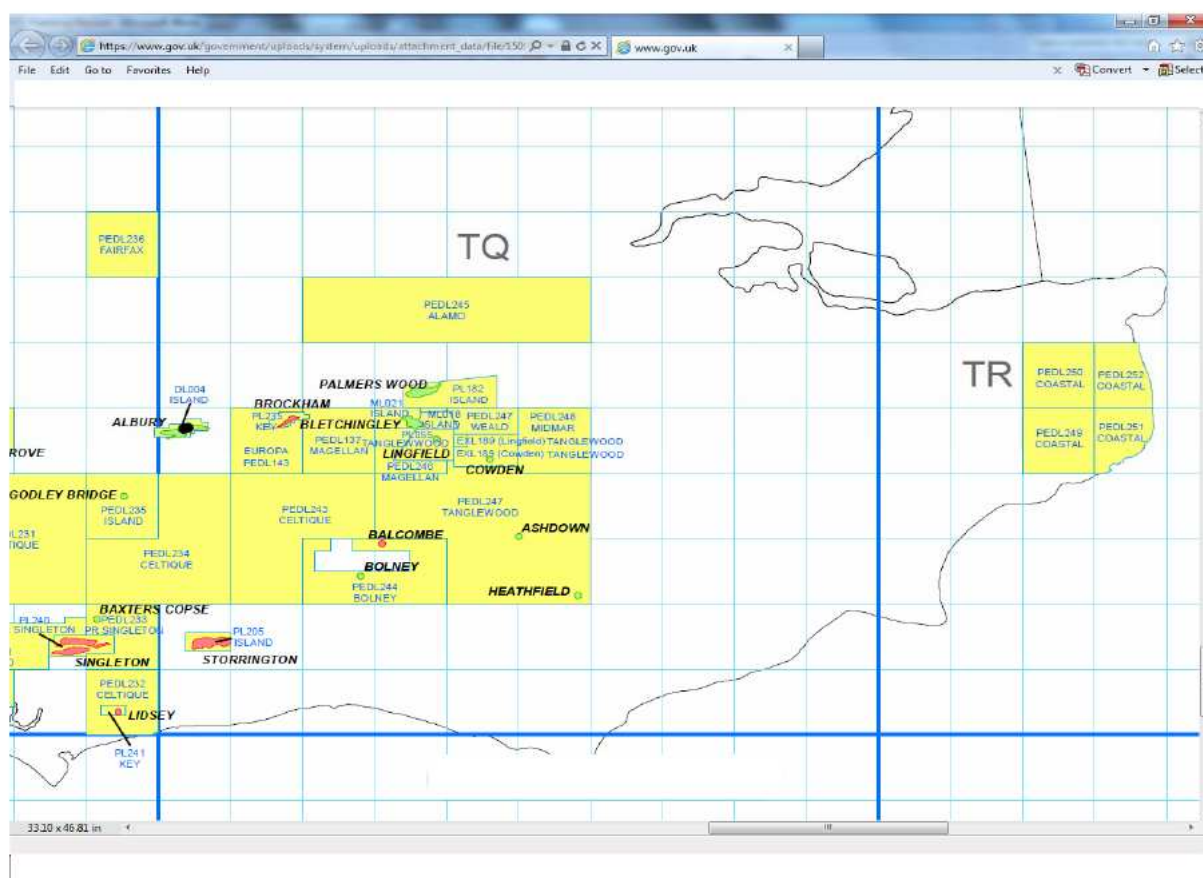
- Any need to gain access rights from landowners
- Health and safety regulations
- Planning permission from relevant local authorities (in our case Kent County Council).

For PEDL the initial term of the licence is set at 6 years and carries a work programme of exploration activity that DECC and the licensee will have agreed as part of the application process. This licence will expire at the end of the initial term unless the licensee has completed the work programme. At this time the licensee must also relinquish a fixed amount of acreage (usually 50%). The initial term is usually an exploration period.

The second term is intended for appraisal and development. It is for a period of 5 years and will expire at the end of the second term unless the Secretary of State has approved a development plan.

Finally, the third term is intended for production. It is for a period of 20 years although the Secretary of State has the discretion to extend the term if production is continuing.

Picture 1: Source Department of Energy and Climate Change - Areas Licensed for oil and gas extraction under the Petroleum Act 1998 (as of 1 November 2013)



The four PEDLs covering the Dover District are all in the initial exploratory stage (6 year term from 2008). The commitments of the work programme are as follows:

Licence	Firm (Minimum) Commitment
PEDL249	The Licensee shall obtain and reprocess 22km of 2D seismic data. The Licensee shall drill one well to a depth of 1000m.
PEDL250	The Licensee shall obtain and reprocess 22km of 2D seismic data. The Licensee shall drill one well to a depth of 1000m.
PEDL251	The Licensee shall drill one well to a depth of 1000m.
PEDL252	The Licensee shall obtain and reprocess 44km of 2D seismic data. The Licensee shall drill one well to a depth of 1000m.

The hydraulic fracturing undertaken by Cuadrilla Resources in the Bowland Basin in Northern England (potentially the biggest shale basin found so far in the world) takes place at depths generally in excess of 6,000 feet.

Coal-related Hydrocarbons

Coal Bed Methane (CBM) is methane formed through the geological process of coal generation. It is present in varying quantities in all coal and can be extracted using hydraulic fracturing techniques. The Coal Authority manages the UK's coal reserves and must agree to any access to coal formations for any purpose.

Certain processes capture native hydrocarbons, which originate in coal seams. The use of these require permission from the Coal Authority (for access to the coal) and a licence from DECC (for capture of the hydrocarbons). The processes include:

- Coal Bed Methane – liberates native methane from virgin coal seams
- Vent Gas (also called mines gas) – captures methane from working or disused mines

Coal bed methane is different to typical sandstone or other conventional gas reservoirs, as the methane is held within the coal by a process called adsorption. The process of extracting coal bed methane works by releasing pressure in coal seams by natural gas production or the pumping of water from the coal bed.

Kent Coalfield⁵

DECC in a report produced in 2010 stated that there have been few problems with methane encountered in Kent coal mining except at Betteshanger.

⁵ Department of Energy and Climate Change, 'Unconventional Hydrocarbon Resources of Britain's Onshore Basins' (2010)

The DECC report, now potentially superseded by subsequent reports, suggested that multiple unconformities on the NE margin of the Mesozoic Weald Basin and the permeable overlying limestone and sandstone might have allowed migration of gas out of the coalfield over an extended period of time into the Weald Basin. The issue of freshwater influx from Mesozoic aquifers having formed biogenic methane was identified as a potential resource.

The Potential Impact on Subsurface Water Resources and Geological Formations

Sub-Surface Water Resources

As mentioned earlier in this report, the process of hydraulic fracturing is designed to release methane trapped in unconventional rocks. A concern identified in Australia and the United States from areas where there has been large scale hydraulic fracturing is the risk of contamination of the groundwater supply with methane gas through release of trapped methane into aquifers and pollution through the chemicals used as part of the hydraulic fracturing process. These issues are addressed as best as possible in this report given the problems in finding sufficient peer reviewed work on this matter. However, a number of government and non-government agencies are undertaking research on the matter currently.

As part of the research for this report, the British Geological Survey (BGS) was contacted and their comments can be found later in this report. In addition, the Chartered Institute of Water and Environmental Management (CIWEM) was contacted and they advised that they would be producing a report in 2014 in respect of the potential water implications of hydraulic fracturing.⁶ In the United States where hydraulic fracturing has been undertaken for longer, the Environment Protection Agency at the request of the US Congress is conducting a study to “better understand the potential impacts of hydraulic fracturing on drinking water resources” that is expected to be released for peer review in 2014.

Sub-Surface Water Resources in the UK

Across the UK as a whole 35% of our drinking water comes from groundwater resources, though this figure is higher for the South East of England.⁷

Water issues arising from hydraulic fracturing process

There is much controversy over the level of risk involved in hydraulic fracturing to the water supply. In a publication from the Royal Society and the Royal Academy of Engineering⁸ issued in June 2012, it was stated that:

“the available evidence indicates that this risk is very low provided that shale gas extraction takes place at depths of many hundreds of metres or several kilometres. Geological mechanisms constrain the distances that fractures may propagate vertically. Even if communication with overlying aquifers were possible, suitable pressure conditions would still be necessary for contaminants to flow through fractures. More likely causes of possible environmental contamination include faulty wells, and leaks and spills associated with surface operations. Neither cause is unique to shale gas. Both are common to all oil and gas wells and extractive activities. Ensuring well integrity must remain the highest priority to prevent contamination.”

The Consumer Council for Water (CCWater) identifies the following potential risks involved to the safety of the UK’s water supply:⁹

⁶ Email from Laura Grant of the Chartered Institute of Water and Environmental Management

⁷ British Geological Survey, ‘Can shale gas be extracted safely?’

⁸ Royal Society and Royal Academy of Engineering, ‘Shale gas extraction in the UK: a review of hydraulic fracturing’ (June 2012)

⁹ Consumer Council for Water: <http://www.ccwater.org.uk/server.php?show=ConWebDoc.2867#>

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- (a) Contamination of the aquifers (underground water sources) by allowing 'fugitive' methane to permeate into drinking water sources from rocks where it was previously confined or by the chemicals involved in hydraulic fracturing;
- (b) Problems over the water demand involved (particularly in water stressed areas);
- (c) Possible issues over contaminated effluents and discharges; or
- (d) Damage to the water and sewerage infrastructure.

However, it should be noted that CCWater recognise that the evidence base in relation to potential risks is limited. As part of this, they are campaigning for water companies to be statutory consultees in all applications for fracking, although this would require legislation to be enacted.

Water UK, the representative body for UK water and wastewater service suppliers, identifies four areas of potential challenge for water companies in the UK:

(a) Water Quality

- Contamination of aquifers as a result of fracturing running through geology;
- Contamination via a failure in the well casing;
- The direct contamination of surface waters from poorly managed waste water or chemical handling; and
- Tertiary risk associated with traffic movement or drilling in general.

(b) Water Quantity

- The high volume of water use involved in hydraulic fracturing and the stress it places on existing potable water supplies.

(c) Removing and treating waste water

- Fluids involved in the hydraulic fracturing process will need to be treated by the local waste water company. This 'flowback' water will be contaminated with both the chemicals involved in the process and typically saline; and
- Naturally Occurring Radioactive Material (NORM) in waste water.

(d) Infrastructure

- Building of new infrastructure to connect water supply to drill site. This may present problems to install on the edges of a network; and
- Periods of variable use / what happens to infrastructure after drilling finishes

The Environment Agency identifies the following risks associated with exploring for and extracting unconventional gas:¹⁰

- gas or dissolved minerals moving through other rocks into aquifers;
- leaks from production wells into neighbouring rock formations and aquifers;
- leaks of gas to the atmosphere; and

¹⁰ Environment Agency: <http://www.environment-agency.gov.uk/business/topics/133885.aspx>

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- spills of fluids that come to the surface from storage tanks or lagoons.

It is the view of the Environment Agency that the above risks can be controlled through proper design and management of the drilling and extraction site. The Environment Agency is a statutory consultee in the planning process and provides local mineral planning authorities (in our case Kent County Council) with advice on the potential risks to the environment from individual gas exploration and extraction sites. Furthermore, any PEDL licence holder is required to consult with the Environment Agency (the environmental regulator for unconventional gas operations in England) and apply for environmental permits and other permissions for these activities.

The environmental permitting regulations cover:

- protecting water resources, including groundwater (aquifers) as well as assessing and approving the use of chemicals which form part of the hydraulic fracturing fluid
- appropriate treatment and disposal of mining waste produced during the borehole drilling and hydraulic fracturing process
- suitable treatment and management of any naturally occurring radioactive materials (NORM)

The International Energy Agency, founded in response to the 1973/74 Oil Crisis, is a 28 country group that includes the UK in its membership. In its publication 'Golden Rules for a Golden Age of Gas' it identifies the following golden rules in respect of unconventional gas extraction and water under the Rule 'treat water responsibly':

- Reduce freshwater use by improving operational efficiency;
- Reuse or recycle, wherever practicable, to reduce the burden on local water resources;
- Store and dispose of produced and waste water safely; and
- Minimise use of chemical additives and promote the development and use of more environmentally benign alternatives.

As part of its fact finding, the Scrutiny (Community and Regeneration) Committee was advised by the Campaign to Protect Rural England (CPRE) that any contamination of the groundwater supply would be "for all practical purposes, irreversible".

Turbidity Issues

Affinity Water in its response to the planning applications made by Coastal Oil and Gas Ltd raised questions over turbidity issues arising at public water supply borehole sources while any drilling may take place through the chalk layers. Affinity Water also highlighted the potential for outages at one or more of the pumping stations as a result.

Turbidity is defined as the cloudiness of a fluid caused by individual particles (suspended solids). While heavier particles will settle to the bottom, smaller particles can remain suspended in the fluid.

'Flowback' Water

Research undertaken by the water industry has concluded that the flowback water should be treatable at larger urban / industrial waste water treatment facilities. The flowback water itself is normally highly saline, which is toxic to the bacteria used by water companies in the treatment process and only larger facilities can provide sufficient dilution of the saline flowback water. It also contains minerals dissolved from rocks as well as small particles of

rock. Due to the high mineral count, the Environment Agency requires that this flowback water should be properly disposed of.

The Environment Agency as part of its monitoring of the flowback water in the Bowland Basin in 2011 stated that typically a quarter of the water injected as part of the hydraulic fracturing process will return to the surface over a period of weeks to a few months through the drilled well.

As part of the monitoring, the Environment Agency found the minerals that it would expect to find naturally occurring in shale rock such as notably high levels of sodium, chloride, bromide and iron, as well as higher values of lead, magnesium and zinc compared with the local mains water that was used for injecting into the shale.

The flowback water could potentially also contain Naturally Occurring Radioactive Material (NORM) that would have to be treated.

Naturally Occurring Radioactive Materials (NORM)

Naturally Occurring Radioactive Material (NORM) is not exclusive to hydraulic fracturing and is found in conventional oil and gas exploration as well as coal mining. In hydraulic fracturing, wastewater from the drilling process may contain (NORM), although the exact levels will be dependent on the local geology.

The Environment Agency states the following in respect of NORM in their report on Bowland Basin samples:

“Naturally occurring radioactive materials have been present in rocks since their formation, perhaps billions of years ago. All radioactive materials undergo decay to become more stable, eventually ceasing to be radioactive. Some radioactive materials decay over very long time periods and others more quickly, and so naturally occurring radioactive materials will contain many different radioactive isotopes in differing amounts. The radioactive materials with very long decay times are usually present in larger amounts. Commonly this is radium-226.”¹¹

The samples from the Bowland Basin taken by the Environment Agency found levels of radium-226 as the radioactive material present at the highest levels at between 14 and 90 Becquerel per litre compared to the average values for natural radioactivity in soil in Western Europe of radium-226 at 40 Bq/kg.

Methane levels in Groundwater

Methane is naturally occurring in most groundwater sources, and originates from one of two main sources – biogenic methane and thermogenic methane.¹² Biogenic methane is bacterially produced and is detectable in nearly all groundwater. It is usually associated with peat bogs, wetlands, lake sediments and landfills. Thermogenic methane is formed during the thermal decomposition of organic matter at depth under high pressures. It is usually associated with coal, oil and gas fields. The British Geological Survey (BGS) states that most methane in UK groundwater is likely to be biogenic in origin.

As a gas methane while not classified as toxic, is flammable and may form explosive mixtures in air. Methane becomes an explosive hazard at concentrations of 5–15% by volume in air.¹³ It is also an asphyxiant and may (as a gas) displace oxygen in an enclosed space. In terms of methane in groundwater, assuming complete outgassing from water, this

¹¹ Environment Agency, Shale Gas ‘North West – Monitoring of Flowback Water’ (6 December 2011)

¹² British Geological Survey, ‘Methane in UK groundwater research overview’

¹³ British Geological Survey, ‘Methane in UK groundwater research overview’

requires a minimum dissolved methane concentration of 1600 µg/l⁻¹ (micrograms per litre) for it to be a potential safety hazard.

Measurements from Cretaceous, Jurassic and Triassic carbonate and sandstone aquifers in the UK have shown mean methane concentrations of less than 10 µg/l⁻¹. The upper range of 500 µg/l⁻¹ for Cretaceous, Jurassic and Triassic carbonate and sandstone aquifers is well below the 1600 µg l⁻¹ level, though Aquiclude and thermal waters from the Carboniferous and Triassic have shown concentrations in excess of 1500 µg/l⁻¹.¹⁴

Baseline methane levels in the Dover District

The BGS is currently conducting studies to establish the baseline methane levels in the UK, including the Dover District and the results of this survey will be published in 2014. As part of the fact finding for this scrutiny review, contact was made with the BGS and while they are unable to provide analyses for individual sites in the district at this stage before publication, they advised that of the 11 sites (7 of which were Affinity Water boreholes) they tested in the Dover District none exceeded 5 µg/l for methane¹⁵. This is an extremely low background concentration and any leakage of methane gas into the district's aquifers would be readily detectable.

Water Stress

The Environment Agency (EA) defines areas of serious water stress as being where:

- The current household demand for water is a high proportion of the current effective rainfall which is available to meet that demand; or
- The future household demand for water is likely to be a high proportion of the effective rainfall available to meet that demand.

Under the methodology used by the EA, the Dover District areas served by both Affinity Water and Southern Water respectively are classified as being 'Areas of Serious Water Stress' in the most recent survey (2013) for the purposes of Regulation 4 of the Water Industry (Prescribed Condition) Regulation 1999 (as amended).

Water usage in hydraulic fracturing

There were many estimated figures quoted for water consumption involved in hydraulic fracturing as part of the research for this report and although no single definitive water consumption figure 'per frack' was found there were common ranges identified.

In terms of the UK, Cuadrilla Resources' website states that during operations at Preese Hall, Lancashire, 8,400 cubic metres of water were used for the fracture treatments.¹⁶ Drilling at each site used around 900 cubic metres, some of which was recycled water. A distinction was however drawn over water usage in the exploratory stage and the production phase, with most fracturing water during the exploratory stage not being recycled as opposed to the production phase where it was "more practical to recycle the water".¹⁷ Cuadrilla state that during dry spells and droughts, the supply for hydraulic fracturing would be restricted "well before residents and farmers see any impact on their supplies".

¹⁴ British Geological Survey, 'Methane in UK groundwater research overview'

¹⁵ Email from Dr George Darling, British Geological Survey

¹⁶ Cuadrilla website: <http://www.cuadrillaresources.com/protecting-our-environment/water/water-sourcing/>

¹⁷ Cuadrilla website: <http://www.cuadrillaresources.com/protecting-our-environment/water/water-sourcing/>

Cuadrilla cite as a comparison a figure of 1-6 gallons of water needed per million British Thermal Units¹⁸ for deep shale natural gas production in comparison with 13-32 gallons of water per million British Thermal Units for coal (ready to use in a power plant) or 8-14 gallons of water per million British Thermal Units for nuclear power.

Water UK estimated that a single production field could have a peak demand of approximately 2 million litres per day during fracturing with a total demand in the order of 20 million litres per year. The research assumed no recycling of waste water and was based on the demand of a 1000 well field reaching peak production in around 3 to 6 years into the development.¹⁹ This was on a par with large industrial usage and would require a 300mm pipe to deliver to the site.

The 'Explore Shale' website which is focused on the drilling activity in the Marcellus Shale in Pennsylvania, cites that each drill site uses between 3 – 5 million gallons of water per 'frack'. The Groundwater Protection Council in the US states that every 'fracked' well requires up to 4 million gallons of water.

Any potential mitigation of the burden that hydraulic fracturing would place on local aquifers could involve utilising water tanker deliveries from sources outside the district, recycling waste water from the drill site, and collecting rain water. Water UK suggests that a water management plan should be developed by the operator of any drilling site.

Contamination of Groundwater by 'Fracking Fluid'

In the UK the disclosure of the constituents of fracturing fluid is already mandatory although this does not mean that the chemical additives are non-hazardous. The use of non-hazardous chemical additives is identified by the Royal Society as a factor that would mitigate the environmental impact of any spill.

Cuadrilla Resources' states that their fracturing fluid is 99.95% water and sand, leaving 0.5% as chemicals.²⁰ As was pointed out to the Committee during its fact finding process, the volume of liquid used in the hydraulic fracturing process can still make 0.5% a substantial quantity of chemical fluids.

According to the Cuadrilla Resources' website, the fracturing fluid used at the Preese Hall exploration well site and for future exploration well sites used the following additives:

- Polyacrylamide (friction reducer)
- Sodium salt (for tracing fracturing fluid)
- Hydrochloric acid (diluted with water)
- Glutaraldehyde biocide (used to cleanse water and remove bacteria)

The website states that so far as an additive to fracturing fluid, Cuadrilla has only used polyacrylamide friction reducer along with a miniscule amount of salt, which acts as a tracer. There has been no need to use any biocide as the water supplied to the Lancashire exploration well sites had been treated to remove bacteria by United Utilities (the water supply company). They have not had to use diluted hydrochloric acid in fracturing fluid at

¹⁸ A British Thermal Unit is the energy needed to heat one pound of water by one degree Fahrenheit (1055 Joules).

¹⁹ Water UK, "Understanding the impacts of shale gas on the UK water industry", Speech given at – UK Shale 2013, 17 July 2013: <http://www.water.org.uk/home/news/press-releases/challenge-on-gas-fracking/publication-version---jm-shale-gas-speech.pdf>

²⁰ Cuadrilla Resources: <http://www.cuadrillaresources.com/what-we-do/hydraulic-fracturing/>

Preese Hall. The additives proposed, in the quantities proposed, have resulted in the fracturing fluid being classified as non-hazardous by the Environment Agency.²¹

The concerns expressed in relation to fracking fluid are that the fractures caused by the fracking process could lead to the chemical permeating into the groundwater supply such as aquifers.

Restrictions on Drilling

The Chartered Institute of Water and Environmental Management (CIWEM) views the impact on amenity of hydraulic fracturing as likely to be greater in the UK than other countries where fracking is common practice, as the proximity and density of populations relative to possible UK sites are greater. CIWEM advocate the restriction or prevention of development in areas of high value or sensitivity with regard to biodiversity, water resources and local communities.

Furthermore, it considers that an Environmental Risk Assessment should be made mandatory for proposed shale gas operations to ensure that each site is individually assessed and the cumulative impacts of fields and the likelihood of a specific impact are taken into account.²²

In Pennsylvania, gas wells cannot be drilled within 200 feet of structures, water wells or freshwater springs or within 100 feet of streams or wetlands. However, waivers do permit companies to drill inside of these limits with additional protective measures.²³

Public Health Issues

On 31 October 2013, Public Health England published its draft 'Review of the Potential Public Health Impacts of Exposures to Chemical and Radioactive Pollutants as a Result of Shale Gas Extraction'.²⁴ The report focused on the impact of direct releases of chemicals and radioactive material from shale gas extraction and related activities, primarily through pollution to air, land and water.

The report also highlights the absence of peer reviewed research on the health implications of the hydraulic fracturing process. It identifies the problems in the United States as being due to "operational failures and inadequacies in the regulatory environment" and cautions over difficulties in accurately extrapolating information from events there.

The main areas of risk are summarised by Public Health England as:

- Contamination of groundwater as a result of borehole leakage; and
- Accidental spills and accidents above ground.

The report also draws a distinction between the risks from small scale exploratory drilling (a single well) and commercial scale operations. The cumulative impact of multiple wells at different phases of operation in a relatively small area is identified as needing careful scrutiny.

Public Health England concludes on the available evidence that "the contamination of groundwater from the underground fracking process itself is unlikely". However, it recognises the need for further work on:

²¹ Cuadrilla Resources: <http://www.cuadrillaresources.com/what-we-do/hydraulic-fracturing/fracturing-fluid/>

²² Chartered Institute of Water and Environmental Management: <http://www.ciwem.org.uk/policy-and-international/policy-position-statements/hydraulic-fracturing-%28fracking%29-of-shale-in-the-uk.aspx>

²³ Explore Shale website

²⁴ Public Health England <http://www.hpa.org.uk/Publications/Environment/PHECR CEReportSeries/>

Scrutiny (Community and Regeneration) Committee Report

- baseline monitoring;
- development of emission inventories and monitoring programmes during and post production;
- early toxicological assessment of chemicals used in fracking fluids; and
- the cumulative impact of multiple wells.

The report emphasises the need for “good on-site management and appropriate regulation of all aspects of operations, from exploratory drilling to gas capture and use and storage of fracking fluid” and the importance of the planning and environmental permitting process.

Seismic Impact

The UK, on average, experiences seismicity of magnitude 5M (felt by everyone nearby) every 20 years and magnitude 4M (felt by many people) every 3 or 4 years. Coal mining related seismicity according to British Geological Survey records was no larger than magnitude 4M. As of June 2012, the Royal Society / Royal Academy of Engineering stated that the emerging consensus was that seismicity induced by hydraulic fracturing would be no greater than magnitude 3M and therefore less than coal mining related seismicity. The depth of the hydraulic fracturing would also determine the surface impact of any seismicity, with a lesser impact the deeper the fracturing.

The earth tremor attributed to the hydraulic fracturing undertaken near Blackpool in April and May 2011 was measured as magnitude 2.3M. The earth tremor that affected Folkestone in 2007 measured 4.3M, with a subsequent earth tremor in 2009 measuring 2.3M.

As a result of these earth tremors, the Secretary of State for Energy and Climate Change issued a Written Ministerial Statement in December 2012 announcing the outcome of investigations into the cause. The evidence was reviewed with the aid of independent experts and concluded that appropriate controls were available to mitigate the risks of undesirable seismic activity and that such controls would be required by DECC for all future shale gas wells.

All new applications for hydraulic fracturing require the applicant to conduct a review of fault lines in the area of the licence application and produce a plan showing any seismic risks. In the UK hydraulic fracturing is monitored by a ‘traffic light system’ and drilling must be stopped if seismic activity reaches 0.5 on the Richter scale above the background seismic activity.

However, a study conducted by Columbia University (in the US) concluded that the use of water to extract oil and gas in hydraulic fracturing could weaken existing fault lines and leave them vulnerable to being triggered by normal seismic activity. There is some controversy over how permanent this weakening of the fault lines could be.

The Type and Scale of Surface Structures

In the UK Shale gas operations are likely to require environmental permits from the Environment Agency under the Environmental Permitting Regulations 2010 and Shale gas wells must be designed, built and operated to standards set in the regulations governed by the Health and Safety Executive (HSE).

The Campaign to Protect Rural England (CPRE) state that a drilling site is approximately 1900 square metres in size with a drilling rig standing around 9 metres in height.²⁵ In

²⁵ Campaign to Protect Rural England - <http://protectkent.org.uk/blog/fracking-coming-kent/>

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addition to the visual impact, there will be issues around the lighting of the site, the flaring of methane gas, the noise of production / drilling and traffic movements to and from the site. All of these issues are covered by the planning process.

The image below is obtained from the Cuadrilla Resource website shows hydraulic fracturing equipment at Preese Hall in 2011.

Picture 2: Source Cuadrilla Resources - Image of Preese Hall.

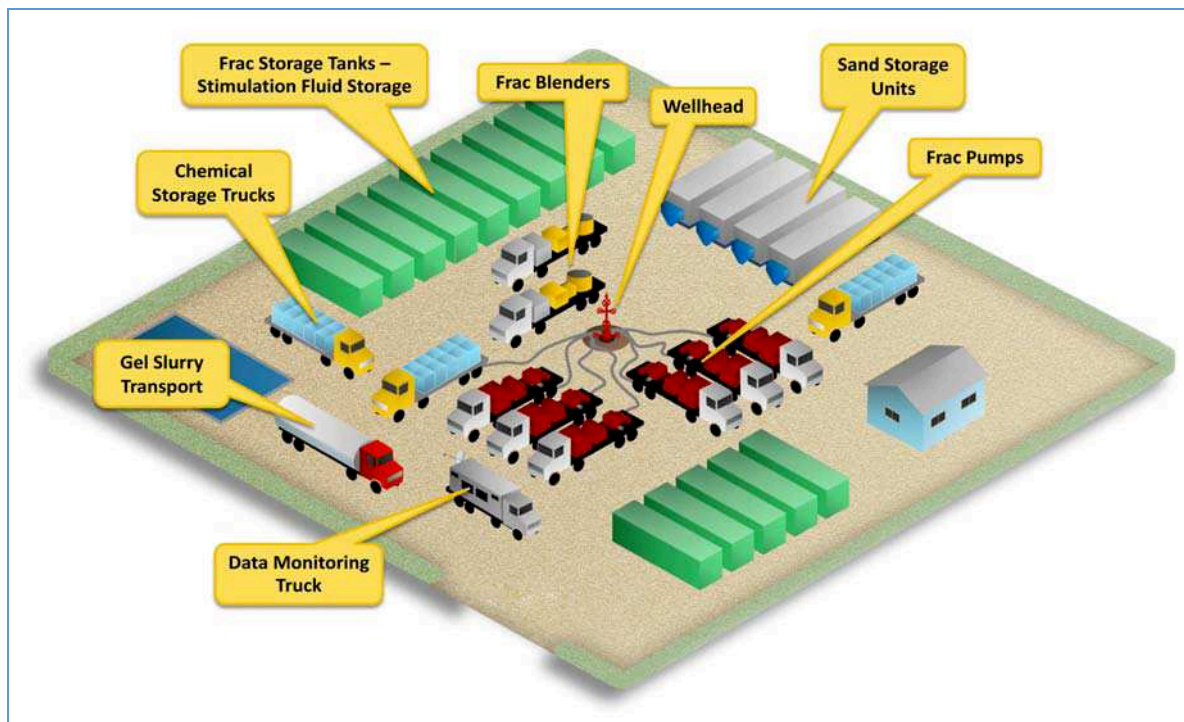


The US Department of Energy leaflet on how shale gas is produced provides the following illustration of common equipment at a hydraulic fracturing drill pad.

The American energy company Chevron state that it takes up to a year to build the well site and drill and complete the well. This is based on a drilling rig that drills a vertical well approximately 8,000 feet (2,438 m) below the earth's surface. The rig then drills horizontally, about 2,000 to 6,000 feet (610–1,829 m) outward into the layer of shale rock.

Scrutiny (Community and Regeneration) Committee Report

Picture 3: Source US Department of Energy - Representation of common equipment at a natural gas hydraulic fracturing drill pad.



Impact of Anti-Fracking Demonstrations on the Local Communities and on the Police

Sussex Police has responsibility for policing the anti-fracking demonstrations at the Cuadrilla Resources site in Balcombe. The cost of policing the demonstrations was estimated at £2.381 million as of Thursday 5 September 2013.

As part of this report a letter was sent to Kent Police in respect of this area. The response from Paul Brandon, Assistant Chief Constable (Operations) recognises the possibility of protest at potential drilling sites (the letter was written at the time the planning applications to Kent County Council were live) and states that “Kent Police will facilitate lawful protest while also seeking to prevent crime and disorder”. The experience Kent Police has of policing peaceful protests is cited and that officers were “specially trained to deal with events of this nature, to uphold the law and police protests fairly and even-handedly”.

In addition, Kent Police have been liaising with Sussex Police to share lessons learnt from the experience at Balcombe. The costs for any deployment would be met by Kent Police.

Supporting Papers

Correspondence (Appendix 1)

- Cuadrilla Resources – Letter dated 24 October 2013
- British Geological Survey – Email dated 13 November 2013
- Kent Police – Letter dated 7 November 2013
- Affinity Water – Letter dated 4 November 2013
- Chartered Institute of Water and Environmental Management – Email dated 23 October 2013

Letters were written to Southern Water and Coastal Oil and Gas Ltd to which no reply was received.

Documentation Received by the Committee at its meeting held on 11 November 2013

- Campaign to Protect Rural England – Slides with explanatory information
- East Kent Against Fracking – Text of address to Committee
- Keep Shepherds Well – Text of address to Committee
- Keep Shepherds Well – Letter to Kent County Council Planning Department
- Shepherds Well Parish Council – Letter in respect of Planning Application (KCC/DO/0218/2013)
- Guston Parish Council – Report
- DVD 'Fracking in the UK' by Marco Jackson (Provided by Campaign to Protect Rural England)

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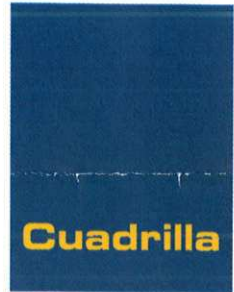
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- The Global Warming Policy Foundation website: <http://www.thegwpf.org/britain-holds-biggest-shale-basin-world/>
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- Hydraulic fracturing (Wikipedia): <http://en.wikipedia.org/wiki/Fracking>
- UK Groundwater Forum: <http://www.groundwateruk.org/Default.aspx>
- Shale Gas Report: <http://www.shalegas-europe.eu/en/index.php/about-us/the-expert-advisory-panel>
- Centre for Energy Economics and Policy: http://www.rff.org/centers/energy_economics_and_policy/Pages/Shale-Gas-Expert-Survey.aspx
- The Telegraph, 'Shale could fuel UK for 10 years': <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/10111793/Shale-could-fuel-UK-for-10-years-say-experts.html>
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- The Telegraph, 'Prof Robert Mair: Here the facts about fracking': <http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/10266881/Prof-Robert-Mair-Here-are-the-facts-about-fracking.html>
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- BBC News, 'Fracking: Water concerns persist?' (16 August 2013): <http://www.bbc.co.uk/news/science-environment-23724657>
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- East Kent Against Fracking: <http://eastkentagainstfracking.blogspot.co.uk/>
- Affinity Water: <https://stakeholder.affinitywater.co.uk/home.aspx>
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- Public Health England: <http://www.hpa.org.uk/Publications/Environment/PHECRCEReportSeries/>
- Sussex Police 'Balcombe Protests Policing Costs Update' (6 September 2013): <http://www.sussex.police.uk/whats-happening/latest/news-stories/2013/09/06/balcombe-protests-policing-costs-update>

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www.cuadrillaresources.com



By email and post rebeccabrough@dover.gov.uk

Ms R Brough
Team Leader – Democratic Support
Dover District Council
Democratic Services
White Cliffs Business Park
Dover
Kent
DT16 3PJ

24 October 2013

Dear Ms Brough,

**Invitation to attend and present to Scrutiny (Community and Regeneration)
Committee meeting on Wednesday 13 November 2013**

Thank you for your letter dated 18th October inviting Cuadrilla to attend and present to The Scrutiny (Community and Regeneration) Committee meeting scheduled for Wednesday 13 November.

We appreciate the invitation and the opportunity to contribute to your session, however, we do not have any planned operations in the Dover district area and will therefore politely decline to attend your Committee meeting on this occasion.

Cuadrilla is keen to ensure that information about the company, its operational sites and activities and the fracking process is readily available and there are comprehensive details available via our website www.cuadrillaresources.com – we hope you find this source of information useful in answering the points raised in your motion.

Yours sincerely,



Francis Egan
Chief Executive Officer

FGE-E-L036/FGE/dmp

Dear Ms Brough,

At this stage in our methane baseline investigations we are not reporting analyses for individual sites in any area; it is intended that the data will be released in a report some time next year. However, I can tell you that of the 11 sites we have measured in the DDC area (seven of which were Affinity Water boreholes), none has exceeded 5 µg/L for methane. This is an extremely low background concentration against which any leakage of gas into the aquifers would be readily detectable.

I hope this helps,

Kind regards,

George Darling

British Geological Survey
Wallingford



**Kent
Police**

Protecting and serving the people of Kent

**Paul Brandon
Assistant Chief Constable (Central Operations)**

Ms. R. Brough
Team Leader, Democratic Support
Dover District Council
White Cliffs Business Park
DOVER
Kent CT16 3PJ

Date: 7 November 2013
Ref: 3621/2013

Dear Ms. Brough

Re: Proposed drilling activity in the Dover District.

Thank you for your letter, dated 22nd October 2013, which was passed to me by Chief Constable Learmonth. Kent Police is aware of a number of planning applications relating to exploratory drilling in Kent. These planning applications are with the KCC Planning Committee and Kent Police have no control over their decision.

None of these sites has to date attracted any notable protest, but we recognise that is a possibility and should the situation change then Kent Police will facilitate lawful protest while also seeking to prevent crime and disorder.

Kent Police has a great deal of experience of policing peaceful protests and officers are specially trained to deal with events of this nature, to uphold the law and police protests fairly and even-handedly. As a further contingency, officers and staff have been liaising with our counterparts in Sussex Police to draw on their experiences following the incidents at Balcombe earlier this year.

Costs for policing protests are likely to be met by Kent Police, but no significant deployment is either necessary or anticipated at this time.

Chief Superintendent Roden, who is the appointed Gold Commander for the Operation, has arranged a briefing session on the 21st November 2013 to key partners on the preparations that are underway from a Police perspective.

You may be aware that an invitation was sent to Mr. Nadeem Aziz on the 30th October, which he declined. However, he has confirmed that the briefing will be attended by Mr. David Randall.

Yours sincerely

Paul Brandon
Assistant Chief Constable (Central Operations)

cc: C/Supt. Alison Roden – Head of Tactical Operations.

Rebecca Brough
Dover District Council
Democratic Services
White Cliffs Business Park
Dover
Kent. CT16 3PJ

Dear Rebecca,

Ref: Methane levels in Dover District Groundwater

I am writing in response to Dover District Council's Scrutiny Committee request for Affinity Water views in respect of potential contamination of the aquifers from proposed Coal Bed Methane exploration planning applications submitted to Kent County Council.

Affinity Water Limited is the water undertaker appointed by Ofwat for the area affected by the potential exploratory drilling operations. As the water undertaker for the area, we have a duty under the Water Industry Act 1991 to ensure that the water we supply to our customers is wholesome and that in relation to each of our water sources there is, as far as reasonably practicable, no deterioration in the quality of water which is supplied from the source. We must therefore ensure that an assessment is made of the proposed activity within the catchments that present a risk of pollution to our public supply boreholes.

We have reviewed the documentation provided by Coastal Oil and Gas as part of their planning applications and the documentation does not currently contain sufficient information to provide assurance that appropriate steps have been taken to identify, assess and mitigate potential risks to groundwater. Consequently, we have raised an objection to these applications to Kent County Council.

I have summarised below our general concerns which were raised in the objection:

- Hydrogeological Risk Assessments have not been included in the applications so potential risks to groundwater are not identified at the planning stage of the process. We therefore cannot be certain that risks to groundwater have been adequately considered and mitigation measures identified.
- We are concerned that turbidity issues may arise at the nearby public water supply borehole sources while drilling through the chalk layers which may cause outages at one or more of our pumping stations. We have particular concerns during periods of high demand and request assurance on how this can be mitigated/avoided.
- There appears to be a lack of baseline monitoring for methane and other gases and also groundwater level monitoring at the existing boreholes in the vicinity that may be affected by the drilling activities prior to, during and after the installation of the exploratory borehole. We also have concerns that long term monitoring has not been defined once the exploration stage has ceased, especially should the exploratory boreholes become production sources.

There is uncertainty regarding the potential nature and impact of such activities on groundwater which we are seeking assurances that our concerns are addressed through the planning process. Affinity Water is working with the Environment Agency and the water industry to identify, assess and understand the mitigation measures required to protect groundwater.

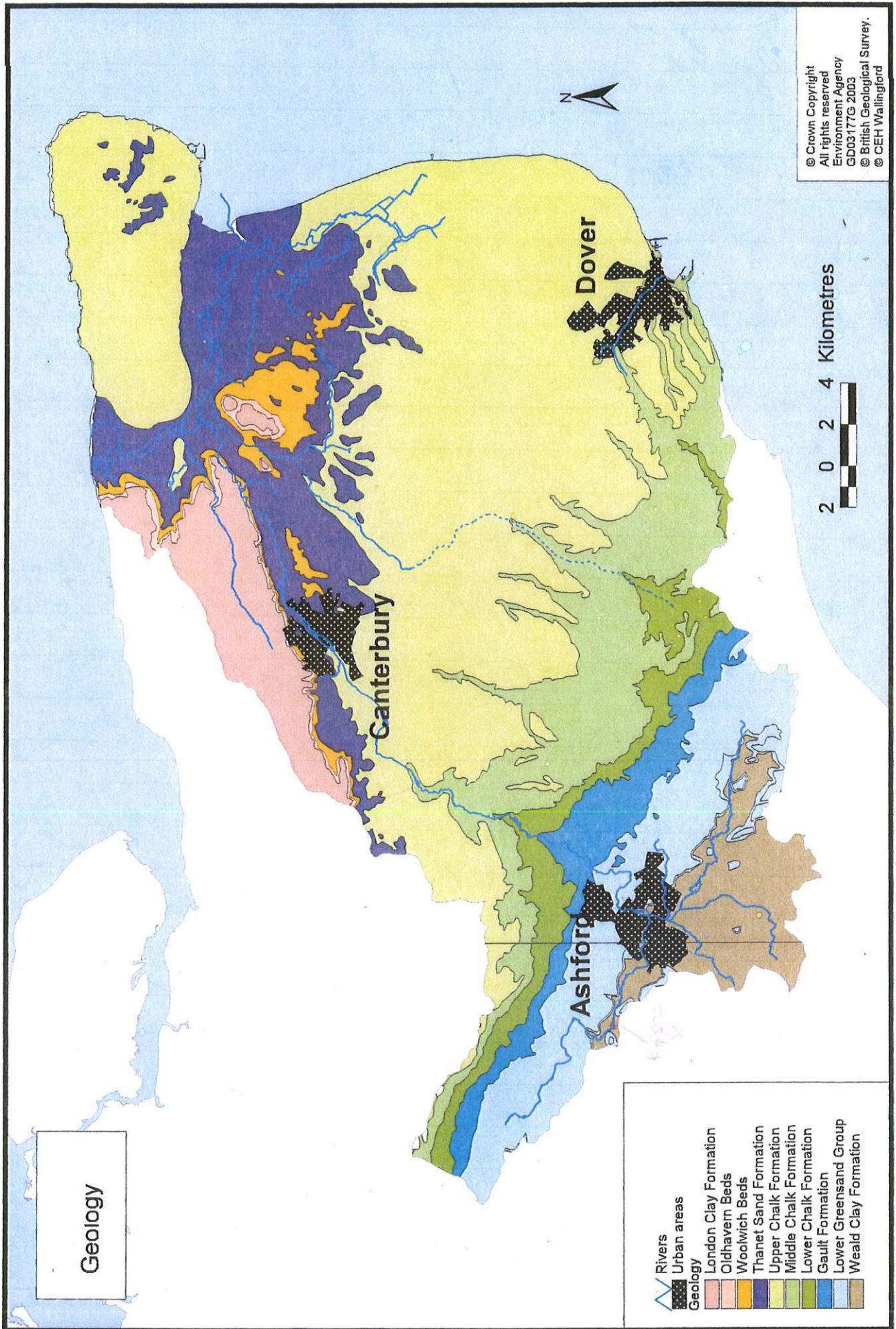
We are prepared to discuss these concerns further with the Environment Agency, Kent County Council and the applicants (Coastal Oil and Gas) to ensure that protection of groundwater during drilling, exploration and long term monitoring is fully considered and any risks identified are mitigated.

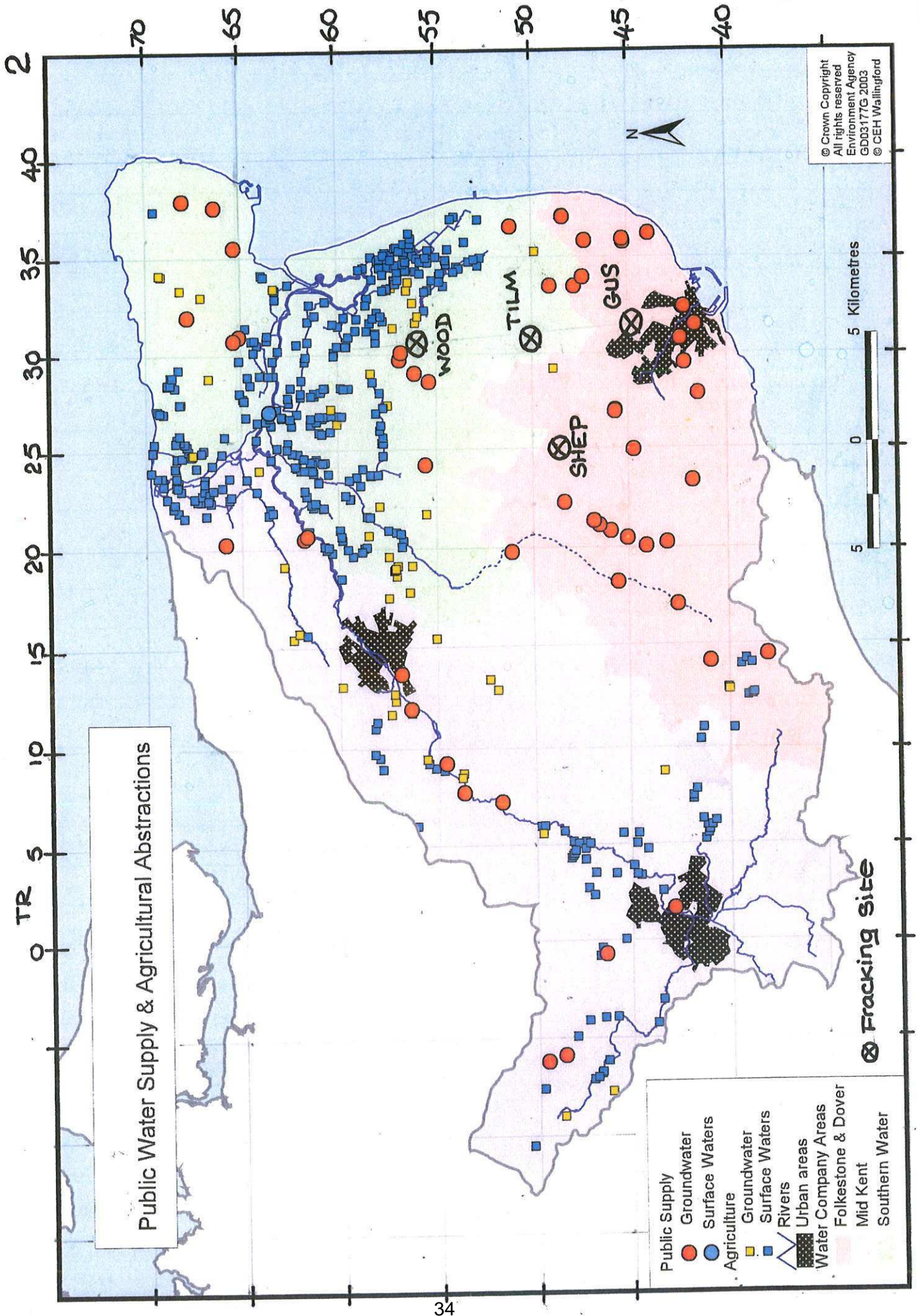
Yours sincerely

Alister Leggatt
Catchment Officer
Affinity Water Ltd.

CPRE KENT.

SHALE GAS RECOVERY IN EAST KENT
WATER RESOURCE IMPLICATIONS





Public Water Supply & Agricultural Abstractions

- Public Supply
 - Groundwater
 - Surface Waters
- Agriculture
 - Groundwater
 - Surface Waters
- Rivers
- Urban areas
- Water Company Areas
 - Folkestone & Dover
 - Mid Kent
 - Southern Water
- ⊗ Fracking site

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 Environment Agency
 GD03177G.2003
 © CEH Wallingford

5 Kilometres

The representation on this map of a road, track or footpath, is no evidence of the existence of a right of way.
 Made and published by the Director General of the Ordnance Survey, Cheshington, Surrey, 1966, for the Geological Survey.

Index to the Six-Inch Maps in this sheet

NE	NW	NE
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SE	SW	SE
NE	NW	NE
TR 24	TR 34	
SE	SW	SE

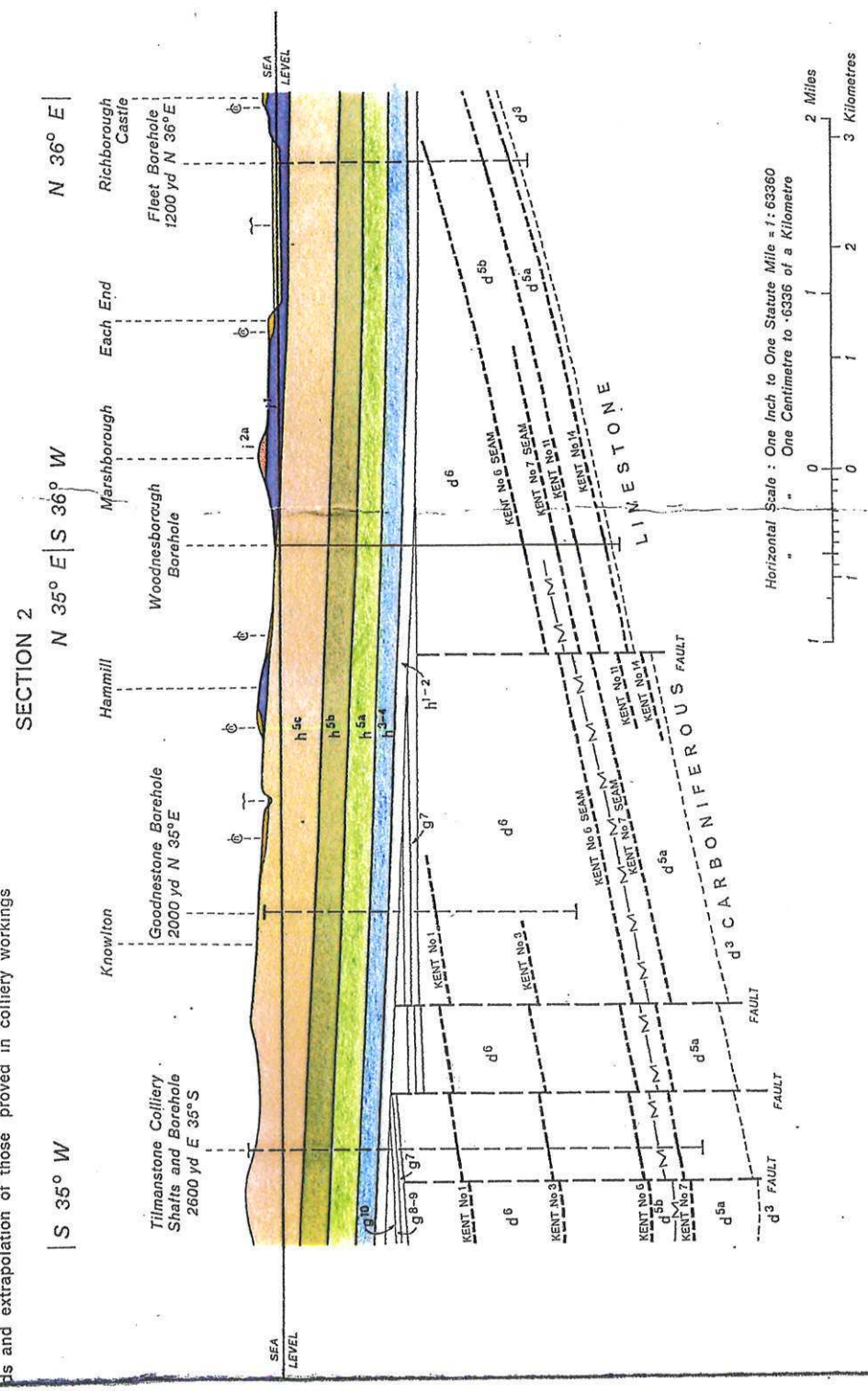
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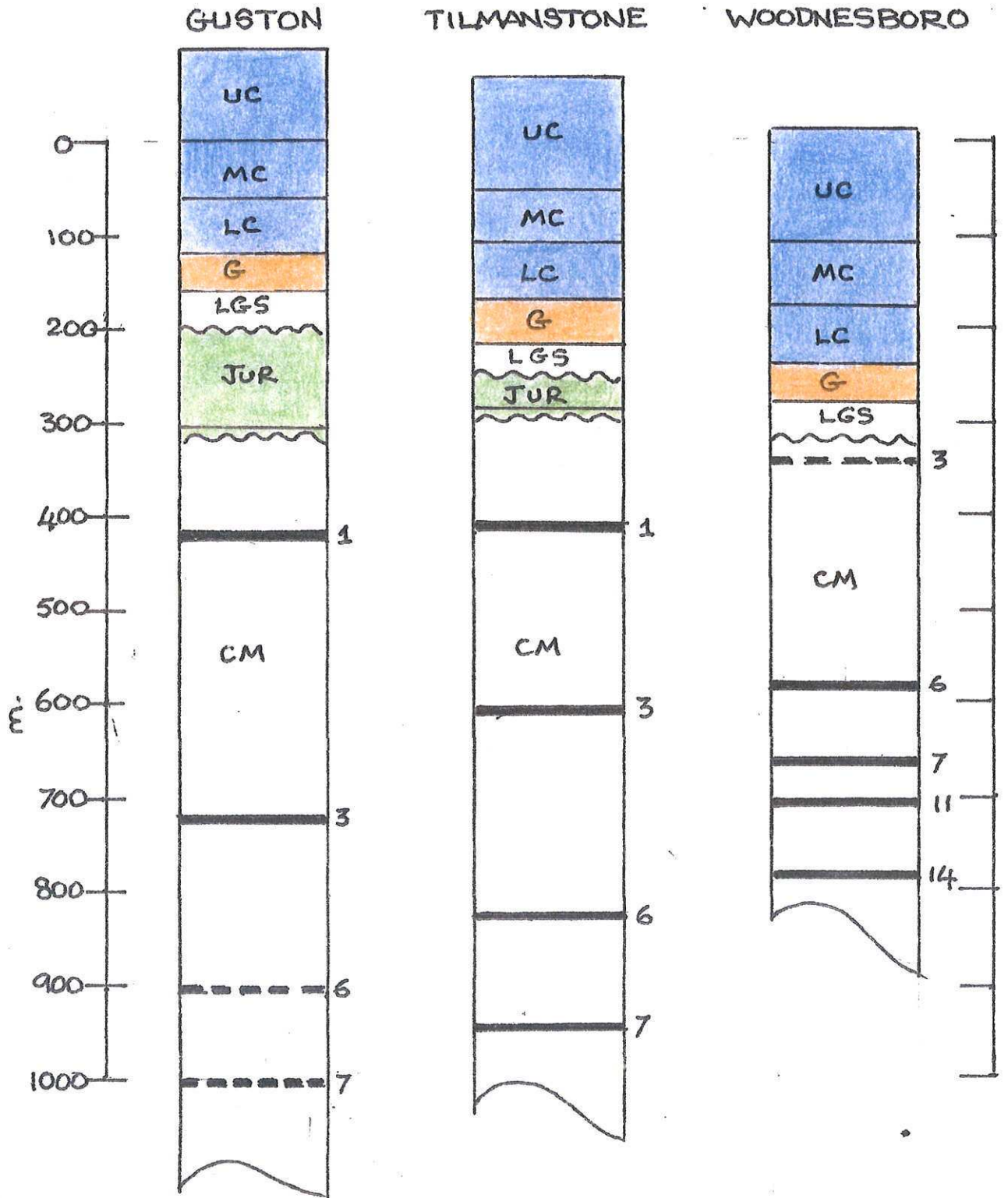
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 Data from Admiralty Chart No 1895 dated 1959.

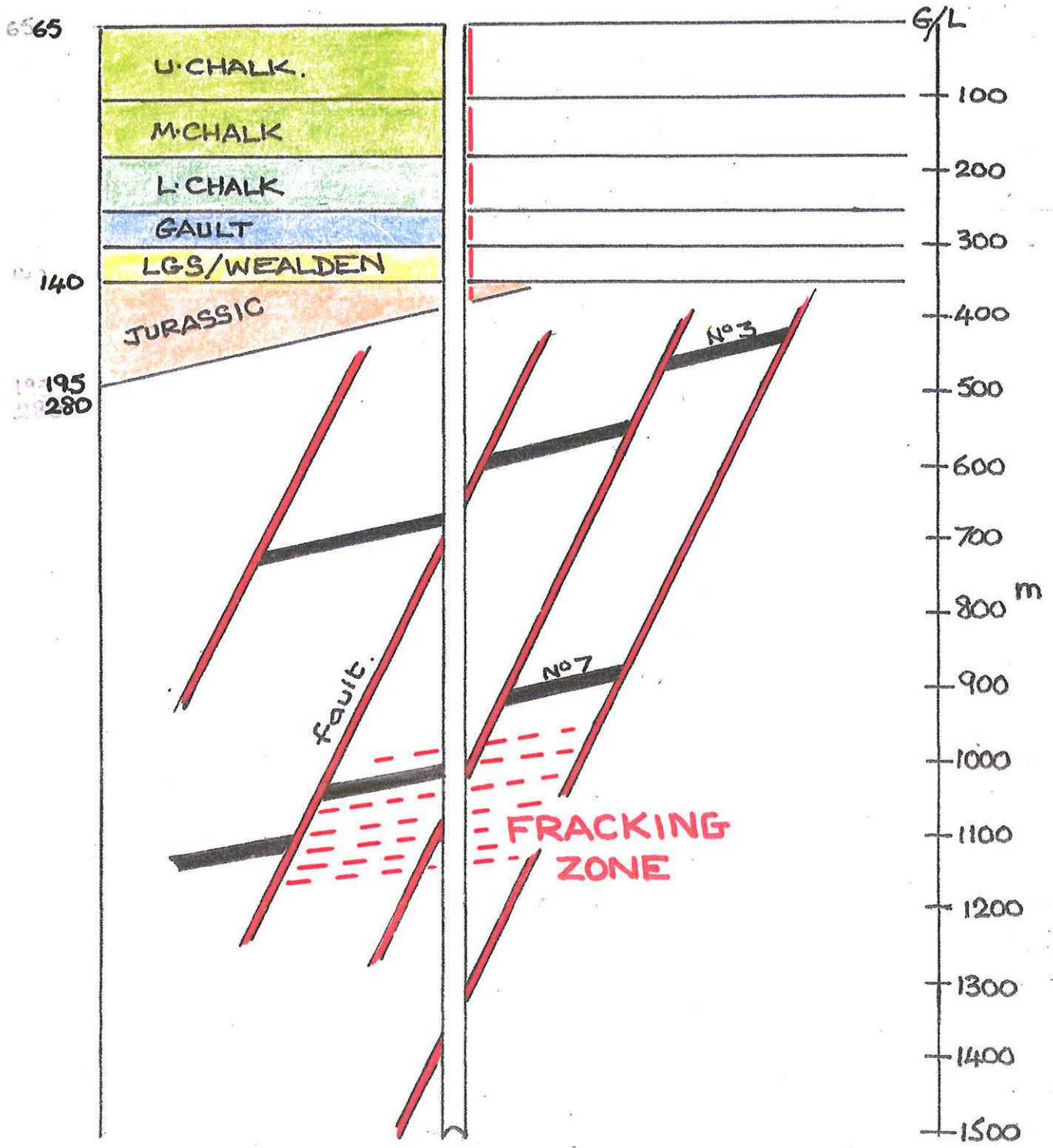
1966

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**DOVER D.C. SCRUTINY COMMITTEE MEETING:
11TH NOVEMBER 2013.**

SHALE GAS RECOVERY IN EAST KENT: WATER RESOURCE IMPLICATIONS.

1. REF. APPLICATIONS BY COASTAL OIL AND GAS FOR EXPLORATORY DRILLING AT GUSTON, SHEPHERDSWELL AND TILMANSTONE; AND THE THREAT TO DOVER'S WATER SUPPLY.

2. FIG 1. GEOLOGY.

SETTING THE SCENE: NOTE OUTCROP AREA OF THE CHALK (GREEN). KENT'S PRINCIPAL WATER RESOURCE, PROVIDING 70% OF THE COUNTY'S DOMESTIC AND COMMERCIAL SUPPLY (90% FOR DOVER) UNDERLAIN AT 300 – 400M BGL BY THE COAL MEASURES OF THE KENT COAL FIELD (THE PROSPECTIVE SOURCE OF SHALE GAS + COAL BED METHANE)

3. FIG 2. MAP OF APPLICATION SITES + PUBLIC SUPPLY BOREHOLES DRAWING ON THE CHALK GROUNDWATER.

NOTE:-

- WATER Co SUPPLY AREAS (PINK = AFFINITY, GREY = SEW, GREEN = SW)
- RED CIRCLES = PWS BOREHOLES
- BLACK CROSSES = APPLICATION SITES
- NOTE ALSO, CLOSE PROXIMITY OF EXPLORATORY SITES TO PWS BOREHOLES.
- MANY OF THESE COULD BE AT RISK OF CONTAMINATION BY INVASION OF TOXIC GASES AND FRACKING FLUIDS, **HOW?**

**4. FIG 3 BGS GEOL SECTION SW – NE
TILMANSTONE – WOODNESBOROUGH (DOVER SHEET 290)**

- NOTE CHALK STRATA OF N.DOWNS UNDERLAIN BY GAULT CLAY (BLUE) AND THE COAL MEASURES.
- NOTE FORMER EXPLORATORY BOREHOLES (NCB ETC)
- NOTE NUMEROUS FAULTS (PLANES OF STRUCTURAL WEAKNESS) WITH 30 – 40M DISPLACEMENT.

5. FIG 4 BOREHOLE SECTIONS. GUSTON, TILMANSTONE AND WOODNESBOROUGH.

SHOWS DETAILS OF CHALK AQUIFER AND UPPER COAL MEASURES

NOTE KENT LEVELS 1 – 14

1 TO 7 = UPPER (SANDSTONE) GROUP

7 TO 14 = LOWER (SHALE) GROUP:- THE FRACKING ZONE.

6. Fig 5 HIGH ANGLE FAULTS AND THE FRACKING ZONE.

- THE FRACKING PROCESS INVOLVES PUMPING LARGE VOLUMES OF WATER CONTAINING SAND + A MIXTURE OF (UP TO 200) CHEMICALS OF VARYING TOXICITY, UNDER HIGH PRESSURE DOWN DEEP BOREHOLES AND ALONG LATERAL EXTENSIONS INTO THE SHALE BEDS TO BREAK UP THE FORMATION AND RELEASE THE CONSTITUENT GASES (TYPICALLY METHANE).
- OUR CONCERN IS THAT THE IMPACT OF HIGH PRESSURE FLUID INJECTION COULD RE-ACTIVATE THE FAULTS AND CREATE NEW PATHWAYS FOR FLUID MIGRATION INTO THE OVERLYING CHALK AQUIFER WITH RESULTING CONTAMINATION OF THE GROUND WATER RESOURCE.

7. WHAT'S THE EVIDENCE ?

- NOTABLY WE HAVE THE BLACKPOOL EARTHQUAKES, FIRST RECORDED IN 2011 AND CONTINUING INTO SEPT OF THIS YEAR.

THESE WERE LINKED BY BGS TO LOCAL FRACKING OPERATIONS BY CUADRILLA, WHO EVENTUALLY "OWNED UP".

- ALSO, A LONG HISTORY OF METHANE CONTAMINATION OF DRINKING WATER ASSOCIATED WITH FRACKING OPERATIONS IN THE US.

TWO EXAMPLES:-

2004, UNION OF CONCERNED SCIENTISTS CITING INCIDENTS IN ALABAMA, COLORADO, NEW MEXICO VIRGINIA AND WYOMING HIGHLIGHTING EPA'S FAILURE TO PROTECT PUBLIC HEALTH

2011 S.G. OSBORN et al. DUKE UNIVERSITY DURHAM, N. CAROLINA. METHANE CONTAMINATION OF DRINKING WATER ASSOCIATED WITH GAS WELL DRILLING AND HYDRAULIC FRACTURING (DRAWING ON STUDIES IN PENNSYLVANIA AND NEW YORK)

- WE ALSO HAVE THE STUDIES BY PROF DAVID SMYTHE, FORMER CHAIR OF GEOPHYSICS AT GLASGOW UNIVERSITY; DRAWING ON DATA FROM UK AND EUROPEAN OPERATIONS.

HIS CONCLUSIONS WERE:-

"A LEAKY FAULT IS A FAST-TRACK TO THE CONTAMINATION OF SHALLOW GROUNDWATER BY SHALE GAS AND FRACKING FLUIDS"

- FRACKING IS NOW BANNED IN FRANCE AND GERMANY.

8. CONCLUSIONS.

- SHALE GAS RECOVERY IS A HIGH RISK OPERATION, WITH LASTING CONSEQUENCES FOR DOVER PWS CONSUMERS AND PUBLIC HEALTH THROUGHOUT THE WIDER E. KENT COMMUNITY. ALSO, IMPLICATIONS FOR PRIVATE WATER SUPPLIES AND IRRIGATION AS WELL AS THE LONG TERM IMPACT ON SOILS.
- ANY CONTAMINATION MUST BE REGARDED AS, FOR ALL PRACTICAL PURPOSES, IRREVERSIBLE.

- THERE ARE 25+ PWS BOREHOLES IN THE AREA OF SEARCH, AND THE LOSS OF JUST 2 OR 3 WOULD SIGNIFICANTLY DEplete PWS CAPACITY OF AFFINITY.
- AND EA HAVE ALREADY ASSESSED KENT'S WATER RESOURCES (NOV 2012) AS "SERIOUSLY STRESSED" THEREFORE INSUFFICIENT RESERVES REMAIN TO SUSTAIN THE VOLUMES REQUIRED FOR FRACKING OPERATIONS.
- EA AND KCC ARE NOW FINALISING A SPECIFICATION FOR THE PROPER CONDUCT OF DRILLING AND TESTING OPERATIONS ENVISAGED FOR THE EXPLORATORY PHASE. THIS INCLUDES MEASURES TO ENSURE ADEQUATE PROTECTION OF GROUNDWATER QUALITY AND COMPLIANCE WITH THE STATUTORY CONDITIONS GOVERNING WATER ABSTRACTION AND DISPOSAL.
IT IS CONSIDERED UNLIKELY THAT THE APPLICANTS WILL BE ABLE FULLY TO MEET ALL REQUIREMENTS. AND THERE ARE DOUBTS THAT THE REGULATORS WILL HAVE SUFFICIENT STAFF OR RESOURCES TO ENSURE COMPLIANCE.
- THE APPLICANT'S PRIMARY OBJECTIVE UNDER THE EXPLORATORY PHASE WILL BE TO IDENTIFY THE OPTIMUM DEPTHS (AND LIKELY YIELD) FOR SUBSEQUENT FRACKING OPERATIONS. IF THEREFORE, A CONCLUSIVE CASE CAN BE MADE AGAINST SHALE GAS EXTRACTION. NO PURPOSE WOULD BE SERVED BY AUTHORISING ANY EXPLORATORY DRILLING, WITH ALL SOCIAL AND ENVIRONMENTAL DISRUPTION (AND PUBLIC COSTS) THAT THIS WOULD ENTAIL.
- I WOULD SUGGEST THAT WE ALREADY HAVE THE BASIS FOR A CONCLUSIVE CASE AGAINST FRACKING AS A SIGNIFICANT THREAT TO THE INTEGRITY OF THIS UNIQUE AND INCREASINGLY VULNERABLE RESOURCE.

THANK YOU.
GDW. 3/11/2013.

East Kent Against Fracking

The impacts of unconventional gas extraction on the local economy and jobs

I am sure that those of you who are in favour of approving these applications take that position because you believe that they will lead to cheaper energy and more jobs. These are the key arguments of the industry and of our government and are seen to outweigh the risk to our water and the quality of life issues raised by industrialising our countryside.

First of all, I should like to outline the true picture of the position today in the USA, which is not quite the rosy picture painted by the industry.

Cheap Energy – the American Experience

In January 2012, the price of natural gas plunged to below \$2 per thousand cubic feet (mcf) due to overproduction by shale operators. Unfortunately, as with most aspects of unconventional shale production, this proved short-lived and was oversold. Electricity generation from natural gas began to fade only months after it had gained ground in much the same way that shale gas wells fade only months after initial production. As gas prices moved up to trade between \$3.50 and \$4 per mcf, utilities promptly began switching back to using coal for generation.

During the first half of 2013 the price of natural gas delivered to electricity generators averaged \$4.46 per mcf, 44% higher than in the same period last year.

Industry and its proponents, including such entities as the *Wall Street Journal*, have made extravagant comments about natural gas providing “benefits to the poor”, particularly with respect to lower electricity costs for the consumer well into the future. Such benefits are already evaporating.

Secondly, but most importantly, we can now safely assume that natural gas is priced out of the market for electricity generation; it is somewhere between \$3.50 and \$4 per mcf. This produces an enormous difficulty for natural gas producers in that the break-even costs of unconventional shale wells are considerably higher, with the average amounting to around \$6/mcf. Exportation of shale gas will drive these prices higher still, creating an unfavourable climate for natural gas as a primary source of electricity generation.

The financial analyst Rogers¹ warns that the interplay of geological constraints and financial exuberance are creating an unsustainable bubble. Her report shows that shale oil and gas reserves have been “overestimated by a minimum of 100% and by as

¹ <http://energypolicyforum.org/portfolio/deborah-rogers-in-londons-guardian/>

much as 400-500% by operators according to actual well production data filed in various states... Deliberate overproduction drove gas prices down so that Wall Street could maximise profits “from mergers & acquisitions and other transactional fees”, as well as from share prices. Meanwhile, the industry must still service high levels of debt due to excessive borrowing justified by overinflated projections.

With the addition of our proximity to EU markets, plus the higher cost of production here if regulation is to make it safe, do you really still believe the myth of cheap energy?

Job Creation – the American Experience

Much has been claimed by the oil and gas industry with regard to job creation from shale development. In the USA it has been stated repeatedly that as many as 600,000 jobs will be generated by shale production. But these numbers are based on economic models which, when assessed, were found to include jobs such as strippers and prostitutes in the mix. Arguably this is job creation, just not the sort that most Americans would prefer to acknowledge.

Unemployment is growing in Pennsylvania in spite of its self-proclaimed “booming” Marcellus shale production. The oil and gas industry has shouted from the roof tops for quite some time about the “shale revolution” and its supposed long-term economic benefits. But those benefits seem to be confined to the few, such as one of the biggest players in the business who boasts: “I can assure you that buying leases for x and selling them for 5x or 10x is a lot more profitable than trying to produce gas at \$5 or \$6 per thousand cubic feet.”

Meanwhile, small business owners are the ones who have been impoverished. They are the ones whose businesses have failed and faltered and struggled. They are also the largest provider of net new jobs in the USA, in spite of all the oil and gas industry’s rhetoric. Independent analyses of shale plays throughout the country confirm that wells are short-lived and reserves not as great as industry promises. In addition, communities where drilling has occurred are now dealing with the expensive aftermath. The drilling companies have offloaded that significant burden onto the taxpayers and local businesses. This is true of the oil and gas industry as a whole. In fact, economists estimate that if all the external costs of oil and gas were included, gasoline would cost in excess of \$12 per gallon.

What are these costs? Firstly, water must be provided for communities where it has been contaminated. Secondly, there are rising health care costs to pay for those suffering from the effects of fracking, everything from skin rashes to respiratory problems and cancer. And last but not least for district councillors are the costs of repairing roads damaged by the constant stream of heavy goods vehicles to and from fracking sites. Some roads require annual maintenance at \$70,000-80,000 per mile. However, other roads need basic reconstruction at a cost of up to \$920,000 per mile.

The Scenario Locally

So let's look at the issues in our local context. First of all, jobs. The extraction of unconventional gas is not a labour-intensive industry. You will note on the planning applications that they require only 2-3 cars per shift. The normal practice in this industry is to bring in existing staff or experienced contractors for skilled posts such as engineers; companies will not recruit locally for these positions. There may be some work available on and between sites, but this will be unskilled, insecure and potentially hazardous (operatives are not given details of the toxic substances which they handle).

However, the real worry is the likely impact on existing jobs. How will these proposed developments affect the various sectors that at present provide jobs in Dover District? First of all, *The Economic Impact of Tourism in 2011*, commissioned by Dover District Council and Visit Kent, found that tourism was worth £243,590,000 to the district in 2011 – up 16% on 2009 – and employment supported by tourism was up by 3%. So local tourism is an existing, growing industry. What impact could be made on these positive figures by even a year's worth of unsightly, traffic-heavy drilling, with the associated reputational cost to Kent's natural beauty? The world-famous Church of St Nicholas at Barfreston is not two miles from the proposed drilling site at Tilmanstone. Then consider the effects of the hundreds of wells that would have to be drilled to make the project economically viable. How much of our lovely countryside would be left? And who would want to visit our district any more?

While the three exploratory sites under consideration and the one already approved might not represent a large take of agricultural land, should these tests prove successful and Coastal Oil and Gas Ltd proceed to production, then there would be a considerable loss of agricultural land and the jobs attached to it. And the damage would not stop there: all adjacent land and what it produces could also be blighted by public perception that the food produced might be contaminated. Consider a business like Tilmanstone Salads, which supplies fresh, locally grown produce to Marks & Spencers: how would their trade be affected? Not only would they be worried about consumer perception of their product, but also about the speedy delivery essential to them. With the huge increase in HGV traffic in the area and the congestion caused by regular demonstrations, their delivery trucks would face unacceptable delays. In their position I would already be considering relocation . . . and they employ over 800 people.

Of course the other major employer is Dover Harbour with its associated freight trade, as well as private passengers and the cruise liners. How will the big increase in traffic impact on them? With the very narrow lanes which will have to be negotiated to reach Guston and the possibility of HGVs causing gridlock on those roads, with traffic backed up to the routes out of Dover, who would not consider another route for their journeys to the continent?

Our local economy is also boosted by the large number of second home owners and retirement households. But who would choose to come and live inside an industrial

complex? I am sure there are many other businesses whose prospects will not be improved by the coming of this industry to the district. The realistic prospects are for an enormous net loss of jobs.

At the same time, we need to consider all the other costs to our local economy that such an industry will bring with it.

I have already referred to the damage to roads, and possible health care costs. Other costs to the taxpayer could include the costs of processing such controversial applications to local government, the costs of policing such unpopular developments which will inevitably draw demonstrations, the cost of implementing the regulation and ongoing monitoring of what is a potentially dangerous operation, and finally the costs of any clean-up in the event of a catastrophe, and/or the probable bankruptcy of the firm involved. You may not be aware that the total assets of Coastal Oil and Gas declared in October 2012 amounted to only £1,000. So potentially enormous costs will devolve onto the taxpayer. We should also consider the costs to residents of increased insurance payments and the loss of value to their property.

Many people I know are saying: "Let them get on and test, because we don't think they will find economically viable methane." But we must be aware that companies will want to test the shale below the coal bed. Having expended so much, they will not want to give up. There is also the fact that once those applications are passed, it will be much more difficult to refuse later ones. If the company receives permission for three more exploratory boreholes on top of the one it already has, drilling will be going on within the District for more than a year. The whole area will be blighted, incoming business will falter, and heaven help you if you need to sell your house or business during that year.

Furthermore, should these trials lead on to production, any employment created by the industry would be vastly outweighed by the likely number of existing and future jobs and small business livelihoods which would be lost in the tourism and agriculture sectors. Even if no accidents, leaks or other problems occurred (statistically almost impossible, given the number of wells contemplated) the effect upon our unspoilt countryside, which can sustain world-class tourism and high-quality food production would be disastrous. As an industrial zone, with ravaged landscapes, thousands of daily HGV vehicle journeys and the diversion of millions of gallons of water, both the perception and the reality of the area would be drastically and irrevocably changed.

Sources

Osborn et al. (2011) *Methane Contamination of drinking water accompanying gas--well drilling and hydraulic fracturing.*

Bamberger, M. & Oswald, R. E. (2012) *Impacts of Gas Drilling on Human and Animal Health.*

Brundage. et al. (2011). *Pennsylvania Marcellus Shale Workforce Needs Assessment*

Barth (2011) *Hydrofracking offers short--term boom, long--term bust*

Deutsche Bank (2011) *European Gas: A First Look At EU Shale--Gas Prospects*

Goldenberg (11 August 2013) *A Texan tragedy: ample oil, no water*

Food & Water Watch (2012) *Fracking and the food system*

Osborn et al. (2011) *Methane Contamination of drinking water accompanying gas--well drilling and hydraulic fracturing.*

Tom Brown, Senior Credit Executive, Norddeutsche Landesbank, London EC2 UK (quoted in *Financial Times*)

The Economic Impacts of Developing CSG in North West NSW The Australian Institute

Deborah Rogers Energy Policy Forum

Keep Shepherds Well

**Address to Dover District Council Scrutiny committee on the subject of Fracking,
November 11, 2013**

Introduction: My name is Pamela Mudge-Wood. I have lived in East Kent for 30 years; 25 years in Canterbury and 5 years in Shepherds Well. Originally from America, I am married to Kevin Mudge-Wood, the son of a Kent miner, raised in Snowdown; he is an Old Pharosian and has worked for 20 years as a production editor on Kent's local newspapers. With a PGCE from Christ Church University, I have taught music and English in Kent schools since 1993.

I say all this to show that, contrary to the popular image of anti-fracking campaigners as rent-a-mob ideologues drifting from benefit offices to protest camps, neither I nor my fellow Keep Shepherds Well colleagues speaking tonight are 'professional protesters'. We are hard-working, tax-paying residents of a village and district directly threatened by the government-backed encroachment of a polluting industrial practice upon and underneath our locality.

We are standing up alongside our neighbours to protect ourselves from the deteriorating effects on the landscape, local economy, public health, social cohesion and political integrity that fracking and related drilling practices have brought to many parts of the US over the past decade, including the area where I grew up, on the banks of the Delaware River in the Catskill Mountains; on the border between New York and Pennsylvania; above the Marcellus Shale.

I first encountered the gas drilling industry on an extended visit to my parents in 2007, as I witnessed a gas pipeline cutting 100 foot-wide scars along hundreds of miles of the gently forested and rural landscape of the Catskill foothills. This was before I had ever heard of fracking, or coal bed methane extraction, or coal gasification, or any of the other extreme forms of fossil fuel extraction currently being sold to the UK public as the magic formula that has brought Americans cheaper gas bills, skilled jobs, and clean, safe energy.

Argument:

Having watched the development of the fracking boom in my home area from the safe distance across the Atlantic over the past 5 years, I have become thoroughly convinced that all of these

unconventional extraction practices are to be opposed on principle, not just as a localised or NIMBY issue, for the following reasons:

- They have the potential to cause air and water pollution with catastrophic consequences, and cannot be made entirely risk-free even if regulation and monitoring of industrial practices are of the highest standard. All cement casing deteriorate eventually.
- The US government has reduced standards of monitoring and regulation by excluding these practices from the jurisdiction of federal environmental protection legislation, (the Halliburton loophole) thus leaving the states and local authorities to take up the responsibility for regulating, monitoring and dealing with accidents; and
- The UK government is giving every indication that it intends to follow the same agenda:
 - by cutting Environment Agency budgets further and faster than expected,
 - by putting political pressure on local authorities to permit drilling applications,
 - by pledging de-regulation, while at the same time promising that accidents that have happened abroad could never happen in our highly regulated industrial scenario; and
 - by appointing gas industry moguls to cabinet posts, including Lord John Browne, former CEO of BP, who while in office has made extensive use of his power to appoint non-executive members of his choice to government departments concerned with regulating the oil and gas industry. (1)

We have heard much eyewash from central government and the energy companies about how utterly risk-free these drilling practices are. Only this Saturday, Business and Energy minister Michael Fallon was again assuring us in the Daily Telegraph (2) that the Water UK study into the dangers of fracking, as yet unpublished, **will show** that fracking is “largely safe” (but it’s the small, unsafe bit we’re concerned about!) and **will show** that there is “no risk” of contamination of water supplies. We must ask (a) how can he know what the report will say before it is published, and (b) how can we believe that anything can be as risk-free as they repeatedly claim, especially when (c) our government is working so hard to increase the risk through de-regulation; as Fallon boasts later in the article, “ministers have reduced the regulatory barriers to fracking, clearing the way for the industry to spread across the country.”

This relentlessly positive slant on the risk-free benefits of fracking strains the credulity of the famously sceptical British public and so weakens the government's Dash for Gas.

Conflict of interest in the highest offices of state, rampant de-regulation, exemption from environmental protection legislation, dismissal of risk, denial of alleged harm, disparagement of dissent and legal gagging of dissenters; these are all hallmarks of the political climate which has allowed fracking to spread unrestricted across rural America over the past decade. This laissez-faire approach enabled fracking companies to go from a small handful of vertical test bores in Western Pennsylvania in 2007 to over 3,000 wells, about half of which are now horizontal fracking wells, spreading like a fungus across the once-rural landscape of Northwestern Pennsylvania. (3)

In response to the repeated industry claim that there is no documented evidence of fracking ever causing harm, may I direct you to the Pennsylvania Alliance for Clean Water and Air's "List of the Harmed". (4) an online list of now approaching 1800 cases of harm to individuals' health and homes caused by gas drilling, ranging from nosebleeds and cracks in walls to cancer and sudden death. Each entry includes direct online links to media reports, photos and films of the people concerned; I have included one such media report here (5). So how does the industry maintain this stance of blanket denial of harm? Proof of contamination is hidden from public view by the industry-wide practice of settling out of court and imposing non-disclosure agreements, once the harmed individuals have themselves paid for environmental testing to prove contamination. Big oil and gas companies have big pockets to pay for big lawyers, and individuals impoverished by legal fees, deteriorating health and plummeting property values eventually must give up the fight and agree to remain silent, or face further penury, often alongside public disparagement. (6) For further development and evidence of the political climate in which fracking has flourished in the US, please refer to Sourcewatch.Org (7) <http://www.sourcewatch.org/index.php/Fracking> Also watch Gasland I and II <http://gaslandmovie.co.uk/>

Conclusion:

We are aware that there is a public order concern in East Kent around the anti-fracking movement, and my aim here has been to inform you of the political paradigm under which the fracking debate has developed and is developing. What is happening in East Kent has

happened before in many other places in the US. EKAF and Keep Shepherds Well have not brought the threat of public protest to our area; no more than the residents of Balcombe started direct action on a whim, to follow some environmental bandwagon in August. By allowing Cuadrilla unchecked permission to drill in their village, over the heads and literally under the feet of the residents, Balcombe Parish Council and East Sussex County Council themselves brought the prospect of public protest to their doorstep. And without the concerted intervention on our own behalf of local residents of Shepherds Well and East Kent, Coastal Oil and Gas were undoubtedly hoping to push their borehole plans through unnoticed and unopposed as well.

We are grateful that the Parish Councils of the four villages most directly affected have voted over-whelmingly to reject the test bore applications, we are grateful that Dover District Council has undertaken the task of scrutinising the potential effects of fracking and related practices on our locality, and we are very glad that as a result of public opposition through the democratic process and material concerns raised by the Environment Agency about the safety of East Kent's water supply, we have, for now, escaped the fate of Balcombe as well as those of Dimock, PA, Pavillion, WY and Dish TX. (see Gasland I and II) We should be wary though, of Michael Fallon's warning/threat in The Telegraph this weekend: "Households right across the South should prepare for gas fracking to begin in their areas, a senior minister warns." (2)

(1) <http://frack-off.org.uk/the-fracking-czar-lord-john-browne/>

(2) <http://www.telegraph.co.uk/earth/energy/fracking/10437394/Fracking-is-safe...-and-its-coming-soon.html>

(3) www.eia.gov/todayinenergy/detail.cfm?id+6390

(4) <http://www.pennsylvaniaallianceforcleanwaterandair.wordpress.com/the-list/>

(5)

[http://www.alternet.org/story/150527/%22they are afraid their house could blow up%22 %3A meet the families whose lives have been ruined by gas drilling %5Bphotos by award-winning photographer nina berman%5D](http://www.alternet.org/story/150527/%22they%20are%20afraid%20their%20house%20could%20blow%20up%22%3A%20meet%20the%20families%20whose%20lives%20have%20been%20ruined%20by%20gas%20drilling%5Bphotos%20by%20award-winning%20photographer%20nina%20berman%5D)

(6) Cycle of fracking denial, Earthworks, handout

(7) <http://www.sourcewatch.org/index.php/Fracking>

(8) <http://gaslandmovie.co.uk/>

Keep Shepherds Well

www.KeepShepherdsWell.org

c/o 42 Saint Andrews Gardens
Shepherds Well
Dover, CT 15 7LP

10 November 2013

Mr M Clifton
Planning Applications Unit
Invicta House
Maidstone
ME14 1XX

Dear Mr Clifton

**Planning Application DOV/13/0074 (KCC/DO/0218/2013)
Land off un-named road, South West of Puckland Wood, Shepherds Well, CT15 7PZ**

The organisers of 'Keep Shepherds Well', a campaign group established by Shepherds Well residents, wish to object to the above planning application.

The Kent Minerals Plan states in OG2 that the Planning Authority has to be satisfied that the proposed site has been selected to "minimise its environmental and natural resource impact". OG8 goes on to state that Planning Authority "will be required to be satisfied that the earth sciences and ecological interests of the site and its surroundingshave been established". The National Planning Policy Framework para 109 states that 'the planning system should contribute to the natural and local environment' by 'preventing new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air water or noise pollution'.

We do not see how KCC can possibly consider this application as meeting these requirements.

We have carefully read the Environment Agency's advice (ref. KT/2013/117018/01-L01) and the 17 items of further information it requires from the applicant. We have also noted the concerns of the Kent Wildlife Trust's letter (Ref 315420/KN) and the objections by Shepherds Well and Coldred Parish Council. We add our support to the points made by these organisations.

Our concerns cover the environment, including the impact on the aquifer and wildlife, access to the site, noise pollution and impact on general amenities. We are also concerned at the general lack of 'knowledge and awareness' about potential risks displayed in the application by Coastal Oil and Gas (COG).

1. The aquifer and our water supply

The application makes no attempt to address concerns about the effect on the environment, especially potential contamination of the chalk aquifer. Its failure even to acknowledge the fact that Shepherds Well is located in a protected area of the aquifer suggests that COG is unaware of the issues involved. It would be very difficult if not impossible to put in place safeguards to guarantee protection of the aquifer but the applicants show little understanding that this is even

necessary. As the Environment Agency (EA) points out, groundwater flow can be rapid and reach the aquifer, boreholes and surface water very quickly.

COG gives no details about how it would capture, store or remove contaminated water from the drilling process. It does not detail what chemicals would be used and whether they are appropriate to this onshore area.

Not only will waste water contain chemical contaminants, it may also be affected by the presence of Radon and arrangements for disposal are not set out in the application. The Indicative Atlas of Radon in England and Wales (p. 15) identifies the area in which the proposed borehole is located as having 5 to 10 per cent of dwellings 'at or above the action level'.

The area is also one of seismic activity. This issue has also not been addressed by COG. According to the British Geographical Survey, the April 2007 activity at Folkestone was measured at an intensity of 5 on European macroseismic scale. In April and May 2011, tremors in Lancashire measured at 1 and 2.3 on the macroseismic scale. They nevertheless resulted in an annulus becoming twisted on the Caudrilla site. An earthquake in East Kent, whether occurring naturally or induced could rupture the borehole linings and seals, potentially contaminating the aquifer. A review by independent experts, *Preese Hall Shale Gas Fracturing Review & Recommendations for Induced Seismic Mitigation*, stated that the seismic activity in Blackpool 'was induced by the hydraulic fracture treatment'. Noting the lack of research into the industry, the authors were not convinced by Caudrilla's projected low probability of further earthquakes during future treatments.

The application would involve large amounts of water but this has not been quantified, nor are details given of how it would be sourced.

2. General environment/wildlife

The aquifer also feeds into rivers and other important features of the landscape and ecology which may be affected by contamination.

The site is adjacent to Puckland Wood, which, according to the Kent Landscape Information System, is the largest wood designated as ancient woodland in Shepherdsweil and Coldred Parish and Dover District and an acknowledged Local Wildlife Site (LWS – DO36). Westcourt Lane also has wayside nature reserves managed by Kent Wildlife Trust. The proposed site is two kilometres from the Lydden National Nature Reserve (NNR), which is designated as a Site of Special Scientific Interest. The applicant sees fit to acknowledge 'the proximity of the racing circuit used by cars and motorbikes' but fails to acknowledge any of the above.

COG's 'ecological walkover survey' attached to the application was carried out in February. It states that 'no badgers, bats or barn owls were present'. Yet villagers often see badgers at night in the road next to the site. Bats and owls also hunt the area at night, especially the leafed tunnel that has formed over the road that will be the access to the site. (See below). The woods and adjacent fields are rich in birds, such as buzzards, kestrels, owls, pheasants, partridge and song birds.

We are very concerned to protect this habitat and wild life from noise and light pollution which will result from the 24hr drilling operations. We are alarmed that Coastal Oil and Gas fail to recognise the local ecology and give no detail about how it would be protected.

3. Traffic and access

The access road to the proposed site is single track and unsuitable for drilling rig and associated equipment access.

The field entrance COG intends to use will not allow access to plant and heavy vehicles without destroying some of the natural hedgerows and trees. A significant length of the lane intended

as access is a natural tunnel of trees, which adds to the natural beauty of the area. The movement of plant up and down this road will destroy this.

Emergency access to and from the proposed site is severely restricted by the closure of the central reserve at the Barfreston junction on the A2. Emergency vehicles coming from the Dover direction have to travel to the Wingham junction before retracing their journey. Vehicles leaving the site travelling towards Canterbury would have to travel to the Shepherdswell junction before taking the Canterbury direction.

The lanes through the village are not suitable for site traffic and should not be used in any way. There is already considerable concern and inconvenience within the village because of the use of these lanes by HGVs.

4. Noise and pollution

The noise level assessment included in the application was based and modelled on out of date information. The same criteria were used to assess the noise levels at the test drilling site in Balcombe, and decibel levels were frequently exceeded, leading to a suspension of drilling. The noise report does not address the problem of continuous low frequency noise, which can be equally disruptive to residents. Low noise also poses a risk to public health (see Colin H. Hansen (ed), *The Effects of Low-Frequency Noise and Vibration on People*, 2007).

COG assumes that the risk of vibration is low because it will be drilling through soft materials. However, chalk is not considered to be in this category and therefore the company's reassurances are based on faulty information.

The application does not address emissions from the site; both for construction and methane. It does not mention whether any methane flaring will take place at the exploratory stage.

The prevailing wind in our area is from the South West and will carry noise to the village and cause noxious emissions to be deposited over the village, which lies in a valley and on a ridge to the North East of the site. We would have expected the Health Protection Agency to be consulted concerning the likely impact of this application on the health of local residents. We would also have expected a review of existing research and the commissioning of further studies where there was a lack of relevant knowledge. Research findings should be made available to residents as part of the consultation process.

5. General amenities and heritage

The site threatens to severely damage the tourist industry, which is worth an estimated £243 million to the Dover and District economy. Plans to regenerate Dover town centre and areas of the sea front, and improved marketing of the area, aim to attract more tourists. But they will be jeopardised if the environment is trashed by a polluting industry.

We are concerned that the responsibility for land restoration is unclear. The details given in application are insufficient. Companies in this industry have a reputation for attempting to avoid their responsibilities. For example, Cuadrilla is involved in a legal battle to avoid cleaning up post-operation pollution following open cast mining in Scotland.

Two national recreational routes go through Shepherdswell and both are threatened by this development. The first is National Cycle Route 16, which has attracted a marked increase in use by cyclists since last year's Olympics. National Cycle Routes are defined as 'a series of safe, traffic-free lanes and quiet on-road routes' (Sustrans). Yet the applicant proposes to use a half-mile section of Cycle Route 16 as an access route for its Guston site. The presence of heavy site traffic threatens the amenity value and safety of this route.

The North Downs Way also passes through the centre of Shepherdswell and is popular with recreational walkers and tourists. The applicant's proposed access route to the Guston site dissects the North Downs Way.

The applicant fails to acknowledge the existence of these two amenities. They are important for local people and for those from wider afield, contribute to the local economy and should be protected.

The proposed site would also undermine the local footpaths neighbouring the site, which are used by local people.

6. Reporting and regulation

It is documented that COG had discussions with EA, KCC and other interested parties before submitting their application. Yet the EA comments that COG has submitted completely inadequate information. The company, says the EA, shows lack of 'awareness and knowledge' of the risks it is meant to address. We would ask how much confidence this gives KCC that this company is managed and equipped in a way that can safely monitor the environmental and health risk of its activities should the application be granted.

We are concerned about the whole issue of monitoring and self regulation in relation to this industry. Regulations are not 'red tape' but in place to protect our drinking water, safety, health, quality of life and our local and general environment.

We are very concerned that the EA generally, because of workloads and staffing issues, relies on operators to self-report problems. The EA is now facing staff cuts of 15% by October 2014. We tremble at the prospect of COG self-reporting given the inadequacy of their 'awareness and knowledge'. We wonder how the EA with its wide ranging responsibilities and fewer staff are going to monitor them. Without proper monitoring and inspections, regulations are insufficient protection.

7. Consultation

There was no discussion between COG and the local community prior to the submission of the planning application. The presence of the company's geologist at the first Parish Council meeting to discuss the application was hardly reassuring. He appeared unaware of environmental or social issues which might apply and was also unforthcoming on geological details in response to concerns that were raised by residents.

Considering the controversial nature of the planning application and the potential impact on residents' health and quality of life, we would anticipate that, should COG supply further information in relation to its application, residents will be informed at the earliest opportunity and given appropriate and adequate time to research and consider a response.

Yours sincerely,

John Bulaitis
Claudine Nutley
Eddie Higham
Dick Martin
Paul Beamont
Julie Williams
Alan Williams
Steve Gaymer
Linda M Gaymer
Pamela Mudge-Wood
Margaret Creear

(signatures over page)

Notes for the Parish Council
Planning Application DOV/13/0074 (KCC/DO/0218/2013)

The Planning Application does not involve either fracking or horizontal drilling, and therefore should stand alone as an application to sink an exploratory borehole. However care should be taken that should permission be given this will not automatically give the right to extend the consent for further investigation including **fracking or horizontal drilling**.

Therefore consideration on this planning application should only consider those issues concerning an exploratory borehole.

- The Kent Minerals Plan states in OG2 the Planning Authority has to be satisfied that the proposed site has been selected to “**minimise its environmental and natural resource impact**”
- The Kent Minerals Plan goes on to state in OG8 that the Planning Authority “**will be required to be satisfied that the earth sciences and ecological interests of the site and its surroundingshave been established**”

These criteria have not been met by this application as it does not attempt to minimise the adverse effect on the environment and amenity issues.

Therefore, this application should be refused on the following grounds:-

- The site is in an area where protection to the chalk aquifer is enshrined in the Dover District Council’s planning policy. This area is an extremely important water resource in an area of stressed water supply and any pollution would have a serious effect on the residents of Shepherdsweil and East Kent.

Whatever safeguards are put into place would not guarantee 100% the protection of this resource.

The detail given in the application is woefully short of detail as to the protection envisaged.

There is no reference regarding the acceptance by the Water Authorities (Affinity and Southern South East Water) of the works to maintain the integrity of the aquifers following a borehole drilled through them.

The expected section does not detail the Wealden clay that lies between the chalk and Jurassic beds and effectively maintains the aquifer, thus the application gives no details as how the various tubes are sealed at this level.

There are insufficient details of the hardstanding to ensure no contamination will occur.

There are many known cases of the well heads of the proposed design cracking causing loss of fluid into the ground and thereby causing contamination.

- The site is adjacent to an area of Outstanding Natural Beauty
- The site abuts Puckland wood, the largest wood designated as ancient woodland in Shepherdswell and Coldred Parish and Dover District.

The ecology report attached to the application was carried out in February and stated that there was no evidence of badgers in the area or birds. This is blatantly wrong.

Badgers are often seen at night in the road adjacent to the site, in fact one was recently a victim of road kill adjacent to the proposed site.

The woods and adjacent fields are rich in birds, such as Buzzards, Kestrels, Owls, Pheasants, Partridge and song birds.

Bats and Owls hunt the area at night especially the natural leafed tunnel that has formed over the road that will be the access to the site.

The application does not even acknowledge that the adjacent woodland is Ancient Woodland, never mind demonstrated sufficient mitigation to protect this habitat from noise and light pollution which will result from the 24hr drilling operations.

- Roads to the north and east of the proposed site are single track and unsuitable for drilling rig and associated equipment access.

The existing field entrance the applicant intends to use is angled to the north east and will not, in its current form, allow access from the A2 direction for the proposed plant without destroying some of the natural hedgerows and trees. Further a good length of the lane intended as access is a natural tunnel of trees, which adds to the natural beauty of the area (see the point above). The movement of plant up and down this road will destroy this.

- Emergency access to the proposed site is severely restricted by the closure of the central reserve at the Barfreston junction on the A2. This will require emergency vehicles to either travel to the Wingham junction to access the site from Dover or to the traffic light junction at the Shepherdswell junction in order to return in the Canterbury direction. The lanes through the village are not suitable and should not be used in any way.

- There has been no discussion between the applicant and the local community prior to the submission of the planning application, which is contrary to the guidance for onshore oil and gas issued by DCLG.

- There appears to be no advice from the HSE or the EA on the issues of well design and integrity, operation of surface equipment to prevent

contamination, flaring and venting, disposal of water, decommissioning and abandonment, before the application, all in accordance with the DCLG guidance. KCC need to **satisfy themselves** that all these issues can be adequately addressed by taking advice from these regulatory authorities before they grant planning consent.

- The noise level assessment that was included in the application was based and modelled on out of date information. The same criteria were used to assess the noise levels at Balcombe, and these levels were frequently exceeded. The prevailing wind will further exacerbate the situation with the village lying in a valley WSW of the proposed site. The noise report does not address low continuous noise which can equally disruptive to residents.
- The application has not addressed emissions from the site; both for construction and methane (if they do in fact find any), this prevailing wind will cause all noxious emissions to be deposited over the village.
- The area is one of seismic activity and this has not been addressed by the applicant. There are numerous faults within the area and any movement of these could easily rupture the borehole linings and seals, thereby causing potential contamination of the Aquifer.
- The British Research Establishment report on Radon Gas, No211, identifies the area in which the proposed borehole is located as having 5-10% of dwellings where action against radon gas emissions has been required. There is no mention in the Applicant's documents as to what precautions will be taken to deal with possibility of encountering radon gas.
- The applicant has not demonstrated that the site chosen has no alternative for the proposed borehole.

Alternative sites within the vicinity may exist where disruption to the countryside caused by drilling operations could be minimised, **although the integrity of the aquifers would still remain suspect**. These should have been investigated by the Applicant, in order to satisfy the requirements of the Kent Minerals Plan and the provisions of policy OG2 in particular.

Geoff Peagram/Peter Stebbings

